

# Vegetation Classification of Alliances and Associations in Marin County, California

## Appendix D

### Vegetation Descriptions

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## TREE-OVERSTORY VEGETATION

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### *Acer macrophyllum* – *Alnus rubra* Forest & Woodland Alliance

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**Common Name:** Bigleaf maple – Red alder forest and woodland

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

#### **Statewide Description**

*Acer macrophyllum* and/or *Alnus rubra* is dominant or co-dominant in the tree canopy with *Abies concolor*, *Abies grandis*, *Alnus rhombifolia*, *Calocedrus decurrens*, *Cornus nuttallii*, *Picea sitchensis*, *Populus trichocarpa*, *Pseudotsuga menziesii*, *Quercus* spp., *Salix* spp., *Sequoia sempervirens*, *Taxus brevifolia*, *Tsuga heterophylla*, and *Umbellularia californica*.

This alliance occurs in habitats with different moisture regimes from moist stream terraces to dry talus, but it attains its best development on deep alluvial soils. 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). Stands of *Alnus rubra* were much more restricted in the past, occurring chiefly along streams or natural landslides; today seedlings and stands easily establish in upland areas that have been recently logged (Sawyer 2006). The best developed stands are scattered along alluvial river terraces, in adjacent side drainages, and at springs along slopes. *Acer macrophyllum* is extremely flood tolerant; it is the only hardwood encountered commonly in low elevation in Pacific Northwest coniferous forests in both steep upland slopes and riparian habitats. At the southern portion of its range, in southern and central California, it is usually riparian (Minore and Zasada 1990, Uchytel 1989a).

We are including two different environmental settings in this alliance at this time. Stands surrounded by coastal forests in northwestern or central California contain a scattering of tall conifers, such as *Picea sitchensis*, *Pseudotsuga menziesii*, or *Sequoia sempervirens* (Sawyer 2006). Stands in the mountains,

which are scattered, may contain *Pseudotsuga menziesii* as a co-dominant. Other California authors (Chambers 2003, Fites 1993, Jimerson et al. 1996) have placed their mixed associations in the *Pseudotsuga menziesii* or other conifer alliances; however, we place them in the *Acer macrophyllum* – *Alnus rubra* alliance, because this riparian species is a primary indicator and co-dominant in these associations. We have combined two previously separate alliances, the *Acer macrophyllum* and *Alnus rubra* alliances as recognized in the 2009 book, *A Manual of California Vegetation, second edition*, based on the NVC combining riparian associations of *Alnus rubra* and *Acer macrophyllum* into a merged alliance. However, the NVC is considering an even broader merge of riparian types including *Fraxinus latifolia*. We await further analysis before making additional changes.

### **Local Vegetation Description**

The Bigleaf maple – Red alder forest and woodland Alliance forms an open to continuous tree canopy with a sparse to continuous shrub understory. The dominant tree is *Alnus rubra* are characteristic or often present. Commonly associated shrubs include *Rubus ursinus* and *Sambucus racemosa*, and commonly associated herbs include *Stachys ajugoides* and *Urtica dioica*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	1.0	0 – 26	18.6	2 – 100
Hardwood	45.3	0 – 100	11.9	2 – 35
Regenerating or Shrubby Tree	0.5	0 – 14.0	3.9	1 – 10
Shrub	26.8	0.2 – 95.0	2.7	0 – 5
Herb	39.1	3 – 95	0.5	0 – 5

### **Local Membership Rule**

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

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

### **Local Environmental Description**

**Elevation:** Mean 94 m, Range 2 – 589 m

**Aspect:** NE (9), Variable (8), NW (4), SE (3), Flat (2), SW (1)

**Slope:** Mean 20 degrees, Range 0 – 65 degrees

**Macro Topography:** Bottom (9), Lower 1/3 of slope (9), Draw (3), Middle 1/3 of slope (3), Wash (channel bed) (2), Terrace (former shoreline or floodplain) (2)

**Large Rock:** Mean 6.3%, Range 0 – 33.0%

**Fines Cover:** Mean 19.0%, Range 0 – 81.0%

**Small Rock:** Mean 8.6%, Range 0 – 45.0%

**Litter Cover:** Mean 48.0%, Range 4 – 95%

**Soil Texture (field assessed):** Moderately coarse, sandy loam (6), Moderately fine sandy clay loam (5), Moderately fine clay loam (4), Medium to very fine, sandy loam (3), Coarse, loamy sand (2), Moderately fine silty clay loam (2), Medium silt (1), Medium sand (1), Medium loam (1), Fine clay (1), Medium to very fine, loamy sand (1)

**Geology (field or map data):** Sandstone and other sedimentary (27), Franciscan melange (18), Granitic (17), Alluvium (8), Granitic (generic) (3), Shale (2), Ultramafic rocks, mostly serpentine (1), Large landslides (1), Gravelly alluvium (1), Sandy alluvium (most alluvial fans and washes) (1)

**Marin County Watersheds:** Point Reyes (25), Lagunitas Creek (21), Inverness (13), Bolinas (10), San Rafael (7), Novato (2)

**Site Impacts**

This alliance has low non-native plant cover (average 6.8%) relative to native cover. Non-native species with highest frequency and abundance include *Conium maculatum* and *Holcus lanatus*.

**Associations in Marin County**

- Acer macrophyllum* / (*Rubus ursinus*)
- Alnus rubra* / *Rubus spectabilis* – *Sambucus racemosa*
- Alnus rubra* / *Salix lasiolepis* – *Rubus* spp.
- Umbellularia californica* – *Acer macrophyllum*
- Umbellularia californica* / *Rhododendron occidentale*

**Classification Comments**

We are now including riparian stands of *Umbellularia californica* in this broader alliance.

**References:** AECOM 2013, Jimerson 1993, Keeler-Wolf et al. 2003a, Klein et al. 2007, Klein et al. 2015

**Global Rarity Rank:** GNR                      **State Rarity Rank:** SNR

**Surveys Used for Description**

**Total: N=85; Marin County (n=85):** HYPM193, HYPM194, MARIN046, MARINSP03, MARINSP10, MMWD0156, MMWD0157, MMWD0162, MMWD0182, MMWD0185A, MMWD0188A, MMWD0191, MMWD0198, MMWD0244, MMWD0295A, MMWD0327, MMWD0332, MMWD0341, MMWD0409, MOSD0063, MOSD0064, MOSD0172, MOSD0174, PGA1101, PGA1179, PGA1188, PGA1191, PGA1266, PGA1335, PGA1375, PGA1476, PGA1499, PGA1507, PGA1507A, PGA1548, PGA2318, PGA2334, PGA25, PGA3557, PGA3560, PGA3608, PGA3632, PGA3678, PGA3850, PGA3865, PGA3885, PGA3893, PGA4049, PGA4485, PGA4697, PGA4706, PGA4970, PGA5258, PGA5315, PGA608, PGA609, PGA610, PGA612, PGA612A, PGA613, PGA617, PGA619, PGA623, PGA625, PGA6253, PGA629, PGA6335, PGA6352, PGA6385, PGA650, PGA7003, PGA7619, PGA7893, PGA7921, PGA7939, PGA8229, PGA8478, PGA8710, PORE009, PORE035, PORE064, PORE111, PORE112, PORE132, PORE204

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Tree	<i>Alnus rubra</i>	75	65.6	27.9	6.8	95.0	X	X		X
	<i>Umbellularia californica</i>	53	18.1	8.5	0.2	60.0				X
	<i>Acer macrophyllum</i>	26	5.6	2.9	2.0	30.0				
Shrub	<i>Rubus ursinus</i>	66	24.5	9.9	0.2	60.0				X
	<i>Sambucus racemosa</i>	42	15.2	6.4	0.2	60.0				
	<i>Toxicodendron diversilobum</i>	39	8.5	0.9	0.2	10.0				
	<i>Rubus spectabilis</i>	36	10.3	3.8	1.0	30.0				
	<i>Rubus parviflorus</i>	32	4.1	1.8	0.2	25.0				
	<i>Salix lasiolepis</i>	29	8.2	4.4	0.2	63.0				
Herb	<i>Stachys ajugoides</i>	55	10.3	2.6	0.2	35.0				X
	<i>Polystichum munitum</i>	47	12.0	2.8	0.2	45.0				
	<i>Urtica dioica</i>	41	9.5	2.8	0.2	25.0				
	<i>Athyrium filix-femina</i>	31	5.0	1.6	0.2	22.0				
	<i>Holcus lanatus</i>	22	3.4	1.2	0.2	30.0				
	<i>Conium maculatum</i>	22	2.6	1.0	0.2	15.0				

***Acer macrophyllum* / (*Rubus ursinus*) Association**

**Common Name:** Bigleaf Maple / (California blackberry) Woodland

**Alliance:** *Acer macrophyllum* – *Alnus rubra* Forest & Woodland Alliance

**Local Vegetation Description**

The Bigleaf Maple / (California blackberry) Association forms an open to continuous tree canopy with a sparse to open shrub understory. The dominant tree is *Acer macrophyllum* and those that are characteristic or often present include *Umbellularia californica* and *Pseudotsuga menziesii*. Regenerating or shrubby trees that are often present include *Acer macrophyllum*, *Pseudotsuga menziesii* and *Umbellularia californica*. Commonly associated shrubs include *Toxicodendron diversilobum* and commonly associated herbs include *Iris douglasiana* and *Polystichum munitum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	1.8	0 – 7	34	5 – 100
Hardwood	52	30 – 65	16	5 – 35
Regenerating or Shrubby Tree	3.9	0 – 23.4	5.1	2 – 15
Shrub	5.9	0 – 20	1.5	0.5 – 5
Herb	12.8	2 – 40	0.5	0 – 2

**Local Environmental Description**

**Elevation:** Mean 285 m, Range 60 – 629 m

**Aspect:** SW (3), NE (3), NW (2), Variable (2)

**Slope:** Mean 30 degrees, Range 4 – 65 degrees

**Macro Topography:** Lower 1/3 of slope (4), Middle 1/3 of slope (3), Bottom (1), Bottom to Lower 1/3 of slope (1), Upper 1/3 of slope (1)

**Large Rock:** Mean 7.1%, Range 0.2 – 18%

**Small Rock:** Mean 10.6%, Range 0.4 – 42%

**Fines Cover:** Mean 13.9%, Range 1 – 35%

**Litter Cover:** Mean 58.7%, Range 4 – 95%

**Soil Texture (field assessed):** Coarse, loamy sand (4), Moderately coarse, sandy loam (3), Moderately fine clay loam (1), Moderately fine silty clay loam (1)

**Geology (field or map data):** Franciscan melange (4), Sandy alluvium (most alluvial fans and washes) (1), Volcanic flow rocks (1), Sedimentary (type unknown) (1), Sandstone (1), Mixed alluvium (1), Sandstone and other sedimentary (1)

**Marin County Watersheds:** Lagunitas Creek (2), Novato (1), San Rafael (1)

**Other Watersheds, San Mateo Co.:** Ano Nuevo (1), Palo Alto (1); **Sonoma Co.:** Middle Russian River (2), Sonoma Creek (2)

**Site Impacts**

This association has low non-native plant cover (average 1.6%) relative to native cover. Non-native species that occur with highest frequency and abundance includes *Brachypodium distachyon*.

**Classification Comments**

The name of this association was previously *Acer macrophyllum* Association, which has been updated to match the National Vegetation Classification (NVC). Since the number of surveys of this association in Marin are low, data from nearby counties were included.



References: AECOM 2013, Klein et al. 2007, Klein et al. 2015

Global Rarity Rank: GNR

State Rarity Rank: SNR

State Rare: Y

**Surveys Used for Description**

Total: N=10; Marin County (n=4): MMWD0157, MMWD0182, MOSD0064, MOSD0172

San Mateo County (n=2): SMAT0285, SMAT0326

Sonoma County (n=4): SONO0192, SONO0335, SONO0689, SONO2024

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Acer macrophyllum</i>	100	57.0	32.2	20.0	55.0	X	X		X
	<i>Umbellularia californica</i>	90	16.4	9.0	3.0	19.0	X			X
	<i>Pseudotsuga menziesii</i>	50	2.4	1.5	0.2	7.0				X
	<i>Arbutus menziesii</i>	40	2.6	1.8	0.2	15.0				
	<i>Quercus agrifolia</i>	40	0.9	0.5	1.0	2.0				
	<i>Quercus chrysolepis</i>	30	6.5	3.5	0.2	20.0				
	<i>Notholithocarpus densiflorus</i>	30	1.6	1.1	0.2	6.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Acer macrophyllum</i> *	60	22.3	1.8	0.2	13.0				X
	<i>Umbellularia californica</i> *	50	19.8	1.3	0.2	8.0				X
	<i>Pseudotsuga menziesii</i> *	50	3.9	0.2	0.2	1.0				X
	<i>Notholithocarpus densiflorus</i> *	40	10.3	0.3	0.2	1.2				
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	90	33.8	1.1	0.2	5.0	X		X	X
	<i>Rubus ursinus</i>	30	12.1	1.7	0.2	15.0				
	<i>Heteromeles arbutifolia</i>	30	1.9	0.2	0.2	1.0				
	<i>Symphoricarpos mollis</i>	30	3.5	0.1	0.2	0.2				
<b>Herb</b>										
	<i>Polystichum munitum</i>	60	8.8	0.8	0.2	5.0				X
	<i>Iris douglasiana</i>	50	4.7	0.5	0.2	2.0				X
	<i>Dryopteris arguta</i>	40	10.0	0.4	0.2	2.0				
	<i>Stachys ajugoides</i>	30	5.2	0.3	0.2	2.0				
	<i>Osmorhiza berteroi</i>	30	2.9	0.1	0.2	1.0				
	<i>Pentagramma triangularis</i>	30	1.1	0.1	0.2	0.2				
	<i>Sanicula crassicaulis</i>	30	1.6	0.1	0.2	0.2				
<b>Non-vascular</b>										
	Moss	70	64.1	3.8	0.2	12.0				X

## *Alnus rubra* / *Rubus spectabilis* – *Sambucus racemosa* Association

**Common Name:** Red Alder / Salmonberry – Blue Elderberry Woodland

**Alliance:** *Acer macrophyllum* – *Alnus rubra* Forest & Woodland Alliance

### Local Vegetation Description

The Red Alder / Salmonberry – Blue Elderberry Association forms an open to continuous tree canopy with an open to continuous shrub understory. The dominant tree is *Alnus rubra*. Commonly associated shrubs include *Sambucus racemosa*, *Rubus parviflorus*, *Rubus spectabilis*, and *Rubus ursinus*, and commonly associated herbs include *Polystichum munitum*, *Stachys ajugoides*, and *Urtica dioica*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.2	0 – 2	no data	
Hardwood	45.6	7 – 70	14.3	2 – 35
Regenerating or Shrubby Tree	0.4	0 – 4	no data	
Shrub	38.7	6.4 – 95	3.5	2 – 5
Herb	42.4	7 – 80	0.5	0 – 2

### Local Environmental Description

**Elevation:** Mean 82 m, Range 7 – 317 m

**Aspect:** NE (5), NW (2)

**Slope:** Mean 12 degrees, Range 0 – 30 degrees

**Macro Topography:** Draw (3), Wash (channel bed) (2), Bottom (1), Lower 1/3 of slope (1)

**Large Rock:** Mean 0.1%, Range 0 – 0.2%

**Small Rock:** Mean 2.9%, Range 0 – 15.0%

**Fines Cover:** no data

**Litter Cover:** Mean 63.6%, Range 30.0 – 95%

**Soil Texture (field assessed):** Moderately coarse, sandy loam (3), Moderately fine sandy clay loam (2), Coarse, loamy sand (1), Medium to very fine, sandy loam (1)

**Geology (field or map data):** Granitic (14), Sandstone and other sedimentary (10), Franciscan melange (2), Granitic (generic) (3), Shale (2), Large landslides (1), Sandy alluvium (most alluvial fans and washes) (1)

**Marin County Watersheds:** Point Reyes (17), Inverness (9), Bolinas (3), Lagunitas Creek (3)

### Site Impacts

This association has low non-native plant cover (average 7.4%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Conium maculatum* and *Holcus lanatus*.

### Classification Comments

None.

**References:** Keeler-Wolf et al. 2003a

**Global Rarity Rank:** G3G4

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

**Total: N=34; Marin County (n=34):** MARINSP03, MARINSP10, PGA1266, PGA1499, PGA2318, PGA2334, PGA3608, PGA3632, PGA3678, PGA3850, PGA3865, PGA3893, PGA4049, PGA4697, PGA4706, PGA4970, PGA5258, PGA5315, PGA608, PGA609, PGA610, PGA612, PGA612A, PGA613, PGA625, PGA6352, PGA6385, PGA650, PGA7619, PORE009, PORE035, PORE064, PORE111, PORE204

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Alnus rubra</i>	100	91.1	42.4	7.0	95.0	X	X		X
	<i>Umbellularia californica</i>	38	6.4	2.4	1.0	20.0				
<b>Shrub</b>										
	<i>Sambucus racemosa</i>	88	35.2	14.2	0.2	60.0	X		X	X
	<i>Rubus ursinus</i>	76	24.8	10.1	0.2	40.0	X			X
	<i>Rubus spectabilis</i>	68	21.4	7.0	1.0	30.0				X
	<i>Rubus parviflorus</i>	56	7.2	3.2	0.2	25.0				X
	<i>Toxicodendron diversilobum</i>	26	2.3	0.8	0.2	10.0				
	<i>Ribes menziesii</i>	26	1.6	0.7	0.2	16.0				
<b>Herb</b>										
	<i>Polystichum munitum</i>	65	10.1	3.4	0.2	25.0				X
	<i>Stachys ajugoides</i>	62	11.1	4.8	0.2	35.0				X
	<i>Urtica dioica</i>	56	12.8	4.8	0.2	25.0				X
	<i>Holcus lanatus</i>	38	5.7	2.3	0.2	30.0				
	<i>Athyrium filix-femina</i>	35	6.3	1.9	0.2	15.0				
	<i>Conium maculatum</i>	35	4.7	1.6	0.2	10.0				
	<i>Heracleum maximum</i>	32	3.5	1.2	0.2	12.0				
	<i>Pteridium aquilinum</i>	26	2.1	1.0	0.2	9.0				
	<i>Marah fabaceus</i>	26	2.6	0.8	0.2	10.0				
	<i>Carex obnupta</i>	24	5.3	3.3	0.2	58.0				
	<i>Equisetum spp.</i>	24	2.5	1.2	0.2	20.0				



## ***Alnus rubra* / *Salix lasiolepis* – *Rubus* spp. Association**

**Common Name:** Red Alder / Arroyo Willow – Berry Brambles Woodland

**Alliance:** *Acer macrophyllum* – *Alnus rubra* Forest & Woodland Alliance

### **Local Vegetation Description**

The Red Alder / Arroyo Willow Association forms an open to continuous tree canopy with an open to continuous shrub understory. The dominant tree is *Alnus rubra*. Commonly associated shrubs include *Rubus ursinus* and *Salix lasiolepis*, and commonly associated herbs include *Urtica dioica*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.1	0 – 2	10.5	2 – 20
Hardwood	37.6	10 – 72	10.7	2 – 20
Regenerating or Shrubby Tree	0.2	0 – 4	1.5	1 – 2
Shrub	32.6	3– 80	2.2	0 – 5
Herb	46.2	8 – 95	0.8	0 – 5

### **Local Environmental Description**

**Elevation:** Mean 35 m, Range 2 – 182 m

**Aspect:** SE (2), Variable (1)

**Slope:** Mean 9 degrees, Range 3 – 20 degrees

**Macro Topography:** Terrace (former shoreline or floodplain) (2), Bottom (1), Lower 1/3 of slope (1)

**Large Rock:** Mean 0.5%, Range 0 – 2%

**Small Rock:** Mean 13.5%, Range 10 – 20%

**Fines Cover:** Mean 36.7%, Range 0 – 81%

**Litter Cover:** Mean 28%, Range 5 – 51%

**Soil Texture (field assessed):** Medium to very fine, loamy sand (1), Moderately fine clay loam (1), Medium sand (1), Moderately fine sandy clay loam (1)

**Geology (field or map data):** Sandstone and other sedimentary (12), Alluvium (8), Granitic (3), Franciscan melange (2), Gravelly alluvium (1)

**Marin County Watersheds:** Lagunitas Creek (8), Bolinas (7), Point Reyes (7), Inverness (4)

### **Site Impacts**

This association has low non-native plant cover (average 10.5%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Conium maculatum* and *Rubus armeniacus*.

### **Classification Comments**

Previously there were 2 separate associations recognized, an *Alnus rubra* / *Salix lasiolepis* on Point Reyes (Keeler-Wolf et al. 2003a) and an *Alnus rubra* / *Rubus* spp. from Sonoma County (Klein et al. 2015). These have been lumped into a single association, due to overlapping species composition.

**References:** Jimerson 1993, Keeler-Wolf et al. 2003a, Klein et al. 2015

**Global Rarity Rank:** G4

**State Rarity Rank:** S3

**State Rare:** Y

**Surveys Used for Description**

**Total: N=29; Marin County (n=29):** HYPM193, HYPM194, MARIN046, MMWD0244, PGA1101, PGA1179, PGA1188, PGA1191, PGA1335, PGA1375, PGA1476, PGA25, PGA3557, PGA3560, PGA3885, PGA4485, PGA617, PGA619, PGA623, PGA629, PGA6335, PGA7893, PGA7921, PGA7939, PGA8229, PGA8478, PGA8710, PORE112, PORE132

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Alnus rubra</i>	100	84.7	31.4	6.8	62.5	X	X		X
	<i>Umbellularia californica</i>	34	5.8	2.2	0.2	12.0				
<b>Shrub</b>										
	<i>Rubus ursinus</i>	72	39.2	16.7	1.0	60.0				X
	<i>Salix lasiolepis</i>	69	21.4	11.9	0.2	63.0				X
	<i>Rubus armeniacus</i>	28	13.3	3.8	3.0	50.0				
	<i>Rubus spectabilis</i>	28	5.1	3.0	3.0	23.0				
	<i>Rubus parviflorus</i>	24	3.3	1.5	0.2	15.0				
	<i>Toxicodendron diversilobum</i>	21	4.3	0.5	0.2	6.0				
<b>Herb</b>										
	<i>Urtica dioica</i>	55	13.0	2.6	0.2	20.0				X
	<i>Stachys ajugoides</i>	41	12.9	1.5	0.2	10.0				
	<i>Athyrium filix-femina</i>	38	6.8	2.3	0.2	22.0				
	<i>Scirpus microcarpus</i>	31	6.9	2.6	0.2	26.0				
	<i>Polystichum munitum</i>	24	8.5	1.2	0.2	14.0				
	<i>Conium maculatum</i>	21	1.6	0.8	0.2	15.0				

## ***Umbellularia californica* – *Acer macrophyllum* Association**

**Common Name:** California Bay – Bigleaf Maple Woodland

**Alliance:** *Acer macrophyllum* – *Alnus rubra* Forest & Woodland Alliance

### **Local Vegetation Description**

The California Bay – Bigleaf Maple Association forms an open to continuous tree canopy with a sparse to open shrub understory. The dominant tree is *Umbellularia californica*, and those that are characteristic include *Acer macrophyllum*. Commonly associated shrubs include *Toxicodendron diversilobum*, *Corylus cornuta*, and *Rubus ursinus*, and commonly associated herbs include *Polystichum munitum* and *Stachys ajugoides*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	1.7	0 – 10	12.8	2 – 35
Hardwood	51.8	23 – 92	11.6	2 – 35
Regenerating or Shrubby Tree	0.4	0 – 2.0	5.5	2 – 10
Shrub	9.2	0.2 – 20.0	2.3	0.5 – 5
Herb	20.2	4 – 60	0.3	0 – 0.5

### **Local Environmental Description**

**Elevation:** Mean 139 m, Range 68 – 271 m

**Aspect:** Variable (4), NE (3), Flat (2)

**Slope:** Mean 21 degrees, Range 0 – 45 degrees

**Macro Topography:** Bottom (5), Lower 1/3 of slope (3), Middle 1/3 of slope (1)

**Large Rock:** Mean 6.6%, Range 0.0 – 23.0%

**Small Rock:** Mean 10.5%, Range 0.2 – 45.0%

**Fines Cover:** Mean 17.7%, Range 0.2 – 48.0%

**Litter Cover:** Mean 54.8%, Range 22.0 – 85%

**Soil Texture (field assessed):** Moderately fine clay loam (2), Moderately fine sandy clay loam (2), Medium silt (1), Medium loam (1), Fine clay (1), Moderately fine silty clay loam (1), Medium to very fine, sandy loam (1)

**Geology (field or map data):** Franciscan melange (8), Sandstone and other sedimentary (3)

**Marin County Watersheds:** San Rafael (6), Lagunitas Creek (4), Novato (1)

### **Site Impacts**

This association has low non-native plant cover (average 2.0%) relative to native cover.

### **Classification Comments**

This association was previously placed in the *Umbellularia californica* Alliance, but has been moved here with other riparian associations.

**References:** Evens and Kentner 2006, Klein et al. 2015

**Global Rarity Rank:** G3

**State Rarity Rank:** S3?

**State Rare:** Y

### **Surveys Used for Description**

**Total: N=13; Marin County (n=13):** MMWD0156, MMWD0162, MMWD0188A, MMWD0191, MMWD0327, MMWD0332, MMWD0341, MOSD0063, MOSD0174, PGA1507, PGA1507A, PGA1548, PGA7003

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Umbellularia californica</i>	100	58.1	30.1	10.0	60.0	X	X		X
	<i>Acer macrophyllum</i>	100	18.4	9.9	2.0	30.0	X			X
	<i>Aesculus californica</i>	46	5.7	2.9	0.2	16.0				
	<i>Pseudotsuga menziesii</i>	38	2.2	1.4	0.2	10.0				
	<i>Quercus agrifolia</i>	31	3.9	1.5	3.0	7.0				
	<i>Arbutus menziesii</i>	31	2.7	1.3	0.2	15.0				
	<i>Alnus rhombifolia</i>	31	2.3	0.9	0.2	5.0				
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	85	24.3	2.1	0.2	8.0	X			X
	<i>Corylus cornuta</i>	62	36.3	3.6	0.2	16.0				X
	<i>Rubus ursinus</i>	54	6.7	1.2	0.2	6.0				X
	<i>Holodiscus discolor</i>	38	9.8	1.4	1.0	8.0				
	<i>Lonicera hispidula</i>	38	5.1	0.1	0.2	0.2				
	<i>Heteromeles arbutifolia</i>	23	0.5	0.0	0.2	0.2				
<b>Herb</b>										
	<i>Stachys ajugoides</i>	69	4.8	0.5	0.2	2.0				X
	<i>Polystichum munitum</i>	54	29.7	6.3	0.2	45.0				X
	<i>Dryopteris arguta</i>	31	6.4	0.3	0.2	2.0				
	<i>Adiantum jordanii</i>	23	2.3	0.5	0.2	5.0				
	<i>Iris douglasiana</i>	23	0.7	0.1	0.2	1.0				
	<i>Galium aparine</i>	23	0.3	0.0	0.2	0.2				
	<i>Maianthemum racemosum</i>	23	0.7	0.0	0.2	0.2				
	<i>Pentagramma triangularis</i>	23	0.5	0.0	0.2	0.2				
	<i>Sanicula crassicaulis</i>	23	1.0	0.0	0.2	0.2				
<b>Non-vascular</b>										
	Moss	23	19.2	0.4	0.2	4.0				

## ***Umbellularia californica* / *Rhododendron occidentale* Association**

**Common Name:** California Bay / Western Azalea Woodland

**Alliance:** *Acer macrophyllum* – *Alnus rubra* Forest & Woodland Alliance

### **Local Vegetation Description**

The California Bay / Western Azalea Association forms an open to intermittent tree canopy with an open to intermittent shrub understory. The dominant tree is *Umbellularia californica*, and those that are characteristic or often present include *Pseudotsuga menziesii*. Regenerating or shrubby trees that are often present include *Quercus chrysolepis*. Commonly associated shrubs include *Rhododendron occidentale*, *Heteromeles arbutifolia*, *Toxicodendron diversilobum*, and *Lonicera hispidula*, and commonly associated herbs include *Carex* spp., *Iris douglasiana*, and *Polystichum munitum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	4.6	0.5 – 10	17.5	10 – 35
Hardwood	35.0	20 – 44	12.5	10 – 15
Regenerating or Shrubby Tree	6.0	0 – 20.2	7.5	5 – 10
Shrub	16.0	6 – 40	3.5	2 – 5
Herb	14.2	2 – 35	0.4	0 – 1

### **Local Environmental Description**

**Elevation:** Mean 333 m, Range 107 – 589 m

**Aspect:** Variable (4), NE (1), SE (1)

**Slope:** Mean 29 degrees, Range 4 – 60 degrees

**Macro Topography:** Middle 1/3 of slope (2), Bottom (2), Lower 1/3 of slope (2)

**Large Rock:** Mean 17.8%, Range 1.0 – 33%

**Small Rock:** Mean 8.6%, Range 3.0 – 25%

**Fines Cover:** Mean 14.5%, Range 0.2 – 45%

**Litter Cover:** Mean 30.5%, Range 10 – 70%

**Soil Texture (field assessed):** Medium loam (1), Medium to very fine, sandy loam (1), Moderately coarse, sandy loam (1), Moderately fine silty clay loam (1)

**Geology (field or map data):** Franciscan melange (3), Serpentine (1), Ultramafic rocks, mostly serpentine (1), Volcanic flow rocks (1)

**Marin County Watersheds:** Lagunitas Creek (4)

**Other Watersheds, Sonoma Co.:** Lower Russian River (1), Middle Russian River (1)

### **Site Impacts**

This association has low non-native plant cover (average 1.0%) relative to native cover.

### **Classification Comments**

This association was previously placed in the *Umbellularia californica* Alliance, but has been moved here with other riparian associations. It has also been renamed from the *Umbellularia californica* – *Pseudotsuga menziesii* / *Rhododendron occidentale* Association. Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** Evens and Kentner 2006, Klein et al. 2015

**Global Rarity Rank:** G3

**State Rarity Rank:** S3?

**State Rare:** Y

**Surveys Used for Description**

**Total: N=6; Marin County (n=4):** MMWD0185A, MMWD0198, MMWD0295A, MMWD0409

Sonoma County (n=2): MILOB006, SONO0811

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Umbellularia californica</i>	100	63.3	21.8	10.0	30.0	X	X		X
	<i>Pseudotsuga menziesii</i>	100	10.8	3.5	0.2	10.0	X			X
	<i>Acer macrophyllum</i>	33	4.2	1.7	3.0	7.0				
	<i>Arbutus menziesii</i>	33	3.5	1.2	2.0	5.0				
	<i>Alnus rhombifolia</i>	33	1.9	0.7	2.0	2.2				
	<i>Quercus wislizeni</i>	33	1.6	0.4	0.2	2.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Quercus chrysolepis</i>	50	23.0	1.7	0.2	10.0				X
	<i>Notholithocarpus densiflorus</i>	33	9.1	1.7	2.0	8.2				
	<i>Umbellularia californica</i> *	33	11.0	1.7	0.2	10.0				
	<i>Pseudotsuga menziesii</i> *	33	6.4	0.2	0.4	1.0				
<b>Shrub</b>										
	<i>Rhododendron occidentale</i>	100	61.8	12.7	4.0	34.0	X	X		X
	<i>Heteromeles arbutifolia</i>	83	16.1	1.8	0.2	5.0	X			X
	<i>Toxicodendron diversilobum</i>	83	1.6	0.2	0.2	0.6	X			X
	<i>Lonicera hispidula</i>	67	1.2	0.2	0.2	0.4				X
	<i>Rubus ursinus</i>	33	4.9	0.7	1.0	3.0				
	<i>Corylus cornuta</i>	33	3.4	0.4	0.2	2.0				
<b>Herb</b>										
	<i>Polystichum munitum</i>	67	7.5	0.7	0.2	2.0				X
	<i>Carex</i> spp.	50	10.8	0.7	0.2	3.0				X
	<i>Iris douglasiana</i>	50	5.3	0.2	0.2	1.0				X
	<i>Woodwardia fimbriata</i>	33	22.1	1.8	5.0	6.0				
	<i>Hierochloe occidentalis</i>	33	3.8	0.5	0.2	3.0				
	<i>Adiantum jordanii</i>	33	2.0	0.1	0.2	0.2				
	<i>Stachys ajugoides</i>	33	2.0	0.1	0.2	0.2				
<b>Non-vascular</b>										
	Moss	33	33.3	4.3	1.0	25.0				

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## ***Acer negundo* Forest & Woodland Alliance**

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**Common Name:** Box-elder forest and woodland

**NVC Alliance Code:** A3796. *Acer negundo* - *Fraxinus anomala* - *Celtis laevigata* var. *reticulata* Riparian Woodland Alliance

### **Statewide Description**

*Acer negundo* is dominant or co-dominant in the tree canopy with *Alnus rhombifolia*, *Fraxinus latifolia*, *Juglans hindsii*, *Juglans hindsii* x *regia*, *Platanus racemosa*, *Populus fremontii*, *Populus trichocarpa*, *Quercus lobata*, *Salix gooddingii*, and *Salix* spp.

In California, this alliance is mainly limited to riparian zones of major streams and rivers that are regularly flooded. Individual trees often occur as an understory component in stands of *Populus fremontii*, *Quercus lobata*, and *Salix laevigata* – *Salix gooddingii* Alliances. *Acer negundo* stands may result from removal of the overstory trees in stands of those alliances. The *Acer negundo* Alliance is rare in the state, where small stands form and sometimes are monospecific.

### **Local Vegetation Description**

The Box-elder forest and woodland Alliance forms an open to continuous tree canopy with an open to continuous shrub understory. The dominant tree is *Acer negundo*. Commonly associated shrubs include *Rubus ursinus* and commonly associated herbs include *Urtica dioica*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	59.7	22 – 90	11.3	5 – 35
Regenerating or Shrubby Tree	7.5	0 – 24	4.5	1 – 15
Shrub	38.2	1 – 96	1.7	0.5– 5
Herb	9.0	0.2 – 46	0.6	0 – 1

### **Local Membership Rule**

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

### **Local Environmental Description**

**Elevation:** Mean 21 m, Range 9 – 52 m

**Aspect:** NE (2), SW (2), Variable (2), Flat (1), NW (1)

**Slope:** Mean 8 degrees, Range 0 – 28 degrees

**Macro Topography:** Bottom (5), Lower to Middle 1/3 of slope (2), Lower 1/3 of slope (1)

**Large Rock:** Mean 0.0%, Range 0.0 – 0.0%

**Small Rock:** Mean 0.0%, Range 0.0 – 0.2%

**Fines Cover:** Mean 8.3%, Range 0.0 – 38.0%

**Litter Cover:** Mean 88.3%, Range 60.0 – 97%

**Soil Texture (field assessed):** Medium silt (2), Fine silty clay (1), Medium to very fine, sandy loam (1), Moderately coarse, sandy loam (1)

**Geology (field or map data):** Mixed alluvium (3), Silty alluvium (3), Sandstone and other sedimentary (2), Sandy alluvium (most alluvial fans and washes) (1)

**Marin County Watersheds:** Lagunitas Creek (1)

**Other Watersheds, San Mateo Co.:** Pescadero Creek (3), Ano Nuevo (1); **Sonoma Co.:** Lower Russian River (2), Middle Russian River (2)

### **Site Impacts**

This alliance has low non-native plant cover (average 11.6%) relative to native cover. Non-native species with highest frequency and abundance include *Conium maculatum*, *Delairea odorata*, *Hedera helix*, *Myosotis latifolia*, *Rubus armeniacus*, and *Vinca major*.

### **Associations in Marin County**

*Acer negundo* / (*Rubus ursinus*)

### **Classification Comments**

Since Marin County has fewer than five surveys of this alliance, data from nearby counties were included.

**References:** Buck-Diaz et al. 2012

**Global Rarity Rank:** G5

**State Rarity Rank:** S2

### **Surveys Used for Description**

**Total: N=9; Marin County (n=1):** PGA4155

San Mateo County (n=4): SMAT0102, SMAT0182, SMAT0205, SMAT0298

Sonoma County (n=4): SONO0214, SONO0324, SONO0327, SONO0801



## Alliance Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Acer negundo</i>	100	73.2	49.7	7.0	90.0	X	X		X
	<i>Umbellularia californica</i>	44	6.3	3.7	0.2	20.0				
	<i>Juglans hindsii</i>	22	7.3	3.9	5.0	30.0				
	<i>Fraxinus latifolia</i>	22	5.0	1.4	0.2	12.0				
	<i>Salix laevigata</i>	22	4.3	1.2	3.0	8.0				
	<i>Alnus rubra</i>	22	0.8	0.7	1.0	5.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Acer negundo</i> *	67	54.9	6.2	2.0	24.0				X
	<i>Juglans hindsii</i> *	22	5.6	0.7	1.0	5.2				
	<i>Alnus rubra</i> *	22	2.6	0.3	0.2	2.2				
<b>Shrub</b>										
	<i>Rubus ursinus</i>	78	58.6	20.5	2.0	62.5	X	X		X
	<i>Rubus armeniacus</i>	33	7.8	4.7	1.0	36.0				
	<i>Sambucus racemosa</i>	33	5.3	1.7	2.0	10.0				
	<i>Rubus</i> spp.	22	10.5	8.9	0.2	80.0				
	<i>Hedera helix</i>	22	9.0	7.1	19.0	45.0				
	<i>Salix lasiolepis</i>	22	3.6	1.2	1.0	10.0				
	<i>Prunus</i> spp.	22	0.1	0.1	0.2	0.4				
	<i>Cornus sericea</i>	22	0.1	0.0	0.2	0.2				
<b>Herb</b>										
	<i>Urtica dioica</i>	67	26.3	2.0	0.2	10.0				X
	<i>Marah fabaceus</i>	33	10.5	3.4	1.0	25.0				
	<i>Stachys bullata</i>	33	4.8	0.6	0.2	5.0				
	<i>Dryopteris arguta</i>	33	2.0	0.2	0.2	1.0				
	<i>Delairea odorata</i>	22	9.3	2.6	8.0	15.0				
	<i>Polystichum munitum</i>	22	2.7	0.4	1.2	2.0				
	<i>Vinca major</i>	22	0.4	0.1	0.2	1.0				
	<i>Myosotis latifolia</i>	22	4.8	0.1	0.2	1.0				
	<i>Scrophularia californica</i>	22	0.2	0.0	0.2	0.2				
	<i>Cyperus eragrostis</i>	22	3.9	0.0	0.2	0.2				
	<i>Conium maculatum</i>	22	6.5	0.0	0.2	0.2				
	<i>Equisetum telmateia</i>	22	0.2	0.0	0.2	0.2				
<b>Non-vascular</b>										
	Moss	56	52.6	1.9	0.2	8.0				X
	Lichen	33	3.0	0.1	0.2	0.2				

## ***Acer negundo* / (*Rubus ursinus*) Association**

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**Common Name:** Box-elder Woodland

**Alliance:** *Acer negundo* / (California blackberry) Forest & Woodland Alliance

### **Classification Comments**

The association circumscription is the same as that of the alliance. See above for detailed description. The name of this association has been updated from the *Acer negundo* Association to reflect the important understory component. Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

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## ***Aesculus californica* Forest & Woodland Alliance**

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**Common Name:** California buckeye groves

**NVC Alliance Code:** A4125. *Aesculus californica* Woodland Alliance

### **Statewide Description**

*Aesculus californica* is dominant or co-dominant in the tree canopy with *Fraxinus dipetala*, *Heteromeles arbutifolia*, *Pinus sabiniana*, *Prunus ilicifolia*, *Quercus wislizeni*, and *Umbellularia californica*.

Stands tend to be small and often occur in relatively mesic concavities inland or on steep lower to mid slopes in coastal areas. They intermix with stands of many chaparral and woodland alliances at low elevations.

### **Local Vegetation Description**

The California buckeye groves Alliance forms an open to intermittent tree canopy with a sparse to intermittent shrub understory. The dominant tree is *Aesculus californica*, and *Umbellularia californica*, *Arbutus menziesii*, and *Quercus agrifolia* are characteristic or often present. Commonly associated shrubs include *Diplacus aurantiacus*, *Lonicera hispidula*, and *Toxicodendron diversilobum*, and commonly associated herbs include *Avena* spp., *Carduus pycnocephalus*, *Pentagramma triangularis*, and *Stachys ajugoides*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	23.4	13 – 34	8.5	5 – 15
Regenerating or Shrubby Tree	0.2	0 – 1.0	no data	
Shrub	17.1	0.0 – 43.8	no data	
Herb	22.9	7 – 65	0.3	0 – 0.5

### **Local Membership Rule**

*Aesculus californica* dominates in open to moderately dense woodlands. If *Umbellularia californica* is present, it is sub-dominant. A variety of herbs may be found in the understory.

### **Local Environmental Description**

**Elevation:** Mean 170 m, Range 76 – 245 m

**Aspect:** SW (2), NE (1), SE (1), Variable (1)

**Slope:** Mean 33 degrees, Range 5 – 44 degrees

**Macro Topography:** Upper 1/3 of slope (4), Lower 1/3 of slope (1)

**Large Rock:** Mean 0.6%, Range 0.0 – 2.3%

**Small Rock:** Mean 2.9%, Range 0.2 – 10.0%

**Fines Cover:** Mean 15.6%, Range 2.8 – 35.0%

**Litter Cover:** Mean 42.5%, Range 12.0 – 90%

**Soil Texture (field assessed):** Moderately coarse, sandy loam (2), Moderately fine clay loam (1), Moderately fine silty clay loam (1), Medium silt (1)

**Geology (field or map data):** Franciscan melange (5), Large landslides (1)

**Marin County Watersheds:** San Rafael (5), Novato (1)

### **Site Impacts**

This alliance has low non-native plant cover (average 17.1%) relative to native cover. Non-native species with highest frequency and abundance include *Briza maxima*, *Carduus pycnocephalus*, and *Cynosurus echinatus*.

### **Associations in Marin County**

*Aesculus californica* – *Umbellularia californica*

*Aesculus californica* / *Toxicodendron diversilobum* / Moss

### **Classification Comments**

None.

**References:** Buck-Diaz et al. 2012, Evens and Kentner 2006, Evens et al. 2004, Kittel et al. 2012, Klein et al. 2007, Klein et al. 2015

**Global Rarity Rank:** G3

**State Rarity Rank:** S3

### **Surveys Used for Description**

**Total: N=6; Marin County (n=6):** HYPM137, MMWD0128, MMWD0147, MMWD0322, MMWD0337, MOSD0260

## Alliance Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Aesculus californica</i>	100	72.9	14.8	5.0	25.0	X	X		X
	<i>Umbellularia californica</i>	83	11.3	1.9	2.0	3.0	X			X
	<i>Quercus agrifolia</i>	67	11.3	2.7	1.0	7.0				X
	<i>Arbutus menziesii</i>	50	3.6	0.9	0.3	4.0				X
<b>Shrub</b>										
	<i>Diplacus aurantiacus</i>	67	14.0	2.5	0.2	11.0				X
	<i>Toxicodendron diversilobum</i>	50	15.6	1.0	1.0	3.0				X
	<i>Lonicera hispidula</i>	50	2.7	0.4	0.2	2.0				X
	<i>Adenostoma fasciculatum</i>	33	6.3	2.5	0.2	15.0				
	<i>Holodiscus discolor</i>	33	11.7	0.7	2.0	2.0				
	<i>Symphoricarpos mollis</i>	33	0.3	0.1	0.2	0.2				
<b>Herb</b>										
	<i>Avena</i> spp.	50	21.7	4.0	1.0	20.0				X
	<i>Carduus pycnocephalus</i>	50	6.8	1.7	0.2	5.0				X
	<i>Stachys ajugoides</i>	50	2.6	0.2	0.2	1.0				X
	<i>Pentagramma triangularis</i>	50	2.1	0.1	0.2	0.2				X
	<i>Lolium perenne</i>	33	6.2	3.4	0.2	20.0				
	<i>Adiantum jordanii</i>	33	5.6	0.2	0.2	1.0				
	<i>Cynosurus echinatus</i>	33	5.8	0.2	0.2	1.0				
	<i>Briza maxima</i>	33	1.3	0.2	0.2	1.0				
	<i>Vicia americana</i>	33	1.7	0.1	0.2	0.2				
	<i>Elymus glaucus</i>	33	1.7	0.1	0.2	0.2				
	<i>Iris douglasiana</i>	33	1.9	0.1	0.2	0.2				

***Aesculus californica* – *Umbellularia californica* Association**

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**Common Name:** California Buckeye – California Bay Woodland

**Alliance:** *Aesculus californica* Forest & Woodland Alliance

**Local Vegetation Description**

The California Buckeye – California Bay Association forms an open to continuous tree canopy with an absent to intermittent shrub understory. The dominant tree is *Aesculus californica*, and those that are characteristic or often present include *Quercus agrifolia* and *Umbellularia californica*. Commonly associated shrubs include *Toxicodendron diversilobum* and commonly associated herbs include *Stachys ajugoides*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0	0 – 0	no data	
Hardwood	38.5	13 – 90	9.2	5 – 15
Regenerating or Shrubby Tree	1.5	0 – 10	no data	
Shrub	30.3	0.0 – 60	3.5	2 – 5
Herb	42.4	7 – 90	0.3	0 – 0.5

**Local Environmental Description**

**Elevation:** Mean 140 m, Range 76 – 245 m

**Aspect:** SW (2), NE (1)

**Slope:** Mean 26 degrees, Range 5 – 39 degrees

**Macro Topography:** Upper 1/3 of slope (3)

**Large Rock:** Mean 0.7%, Range 0 – 2.3%

**Small Rock:** Mean 1.4%, Range 0.2 – 3%

**Fines Cover:** Mean 17.7%, Range 2.8 – 35%

**Litter Cover:** Mean 38.3%, Range 12 – 61%

**Soil Texture (field assessed):** Medium silt (1), Moderately coarse, sandy loam (1), Moderately fine clay loam (1)

**Geology (field or map data):** Franciscan melange (6), Large landslides (1)

**Marin County Watersheds:** San Rafael (3), Novato (1)

**Other Watersheds, San Mateo Co.:** San Mateo Bayside (3)

**Site Impacts**

This association has low non-native plant cover (average 12.4%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Avena* spp., *Briza maxima*, and *Carduus pycnocephalus*.

**Classification Comments**

This association is a merge of two previously defined associations which share similar understories, *Aesculus californica* – *Umbellularia californica* / *Diplacus aurantiacus* and *Aesculus californica* – *Umbellularia californica* / *Holodiscus discolor*. Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** Evens and Kentner 2006

**Global Rarity Rank:** G3

**State Rarity Rank:** S3?

**State Rare:** Y

**Surveys Used for Description**

**Total: N=7; Marin County (n=4):** HYPM137, MMWD0128, MMWD0322, MOSD0260

San Mateo County (n=3): PGA1824, PGA758, PGA764

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Aesculus californica</i>	100	65.0	20.6	5.0	50.0	X	X		X
	<i>Umbellularia californica</i>	86	18.5	5.8	2.0	15.0	X			X
	<i>Quercus agrifolia</i>	86	12.7	5.1	1.0	20.0	X			X
	<i>Arbutus menziesii</i>	43	3.1	0.8	0.3	4.0				
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	57	18.1	5.9	3.0	25.0				X
	<i>Rubus ursinus</i>	29	12.2	5.9	1.0	40.0				
	<i>Adenostoma fasciculatum</i>	29	5.4	2.2	0.2	15.0				
	<i>Diplacus aurantiacus</i>	29	7.0	2.0	3.0	11.0				
	<i>Lonicera hispidula</i>	29	0.7	0.3	0.2	2.0				
	<i>Baccharis pilularis</i>	29	2.8	0.2	0.2	1.0				
	<i>Symphoricarpos mollis</i>	29	0.3	0.1	0.2	0.2				
<b>Herb</b>										
	<i>Stachys ajugoides</i>	57	6.5	1.9	0.2	7.0				X
	<i>Marah fabaceus</i>	43	0.3	0.1	0.2	0.2				
	<i>Pentagramma triangularis</i>	43	1.1	0.1	0.2	0.2				
	<i>Heracleum maximum</i>	29	8.2	4.3	10.0	20.0				
	<i>Avena</i> spp.	29	8.8	3.0	1.0	20.0				
	<i>Carduus pycnocephalus</i>	29	5.2	1.4	5.0	5.0				
	<i>Sanicula crassicaulis</i>	29	1.5	0.7	0.2	5.0				
	<i>Briza maxima</i>	29	1.1	0.2	0.2	1.0				
	<i>Aquilegia formosa</i>	29	0.1	0.1	0.2	0.2				
	<i>Galium</i> spp.	29	0.1	0.1	0.2	0.2				
	<i>Iris douglasiana</i>	29	0.9	0.1	0.2	0.2				

## ***Aesculus californica* / *Toxicodendron diversilobum* / Moss Association**

**Common Name:** California Buckeye / Poison Oak / Moss Woodland

**Alliance:** *Aesculus californica* Forest & Woodland Alliance

### **Local Vegetation Description**

The California Buckeye / Poison Oak / Moss Association forms an open to continuous tree canopy with a sparse to intermittent shrub understory. The dominant tree is *Aesculus californica*, and those that are characteristic or often present include *Quercus agrifolia* and *Umbellularia californica*. Commonly associated shrubs include *Toxicodendron diversilobum* and commonly associated herbs include *Dryopteris arguta*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.5	0 – 5	27.5	20 – 35
Hardwood	44.0	6 – 75	8.2	2 – 15
Regenerating or Shrubby Tree	0.9	0 – 3.2	2.3	0 – 5
Shrub	11.6	0.2 – 45	1.9	0 – 5
Herb	15.3	2 – 70	0.5	0 – 2

### **Local Environmental Description**

**Elevation:** Mean 231 m, Range 23 – 508 m

**Aspect:** NE (3), NW (3), SE (3), Variable (2)

**Slope:** Mean 24 degrees, Range 4 – 44 degrees

**Macro Topography:** Lower 1/3 of slope (4), Upper 1/3 of slope (3), Middle 1/3 of slope (2), Middle to Upper 1/3 of slope (1), Wash (channel bed) (1)

**Large Rock:** Mean 0.8%, Range 0 – 5%

**Fines Cover:** Mean 19.4%, Range 3– 74%

**Small Rock:** Mean 6.3%, Range 0 – 38%

**Litter Cover:** Mean 59.4%, Range 10 – 96%

**Soil Texture (field assessed):** Moderately fine clay loam (2), Moderately coarse, sandy loam (2), Moderately fine silty clay loam (1), Medium to very fine, sandy loam (1), Medium to very fine, loamy sand (1), Coarse, loamy sand (1), Not recorded (1)

**Geology (field or map data):** Franciscan melange (4), Volcanic flow rocks (2), Greenstone (2), Sandstone, shale, and conglomerate (1), Sandy alluvium (most alluvial fans and washes) (1), Shale and other sedimentary (1)

**Marin County Watersheds:** San Rafael (2)

**Other Watersheds, San Mateo Co.:** Palo Alto (2), San Mateo Bayside (2), Ano Nuevo (1), San Gregorio Creek (1); **Sonoma Co.:** Middle Russian River (2), Lower Russian River (1)

### **Site Impacts**

This association has low non-native plant cover (average 13.1%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Avena* spp., *Carduus pycnocephalus*, and *Cynosurus echinatus*.

### **Classification Comments**

Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** Buck-Diaz et al. 2012, Evens et al. 2004, Kittel et al. 2012, Klein et al. 2007, Klein et al. 2015

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y



**Surveys Used for Description**

**Total: N=12; Marin County (n=2):** MMWD0147, MMWD0337

San Mateo County (n=7): GGNRA323, PGA761, SMAT0061, SMAT0097, SMAT0112, SMAT0204, SMAT0251

Sonoma County (n=3): SONO0079, SONO0358, SONO0839

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Aesculus californica</i>	100	91.5	43.2	6.0	80.0	X	X		X
	<i>Quercus agrifolia</i>	58	4.4	2.2	0.2	7.0				X
	<i>Umbellularia californica</i>	50	2.8	1.3	0.2	5.0				X
<b>Regenerating or Shrubby Trees</b>										
	<i>Aesculus californica</i> *	33	18.2	0.4	0.4	2.0				
	<i>Quercus agrifolia</i> *	33	20.7	0.2	0.2	1.0				
	<i>Umbellularia californica</i> *	25	6.1	0.1	0.2	1.0				
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	92	49.0	9.4	0.2	20.0	X		X	X
	<i>Rubus ursinus</i>	42	11.6	5.8	1.0	40.0				
	<i>Baccharis pilularis</i>	33	3.7	0.1	0.2	1.0				
	<i>Frangula californica</i>	25	4.5	1.3	1.0	10.0				
	<i>Sambucus nigra</i>	25	1.9	0.9	0.2	10.0				
	<i>Symphoricarpos albus</i>	25	0.7	0.3	0.2	3.0				
<b>Herb</b>										
	<i>Dryopteris arguta</i>	50	14.1	1.3	0.2	10.0				X
	<i>Claytonia perfoliata</i>	42	2.1	0.7	0.2	5.0				
	<i>Pteridium aquilinum</i>	33	3.4	0.4	0.2	3.0				
	<i>Galium aparine</i>	33	1.2	0.3	0.2	3.0				
	<i>Marah fabaceus</i>	33	0.6	0.2	0.2	2.0				
	<i>Adiantum jordanii</i>	33	3.2	0.1	0.2	1.0				
	<i>Carduus pycnocephalus</i>	33	1.5	0.1	0.2	0.2				
	<i>Elymus glaucus</i>	33	1.1	0.1	0.2	0.2				
	<i>Heracleum maximum</i>	25	4.5	2.5	0.2	15.0				
	<i>Polystichum munitum</i>	25	8.3	0.9	0.2	10.0				
	<i>Avena</i> spp.	25	7.3	0.8	1.0	5.0				
	<i>Cynosurus echinatus</i>	25	4.7	0.3	0.2	2.0				
	<i>Sanicula crassicaulis</i>	25	0.7	0.2	0.2	1.0				
	<i>Galium porrigens</i>	25	1.3	0.1	0.2	0.2				
	<i>Iris douglasiana</i>	25	0.7	0.1	0.2	0.2				
	<i>Pentagramma triangularis</i>	25	1.2	0.1	0.2	0.2				
	<i>Stachys ajugoides</i>	25	1.5	0.1	0.2	0.2				
<b>Non-vascular</b>										
	<b>Moss</b>	58	48.6	3.3	0.2	15.0				X
	Lichen	42	9.8	0.3	0.2	2.0				

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## ***Alnus rhombifolia* Forest & Woodland Alliance**

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**Common Name:** White alder groves

**NVC Alliance Code:** A3777. *Alnus rhombifolia* Riparian Forest Alliance

### **Statewide Description**

*Alnus rhombifolia* is dominant or co-dominant in the tree canopy with *Acer macrophyllum*, *Chamaecyparis lawsoniana*, *Fraxinus latifolia*, *Notholithocarpus densiflorus*, *Platanus racemosa*, *Populus fremontii*, *Populus trichocarpa*, *Pseudotsuga menziesii*, *Quercus lobata*, *Salix* spp. and *Umbellularia californica*.

*Alnus rhombifolia* stands primarily occur in inland foothills and lower montane zones, usually as narrow strips along perennial stream courses throughout cismontane California. *Alnus rhombifolia* is well adapted to many flood regimes. Stands exist usually on seasonally flooded stream banks and channel bars just at or below the bank full level, but they occur sometimes in intermittently flooded floodplains and rarely in permanently saturated seeps. Flooding typically comes from winter floods and spring runoff.

### **Local Vegetation Description**

The White alder groves Alliance forms an intermittent to continuous tree canopy with an open to intermittent shrub understory. The dominant tree is *Alnus rhombifolia* and *Acer macrophyllum*, *Pseudotsuga menziesii*, and *Umbellularia californica* are often present. Commonly associated shrubs include *Lonicera hispidula*, *Rubus ursinus*, and *Toxicodendron diversilobum*, and commonly associated herbs include *Athyrium filix-femina*, *Pentagramma triangularis*, *Polystichum munitum*, and *Woodwardia fimbriata*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	2.5	0 – 6	24.5	5 – 50
Hardwood	41.7	20 – 75	10.8	5 – 15
Regenerating or Shrubby Tree	3.9	0 – 12.8	4.2	1 – 10
Shrub	21.3	4.0 – 40.0	2.5	1 – 5
Herb	10.3	1 – 32	0.5	0 – 2

### **Local Membership Rule**

*Alnus rhombifolia* dominates or co-dominates with *Acer macrophyllum* or *Umbellularia californica* in the tree overstory. *Umbellularia californica* may be higher in cover, though stands will often have other riparian trees along with *Alnus rhombifolia* to be classed here. If *Fraxinus latifolia* is co-dominant, key to the *Fraxinus latifolia* Alliance. Careful identification of alder stands closer to the coast is necessary to differentiate from *A. rubra* stands.

### **Local Environmental Description**

**Elevation:** Mean 178 m, Range 10 – 411 m

**Aspect:** Flat (2), SE (2), Variable (2), NW (1)

**Slope:** Mean 26 degrees, Range 0 – 75 degrees

**Macro Topography:** Bottom (4), Bottom to Lower 1/3 of slope (2), Middle 1/3 of slope (1)

**Large Rock:** Mean 10.4%, Range 0.2 – 25.0%

**Small Rock:** Mean 14.6%, Range 1.2 – 34.0%

**Fines Cover:** Mean 23.9%, Range 1.0 – 65.0%

**Litter Cover:** Mean 28.3%, Range 5.0 – 70%

**Soil Texture (field assessed):** Coarse sand (1), Medium sand (1), Medium silt (1), Medium to very fine, sandy loam (1), Moderately coarse, sandy loam (1)

**Geology (field or map data):** Franciscan melange (3), Andesite (1), Mixed alluvium (1), Mixed metamorphic (1), Ultramafic rocks, mostly serpentine (1), Volcanic and metavolcanic rocks (1)

**Marin County Watersheds:** Lagunitas Creek (2), San Rafael (1)

**Other Watersheds, San Mateo Co.:** Palo Alto (1), San Mateo Bayside (1); **Sonoma Co.:** Lower Russian River (2), Sonoma Creek (1)

### **Site Impacts**

This alliance has low non-native plant cover (average 1.7%) relative to native cover. Non-native species with highest frequency and abundance include *Conium maculatum* and *Rubus armeniacus*.

### **Associations in Marin County**

*Alnus rhombifolia* – *Umbellularia californica* – (*Quercus chrysolepis*)

### **Classification Comments**

Since Marin County has fewer than five surveys of this alliance, data from nearby counties were included.

**References:** Evens and Kentner 2006, Keeler-Wolf and Evens 2006, Klein et al. 2007

**Global Rarity Rank:** G4

**State Rarity Rank:** S4

### **Surveys Used for Description**

**Total: N=8; Marin County (n=3):** MMWD0185, MMWD0250, MMWD0332A

San Mateo County (n=2): SMAT0024, PWALD01

Sonoma County (n=3): MILOB004, SONO0095, SONO0838

## Alliance Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Alnus rhombifolia</i>	100	38.6	20.7	7.0	55.0	X		X	X
	<i>Umbellularia californica</i>	100	42.3	19.8	10.0	37.5	X		X	X
	<i>Acer macrophyllum</i>	63	4.1	1.8	2.0	4.0				X
	<i>Pseudotsuga menziesii</i>	50	1.9	0.7	0.2	4.0				X
	<i>Aesculus californica</i>	38	2.8	1.7	0.2	10.0				
	<i>Fraxinus latifolia</i>	38	3.2	1.7	0.2	12.0				
	<i>Quercus agrifolia</i>	38	2.5	1.5	0.2	10.0				
	<i>Quercus chrysolepis</i>	25	1.7	0.6	2.0	3.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Umbellularia californica</i> *	38	15.5	1.1	0.4	5.2				
	<i>Alnus rhombifolia</i> *	25	9.5	1.1	3.2	5.2				
	<i>Fraxinus latifolia</i> *	25	3.0	0.3	0.2	2.0				
	<i>Notholithocarpus densiflorus</i>	25	12.8	0.2	0.2	1.0				
	<i>Pseudotsuga menziesii</i> *	25	1.3	0.2	0.2	1.0				
	<i>Acer macrophyllum</i> *	25	3.7	0.1	0.2	0.4				
	<i>Quercus agrifolia</i> *	25	3.4	0.1	0.2	0.2				
<b>Shrub</b>										
	<i>Rubus ursinus</i>	75	11.0	2.9	0.2	10.0	X			X
	<i>Toxicodendron diversilobum</i>	75	8.3	1.8	0.2	7.4	X			X
	<i>Lonicera hispidula</i>	63	2.8	0.6	0.2	2.2				X
	<i>Calycanthus occidentalis</i>	38	11.5	0.9	0.2	7.0				
	<i>Corylus cornuta</i>	38	13.5	0.9	0.2	4.0				
	<i>Heteromeles arbutifolia</i>	38	4.6	0.3	0.2	2.0				
	<i>Salix lasiolepis</i>	25	8.4	3.5	8.0	20.0				
	<i>Symphoricarpos albus</i>	25	7.1	1.9	5.0	10.0				
	<i>Rubus armeniacus</i>	25	4.1	1.0	3.0	5.0				
	<i>Holodiscus discolor</i>	25	3.6	0.8	0.2	6.0				
	<i>Rhododendron occidentale</i>	25	9.2	0.8	3.0	3.0				
	<i>Frangula californica</i>	25	0.3	0.1	0.2	0.2				
<b>Herb</b>										
	<i>Polystichum munitum</i>	63	12.7	0.9	0.2	3.0				X
	<i>Woodwardia fimbriata</i>	50	2.3	0.3	0.2	2.0				X
	<i>Athyrium filix-femina</i>	50	4.6	0.2	0.2	1.0				X
	<i>Pentagramma triangularis</i>	50	4.7	0.1	0.2	0.2				X
	<i>Scrophularia californica</i>	38	2.1	0.1	0.2	0.2				
	<i>Urtica dioica</i>	25	6.0	0.6	2.0	3.0				
	<i>Equisetum telmateia</i>	25	3.7	0.5	1.0	3.0				
	<i>Adiantum jordanii</i>	25	3.4	0.4	0.2	3.0				
	<i>Carex</i> spp.	25	0.7	0.2	0.2	1.0				
	<i>Carex globosa</i>	25	1.8	0.1	0.2	0.2				

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<i>Conium maculatum</i>	25	1.8	0.1	0.2	0.2				
	<i>Artemisia douglasiana</i>	25	0.7	0.1	0.2	0.2				
	<i>Sanicula crassicaulis</i>	25	1.5	0.1	0.2	0.2				
	<i>Melica torreyana</i>	25	1.9	0.1	0.2	0.2				
	<i>Madia madioides</i>	25	1.9	0.1	0.2	0.2				
	<i>Hierochloe occidentalis</i>	25	1.8	0.1	0.2	0.2				
	<i>Dryopteris arguta</i>	25	0.6	0.1	0.2	0.2				
	<i>Polypodium</i> spp.	25	2.4	0.1	0.2	0.2				
<b>Non-vascular</b>										
	Moss	25	25.0	1.5	2.0	10.0				

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***Alnus rhombifolia* – *Umbellularia californica* – (*Quercus chrysolepis*) Association**

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**Common Name:** White Alder – California Laurel – (Canyon Live Oak) Woodland

**Alliance:** *Alnus rhombifolia* Forest & Woodland Alliance

**Classification Comments**

The association circumscription is the same as that of the alliance. This association has been renamed from the *Umbellularia californica* – *Alnus rhombifolia* Association to better fit the species composition in the southern Sierra Nevada Foothills. It was originally placed in the *Umbellularia californica* Alliance. Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**Global Rarity Rank:** G3

**State Rarity Rank:** S3

**State Rare:** Y



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## **Arbutus menziesii Forest Alliance**

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**Common Name:** Madrone forest

**NVC Alliance Code:** A3357. *Notholithocarpus densiflorus* - *Arbutus menziesii* Forest Alliance

### **Statewide Description**

*Arbutus menziesii* is dominant or co-dominant in the tree canopy with *Acer macrophyllum*, *Notholithocarpus densiflorus*, *Pseudotsuga menziesii*, *Quercus agrifolia*, *Quercus chrysolepis*, *Quercus kelloggii*, *Quercus wislizeni*, and *Umbellularia californica*.

*Arbutus menziesii* groves have traditionally been considered part of the “mixed evergreen forest” and not treated as a separate type (Sawyer 2007). Although *A. menziesii* is common as a secondary species in many forest types, it does form distinctive stands of high cover worthy of recognition in parts of the state that have relatively snow-free winters but upwards of 100 cm of annual precipitation. Stands in northern parts of the state mix with those of the *Pseudotsuga menziesii* – (*Notholithocarpus densiflorus* – *Arbutus menziesii*) Alliance.

### **Local Vegetation Description**

The Madrone forest Alliance forms an open to continuous tree canopy with a sparse to intermittent shrub understory. The dominant tree is *Arbutus menziesii*, and *Quercus agrifolia* and *Umbellularia californica* are characteristic or often present. Commonly associated shrubs include *Toxicodendron diversilobum* and *Lonicera hispidula*, and commonly associated herbs include *Iris douglasiana*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.4	0 – 5	18.9	0.5 – 50
Hardwood	44.7	15 – 95	13.5	5 – 50
Regenerating or Shrubby Tree	4.3	0 – 70.0	3.6	0.5 – 10
Shrub	9.0	0.0 – 40.0	2.3	0 – 5
Herb	10.8	0.2 – 50	0.3	0 – 1

### **Local Membership Rule**

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

### **Local Environmental Description**

**Elevation:** Mean 238 m, Range 68 – 675 m

**Aspect:** NW (13), NE (11), SE (7), SW (6), Variable (3)

**Slope:** Mean 25 degrees, Range 0 – 45 degrees

**Macro Topography:** Middle 1/3 of slope (16), Upper 1/3 of slope (12), Ridge top (5), Lower 1/3 of slope (3), Not recorded (1), Upper 1/3 of slope to Ridgetop (1)

**Large Rock:** Mean 0.5%, Range 0.0 – 7.0%

**Small Rock:** Mean 3.4%, Range 0.0 – 32.0%

**Fines Cover:** Mean 8.7%, Range 0.2 – 40.0%

**Litter Cover:** Mean 72.0%, Range 5.0 – 95%

**Soil Texture (field assessed):** Moderately fine sandy clay loam (10), Moderately fine clay loam (7), Moderately coarse, sandy loam (6), Medium loam (4), Medium to very fine, sandy loam (3), Moderately fine silty clay loam (3), Medium silt loam (2), Fine sandy clay (1), Coarse, loamy sand (1), Unknown (1)

**Geology (field or map data):** Franciscan melange (29), Sandstone and other sedimentary (10), Alluvium (1)

**Marin County Watersheds:** San Rafael (18), Lagunitas Creek (11), Novato (10), Bolinas (1)

### **Site Impacts**

This alliance has low non-native plant cover (average 2.9%) relative to native cover. Non-native species with highest frequency and abundance include *Genista monspessulana* and *Torilis arvensis*.

### **Associations in Marin County**

*Arbutus menziesii* – (*Quercus agrifolia*)

*Arbutus menziesii* – *Umbellularia californica*

### **Classification Comments**

None.

**References:** Evens and Kentner 2006, Klein et al. 2015

**Global Rarity Rank:** G4

**State Rarity Rank:** S3

**Surveys Used for Description**

**Total: N=40; Marin County (n=40):** MARIN113, MARIN156, MARIN161, MMWD0071, MMWD0098, MMWD0104, MMWD0105, MMWD0106, MMWD0125A, MMWD0129, MMWD0153, MMWD0220A, MMWD0223A, MMWD0265, MMWD0273A, MMWD0282A, MMWD0297, MMWD0319, MMWD0328, MMWD0342, MMWD0359, MMWD0401A, MOSD0003, MOSD0021, MOSD0040, MOSD0051, MOSD0061, MOSD0131, MOSD0144, MOSD0155, MOSD0168, MOSD0173, MOSD0176, MOSD0185, MOSD0283, MOSD0353, MOSD0364, MOSD0366, MOSD0369, MOSD0403

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Arbutus menziesii</i>	98	65.2	29.3	10.0	70.0	X	X		X
	<i>Umbellularia californica</i>	68	16.7	6.6	0.2	22.0				X
	<i>Quercus agrifolia</i>	53	7.8	3.3	0.2	18.0				X
	<i>Pseudotsuga menziesii</i>	20	1.7	0.3	0.2	3.2				
<b>Regenerating or Shrubby Trees</b>										
	<i>Pseudotsuga menziesii</i> *	45	22.8	0.3	0.2	2.0				
	<i>Notholithocarpus densiflorus</i>	28	14.8	0.8	0.2	10.0				
	<i>Umbellularia californica</i> *	23	6.0	0.5	0.2	8.0				
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	80	18.6	1.0	0.2	10.0	X			X
	<i>Lonicera hispidula</i>	73	12.7	0.4	0.2	5.0				X
	<i>Heteromeles arbutifolia</i>	45	13.9	1.3	0.2	25.0				
	<i>Diplacus aurantiacus</i>	38	9.3	0.3	0.2	5.0				
	<i>Genista monspessulana</i>	23	10.4	0.8	0.2	15.0				
	<i>Corylus cornuta</i>	23	5.1	0.2	0.2	2.0				
<b>Herb</b>										
	<i>Iris douglasiana</i>	58	14.9	0.9	0.2	8.0				X
	<i>Cynoglossum grande</i>	40	4.4	0.1	0.2	1.0				
	<i>Melica torreyana</i>	35	6.6	0.5	0.2	6.0				
	<i>Stachys ajugoides</i>	28	1.1	0.1	0.2	1.0				
	<i>Pentagramma triangularis</i>	28	1.6	0.1	0.2	0.2				
	<i>Sanicula crassicaulis</i>	25	1.8	0.1	0.2	2.0				
	<i>Elymus glaucus</i>	25	2.3	0.1	0.2	0.2				
	<i>Lathyrus vestitus</i>	23	2.8	0.2	0.2	2.0				
	<i>Galium</i> spp.	23	1.2	0.2	0.2	5.0				
	<i>Whipplea modesta</i>	20	4.1	0.7	0.2	15.0				
	<i>Pteridium aquilinum</i>	20	4.5	0.4	0.2	10.0				
	<i>Galium porrigens</i>	20	1.8	0.0	0.2	0.2				
	<i>Torilis arvensis</i>	20	1.3	0.0	0.2	0.2				
	<i>Polygala californica</i>	20	1.3	0.0	0.2	0.2				
<b>Non-vascular</b>										
	Moss	23	21.7	0.1	0.2	1.0				



## ***Arbutus menziesii* – (*Quercus agrifolia*) Association**

**Common Name:** Madrone – (Coast Live Oak) Woodland

**Alliance:** *Arbutus menziesii* Forest Alliance

### **Local Vegetation Description**

The Madrone – (Coast Live Oak) Association forms an open to continuous tree canopy with a sparse to intermittent shrub understory. The dominant tree is *Arbutus menziesii*, and those that are characteristic or often present include *Quercus agrifolia*. Commonly associated shrubs include *Toxicodendron diversilobum*, *Heteromeles arbutifolia*, and *Lonicera hispidula*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.1	0 – 1	22.5	15 – 35
Hardwood	49.1	15 – 95	11.9	5 – 20
Regenerating or Shrubby Tree	3.1	0 – 19	3.3	0.5 – 10
Shrub	11.7	0.2 – 40	2.3	0.5 – 5
Herb	11.8	0.2 – 50	0.3	0 – 1

### **Local Environmental Description**

**Elevation:** Mean 211 m, Range 68 – 391 m

**Aspect:** NW (6), NE (5), SE (4), SW (4), Variable (2)

**Slope:** Mean 24 degrees, Range 8 – 45 degrees

**Macro Topography:** Middle 1/3 of slope (6), Upper 1/3 of slope (6), Ridge top (5), Lower 1/3 of slope (2), Upper 1/3 of slope to Ridgetop (1)

**Large Rock:** Mean 0.5%, Range 0.0 – 3.0%

**Small Rock:** Mean 2.2%, Range 0.0 – 15.0%

**Fines Cover:** Mean 4.8%, Range 0.2 – 18.0%

**Litter Cover:** Mean 72.7%, Range 5.0 – 95%

**Soil Texture (field assessed):** Moderately fine sandy clay loam (6), Moderately fine clay loam (5), Medium loam (3), Moderately coarse, sandy loam (3), Medium to very fine, sandy loam (2), Moderately fine silty clay loam (1), Unknown (1)

**Geology (field or map data):** Franciscan melange (14), Sandstone and other sedimentary (7)

**Marin County Watersheds:** San Rafael (8), Lagunitas Creek (7), Novato (6)

### **Site Impacts**

This association has low non-native plant cover (average 2.5%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Genista monspessulana*.

### **Classification Comments**

None.

**References:** Evens and Kentner 2006, Klein et al. 2015

**Global Rarity Rank:** G3

**State Rarity Rank:** S3?

**State Rare:** Y

### **Surveys Used for Description**

**Total: N=21; Marin County (n=21):** MARIN161, MMWD0098, MMWD0105, MMWD0106, MMWD0125A, MMWD0129, MMWD0273A, MMWD0282A, MMWD0342, MOSD0003, MOSD0040, MOSD0051, MOSD0144, MOSD0173, MOSD0176, MOSD0185, MOSD0283, MOSD0353, MOSD0364, MOSD0369, MOSD0403

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Arbutus menziesii</i>	100	79.4	36.9	10.0	70.0	X	X		X
	<i>Quercus agrifolia</i>	71	12.0	5.3	0.2	18.0				X
	<i>Umbellularia californica</i>	43	2.4	0.9	0.2	5.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Pseudotsuga menziesii</i>	38	17.7	0.3	0.2	2.0				
	<i>Notholithocarpus densiflorus</i>	29	17.6	1.1	1.0	10.0				
	<i>Umbellularia californica*</i>	29	9.1	0.5	0.2	5.0				
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	86	20.2	1.3	0.2	10.0	X			X
	<i>Lonicera hispidula</i>	62	4.4	0.5	0.2	5.0				X
	<i>Heteromeles arbutifolia</i>	57	15.9	2.0	0.2	25.0				X
	<i>Diplacus aurantiacus</i>	48	7.5	0.4	0.2	3.0				
	<i>Arctostaphylos manzanita</i>	24	10.2	1.3	2.0	12.0				
	<i>Adenostoma fasciculatum</i>	24	4.8	0.6	0.2	4.0				
	<i>Genista monspessulana</i>	24	7.1	0.6	0.2	10.0				
<b>Herb</b>										
	<i>Iris douglasiana</i>	48	15.9	0.8	0.2	8.0				
	<i>Cynoglossum grande</i>	38	4.0	0.1	0.2	0.2				
	<i>Melica torreyana</i>	33	9.9	0.7	0.2	6.0				
	<i>Sanicula crassicaulis</i>	33	2.3	0.1	0.2	0.2				
	<i>Whipplea modesta</i>	29	7.2	1.2	0.2	15.0				
	<i>Pedicularis densiflora</i>	24	12.2	1.6	0.2	20.0				
	<i>Pentagramma triangularis</i>	24	1.5	0.0	0.2	0.2				
	<i>Vicia</i> spp.	24	1.3	0.0	0.2	0.2				
<b>Non-vascular</b>										
	Moss	24	23.0	0.2	0.2	1.0				

***Arbutus menziesii* – *Umbellularia californica* Association**

**Common Name:** Madrone – California Bay Woodland

**Alliance:** *Arbutus menziesii* Forest Alliance

**Local Vegetation Description**

The Madrone – California Bay Association forms an open3.0 to continuous tree canopy with a sparse to open shrub understory. The dominant tree is *Arbutus menziesii*, and those that are characteristic or often present include *Umbellularia californica*. Regenerating or shrubby trees that are often present include *Pseudotsuga menziesii*. Commonly associated shrubs include *Lonicera hispidula* and *Toxicodendron diversilobum*, and commonly associated herbs include *Iris douglasiana*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.6	0 – 5	17.1	0.5 – 50
Hardwood	39.9	20 – 70	15.3	5 – 50
Regenerating or Shrubby Tree	5.5	0 – 70	4.3	0.5 – 10
Shrub	6.1	0.2 – 24	2.5	0 – 5
Herb	9.7	0.2 – 35	0.4	0 – 1

**Local Environmental Description**

**Elevation:** Mean 268 m, Range 88 – 675 m

**Aspect:** NW (7), NE (6), SE (3), SW (2), Variable (1)

**Slope:** Mean 27 degrees, Range 0 – 45 degrees

**Macro Topography:** Middle 1/3 of slope (10), Upper 1/3 of slope (6), Not recorded (1), Lower 1/3 of slope (1)

**Large Rock:** Mean 0.5%, Range 0 – 7%

**Fines Cover:** Mean 12.8%, Range 0.2 – 40%

**Small Rock:** Mean 4.6%, Range 0 – 32%

**Litter Cover:** Mean 71.3%, Range 26 – 95%

**Soil Texture (field assessed):** Moderately fine sandy clay loam (4), Moderately coarse, sandy loam (3), Moderately fine silty clay loam (2), Moderately fine clay loam (2), Medium silt loam (2), Medium loam (1), Coarse, loamy sand (1), Fine sandy clay (1), Medium to very fine, sandy loam (1)

**Geology (field or map data):** Franciscan melange (15), Sandstone and other sedimentary (3), Alluvium (1)

**Marin County Watersheds:** San Rafael (10), Lagunitas Creek (4), Novato (4), Bolinas (1)

**Site Impacts**

This association has low non-native plant cover (average 3.2%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Genista monspessulana*, and *Torilis arvensis*.

**Classification Comments**

None.

**References:** Evens and Kentner 2006, Klein et al. 2015

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

**Total: N=19; Marin County (n=19):** MARIN113, MARIN156, MMWD0071, MMWD0104, MMWD0153, MMWD0220A, MMWD0223A, MMWD0265, MMWD0297, MMWD0319, MMWD0328, MMWD0359, MMWD0401A, MOSD0021, MOSD0061, MOSD0131, MOSD0155, MOSD0168, MOSD0366

### **Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

<b>Layer</b>	<b>Taxon</b>	<b>Con</b>	<b>Rel</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>	<b>Ch</b>	<b>D</b>	<b>cD</b>	<b>Oft</b>
<b>Tree</b>										
	<i>Arbutus menziesii</i>	95	49.5	20.9	12.0	60.0	X		X	X
	<i>Umbellularia californica</i>	95	32.5	12.9	7.0	22.0	X		X	X
	<i>Quercus agrifolia</i>	32	3.1	1.2	0.2	8.0				
	<i>Quercus kelloggii</i>	21	3.1	1.5	2.0	10.0				
	<i>Quercus wislizeni</i>	21	4.5	0.5	0.2	5.0				
	<i>Pseudotsuga menziesii</i>	21	2.6	0.3	0.2	3.2				
<b>Regenerating or Shrubby Trees</b>										
	<i>Pseudotsuga menziesii*</i>	53	28.6	0.2	0.2	1.0				X
	<i>Notholithocarpus densiflorus</i>	26	11.8	0.5	0.2	5.0				
	<i>Quercus wislizeni*</i>	21	13.0	0.4	0.2	7.0				
<b>Shrub</b>										
	<i>Lonicera hispidula</i>	84	21.8	0.3	0.2	2.0	X			X
	<i>Toxicodendron diversilobum</i>	74	16.9	0.7	0.2	4.0				X
	<i>Heteromeles arbutifolia</i>	32	11.7	0.5	0.2	5.0				
	<i>Corylus cornuta</i>	26	9.2	0.3	0.2	2.0				
	<i>Diplacus aurantiacus</i>	26	11.2	0.3	0.2	5.0				
	<i>Genista monspessulana</i>	21	14.0	1.0	0.2	15.0				
	<i>Rosa californica</i>	21	2.1	0.0	0.2	0.2				
	<i>Symphoricarpos mollis</i>	21	2.5	0.0	0.2	0.2				
<b>Herb</b>										
	<i>Iris douglasiana</i>	68	13.8	0.9	0.2	8.0				X
	<i>Cynoglossum grande</i>	42	4.7	0.2	0.2	1.0				
	<i>Melica torreyana</i>	37	3.0	0.3	0.2	2.0				
	<i>Polygala californica</i>	37	2.6	0.1	0.2	0.2				
	<i>Stachys ajugoides</i>	37	1.5	0.1	0.2	0.2				
	<i>Pteridium aquilinum</i>	32	7.0	0.6	0.2	10.0				
	<i>Elymus glaucus</i>	32	3.7	0.1	0.2	0.2				
	<i>Pentagramma triangularis</i>	32	1.7	0.1	0.2	0.2				
	<i>Lathyrus vestitus</i>	26	2.7	0.2	0.2	2.0				
	<i>Galium</i> spp.	26	1.1	0.1	0.2	1.0				
	<i>Torilis arvensis</i>	26	1.6	0.1	0.2	0.2				
	<i>Carex</i> spp.	21	3.4	0.2	0.2	2.0				
	<i>Carex globosa</i>	21	2.2	0.1	0.2	1.0				
	<i>Polystichum munitum</i>	21	1.4	0.1	0.2	1.0				
	<i>Galium porrigens</i>	21	1.7	0.0	0.2	0.2				
<b>Non-vasc</b>										
	Moss	21	20.2	0.1	0.2	1.0				

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

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**Common Name:** Eucalyptus – Tree of heaven – Black locust groves

**NVC Alliance Code:** A0084. *Eucalyptus* spp. Ruderal Forest Alliance

**Statewide Description**

*Ailanthus altissima*, *Acacia melanoxyton*, one or more species of *Eucalyptus*, and/or *Robinia pseudoacacia* is dominant in the tree canopy.

Understories in groves of the fast-growing, long-lived *Eucalyptus* trees are usually depauperate. A buildup of allelopathic chemicals in the soil and high volumes of debris inhibit the establishment of other plants, though sometimes other non-natives, such as *Hedera helix*, clamber extensively in stands. Seeds of *Eucalyptus* germinate when tree crowns and built-up debris are removed by fire or in other ways. Tree stumps sprout readily from the lignotuber when trees are felled (Boyd 2000, Bean and Russo 2005, Esser 1993b, Skolmen and Ledig 1990).

In stands dominated by *Ailanthus altissima*, the understory may be dominated by non-native annual grasses. *Acacia melanoxyton* or *Robinia pseudoacacia* dominated stands have an open to intermittent shrub layer, and an herbaceous layer may be open or dominated by non-native grasses.

**Local Vegetation Description**

The Eucalyptus – Tree of heaven – Black locust groves Alliance forms an open to continuous tree canopy with an open to continuous shrub understory. *Eucalyptus globulus* is a dominant tree in stands sampled in Marin County. Commonly associated shrubs include *Rubus ursinus* and *Toxicodendron diversilobum*, and commonly associated herbs include *Galium aparine*, *Heracleum maximum*, and *Polystichum munitum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	3.7	0 – 15	22.5	15 – 35
Hardwood	48.9	20 – 80	22.5	5 – 35
Regenerating or Shrubby Tree	1.2	0 – 11	10.8	5 – 15
Shrub	31.0	0 – 85	1.8	0 – 5
Herb	15.5	1 – 80	0.3	0 – 0.5

### **Local Membership Rule**

A tree species of *Eucalyptus*, *Acacia melanoxylon* or *Ailanthus altissima* dominates in planted or naturalized stands. Often found in groves, windbreaks, uplands, and along stream courses. Stands were observed but rarely sampled in Marin County.

### **Local Environmental Description**

**Elevation:** Mean 91 m, Range 8 – 331 m

**Aspect:** SW (2), NW (1), SE (1), Flat (1), Variable (1)

**Slope:** Mean 15 degrees, Range 0 – 30 degrees

**Macro Topography:** Middle 1/3 of slope (3), Lower to Middle 1/3 of slope (2), Bottom to Lower 1/3 of slope (1), Lower 1/3 of slope (1)

**Large Rock:** Mean 0.0%, Range 0.0 – 0.0%

**Small Rock:** Mean 0.0%, Range 0.0 – 0.0%

**Fines Cover:** Mean 7.0%, Range 1.0 – 20.0%

**Litter Cover:** Mean 88.8%, Range 75.0 – 95%

**Soil Texture (field assessed):** Fine silty clay (2), Moderately fine sandy clay loam (2), Fine clay (1), Medium to very fine, loamy sand (1)

**Geology (field or map data):** Sandstone and other sedimentary (4), Franciscan melange (2), Volcanic and metavolcanic rocks (2), Alluvium (2), Granitic (1), Sand dunes (1)

**Marin County Watersheds:** Bolinas (1)

**Other Watersheds, San Mateo Co.:** Tunitas Creek (4), San Francisco Coastal (2), San Mateo Bayside (2), Pacifica (1), Pescadero Creek (1); **Sonoma Co.:** Bodega Harbor (1)

### **Site Impacts**

This alliance has greater cover of exotics than natives, with high non-native plant cover (averages 63.7%) relative to native cover. Non-native species with highest frequency and abundance include *Cortaderia jubata*, *Eucalyptus globulus*, *Galium aparine*, *Geranium dissectum*, *Hesperocyparis macrocarpa*, *Oxalis pes-caprae*, *Pinus radiata*, and *Sonchus asper*.

### **Associations in Marin County**

*Eucalyptus (globulus, camaldulensis)*

### **Classification Comments**

Since Marin County has fewer than five surveys of this alliance, data from nearby counties were included.

**References:** AECOM 2013, AIS 2007b, AIS and ESRI 2007, Buck-Diaz et al. 2012, Evens and San 2005, HDR 2014a, Hickson and Keeler-Wolf 2007, Keeler-Wolf and Evens 2006, Keeler-Wolf et al. 2003a, Klein et al. 2007, Klein et al. 2015, Menke et al. 2011, Sproul et al. 2011, Stillwater Sciences 2007a, Thorne et al. 2004, VegCAMP 2005b, VegCAMP 2015a, Verdone and Evens 2010

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA



**Surveys Used for Description**

**Total: N=14; Marin County (n=1):** PGA8245

San Mateo County (n=11): PGA1034, PGA11175, PGA900A, PGA901, PGA903, SMAT0014, SMAT0081, SMAT0131, SMAT0163, SMAT0173, SMAT0174

Sonoma County (n=1): BDGA0002

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Eucalyptus globulus</i>	77	66.5	36.2	12.0	80.0	X	X		X
	<i>Hesperocyparis macrocarpa</i>	31	4.7	2.3	0.2	15.0				
	<i>Acacia melanoxylon</i>	23	22.0	15.4	60.0	75.0				
	<i>Pinus radiata</i>	23	2..0	1.3	1.0	15.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Acacia melanoxylon*</i>	23	20.7	1.3	0.2	11.0				
<b>Shrub</b>										
	<i>Rubus ursinus</i>	77	35.6	14.9	0.2	75.0	X		X	X
	<i>Toxicodendron diversilobum</i>	46	30.2	12.0	1.0	60.0				X
	<i>Frangula californica</i>	31	1.8	1.1	0.2	10.0				
	<i>Sambucus racemosa</i>	23	13.2	1.6	0.2	20.0				
<b>Herb</b>										
	<i>Galium aparine</i>	38	8.6	1.0	1.0	5.0				
	<i>Polystichum munitum</i>	38	4.9	0.4	0.2	4.0				
	<i>Sanicula crassicaulis</i>	38	4.7	0.2	0.2	1.0				
	<i>Oxalis pes-caprae</i>	31	1.2	0.1	0.2	1.0				
	<i>Heracleum maximum</i>	23	6.1	0.9	0.2	10.0				
	<i>Scrophularia californica</i>	23	1.6	0.2	0.2	2.0				
	<i>Geranium dissectum</i>	23	0.9	0.1	0.2	1.0				
	<i>Sonchus asper</i>	23	0.4	0.0	0.2	0.2				
	<i>Cortaderia jubata</i>	23	0.4	0.0	0.2	0.2				

## ***Eucalyptus (globulus, camaldulensis)* Provisional Semi-natural Association**

**Common Name:** Eucalyptus Ruderal Forest & Woodland

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

### **Local Vegetation Description**

The Eucalyptus Ruderal Forest Association forms a open to continuous tree canopy with an absent to continuous shrub understory. The dominant tree is *Eucalyptus globulus*. Commonly associated shrubs include *Rubus ursinus* and *Toxicodendron diversilobum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	3.7	0 – 15	22.5	15 – 35
Hardwood	48.9	20 – 80	22.5	5 – 35
Regenerating or Shrubby Tree	1.2	0 – 11	10.8	5 – 15
Shrub	31.0	0 – 85	1.8	0 – 5
Herb	15.5	1 – 80	0.3	0 – 0.5

### **Local Environmental Description**

**Elevation:** Mean 93 m, Range 8 – 213 m

**Aspect:** SW (2), Variable (1)

**Slope:** Mean 23 degrees, Range 18 – 30 degrees

**Macro Topography:** Middle 1/3 of slope (2), Bottom to Lower 1/3 of slope (1), Lower to Middle 1/3 of slope (1)

**Large Rock:** 0%

**Small Rock:** 0%

**Fines Cover:** Mean 7.0%, Range 1.0 – 20.0%

**Litter Cover:** Mean 88.8%, Range 75.0 – 95%

**Soil Texture (field assessed):** Moderately fine sandy clay loam (1), Fine silty clay (1), Medium to very fine, loamy sand (1)

**Geology (field or map data):** Sandstone and other sedimentary (3), Franciscan melange (2), Volcanic and metavolcanic rocks (2), Granitic (1), Sand dunes (1)

**Marin County Watersheds:** Bolinas (1)

**Other Watersheds, San Mateo Co.:** San Francisco Coastal (2), San Mateo Bayside (2), San Mateo Coastal (2), Pescadero Creek (1); **Sonoma Co.:** Bodega Harbor (1)

### **Site Impacts**

This association has greater cover of exotics than natives, with non-native plant cover averaging 59.5% relative to native cover. Non-native species that occur with highest frequency and abundance include *Eucalyptus globulus*.

### **Classification Comments**

This association is considered provisional since it is under-sampled in its expected range. Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** AECOM 2013, AIS 2007b, AIS and ESRI 2007, Buck-Diaz et al. 2012, Evens and San 2005, HDR 2014a, Hickson and Keeler-Wolf 2007, Keeler-Wolf and Evens 2006, Keeler-Wolf et al. 2003a, Klein et al. 2007, Klein et al. 2015, Menke et al. 2011, Sproul et al. 2011, Stillwater Sciences 2007a, Thorne et al. 2004, VegCAMP 2005b, VegCAMP 2015a, Verdone and Evens 2010

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

**State Rare:** N



### Surveys Used for Description

**Total: N=10; Marin County (n=1):** PGA8245

San Mateo County (n=8): PGA1034, PGA11175, PGA900A, PGA901, PGA903, SMAT0014, SMAT0131, SMAT0174

Sonoma County (n=1): BDGA0002

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Eucalyptus globulus</i>	100	86.4	47.1	12.0	80.0	X	X		X
	<i>Hesperocyparis macrocarpa</i>	30	5.4	2.5	0.2	15.0				
	<i>Pinus radiata</i>	30	2.6	1.7	1.0	15.0				
<b>Shrub</b>										
	<i>Rubus ursinus</i>	70	26.8	14.9	0.2	75.0				X
	<i>Toxicodendron diversilobum</i>	50	39.0	15.5	5.0	60.0				X
	<i>Frangula californica</i>	40	2.3	1.4	0.2	10.0				
<b>Herb</b>										
	<i>Heracleum maximum</i>	30	8.0	1.2	0.2	10.0				
	<i>Galium aparine</i>	30	4.1	0.7	2.0	3.0				
	<i>Polystichum munitum</i>	30	2.8	0.4	0.2	4.0				

### **Acacia melanoxylon Provisional Semi-natural Association**

**Common Name:** Blackwood Acacia Ruderal Forest & Woodland

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

#### Local Vegetation Description

The Blackwood Acacia Association was not adequately sampled in Marin County, but field observations and mapping validate its existence. Stands in this association are dominated by *Acacia melanoxylon* with other non-natives (at > 80% relative cover to native cover).

**References:** Calflora 2021

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

**State Rare:** N

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## ***Fraxinus latifolia* Woodland Alliance**

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**Common Name:** Oregon ash groves

**NVC Alliance Code:** A3743. *Fraxinus latifolia* - *Populus balsamifera* ssp. *trichocarpa* - *Alnus* spp.  
Riparian Forest Alliance

### **Statewide Description**

*Fraxinus latifolia* is dominant or co-dominant in the tree canopy with *Acer macrophyllum*, *Alnus rhombifolia*, *Calocedrus decurrens*, *Pinus ponderosa*, *Quercus kelloggii*, *Quercus wislizeni*, and *Salix laevigata*.

In California, the *Fraxinus latifolia* Alliance has been most thoroughly sampled in the western Sierra Nevada, where it occurs adjacent to stands of the riparian *Populus fremontii* and *Salix laevigata* Alliances or adjacent to stands of the upland *Pinus ponderosa* and *Quercus chrysolepis* Alliances (Potter 2005). Larger, extensive, bottomland stands occur in the North Coast Ranges from Sonoma County north; however, these have been poorly described.

### **Local Vegetation Description**

The Oregon ash groves Alliance forms an open to intermittent tree canopy with a sparse to intermittent shrub understory. The dominant tree is *Fraxinus latifolia*. Regenerating or shrubby trees that are dominant and characteristic include *Fraxinus latifolia*. Commonly associated shrubs include *Rubus ursinus*, *Salix lasiolepis*, and *Toxicodendron diversilobum*, and commonly associated herbs include *Carex* spp.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	37.5	15 – 60	11.7	5 – 20
Regenerating or Shrubby Tree	7.2	0.4 – 17.2	3.4	0.5 – 10
Shrub	20.5	1.0 – 50.0	1.1	0.5 – 2
Herb	30.7	4 – 90	0.5	0 – 1

### **Local Membership Rule**

*Fraxinus latifolia* dominates or co-dominates with *Alnus rhombifolia*, *Quercus lobata*, or *Umbellularia californica* in the tree overstory. While stands were not sampled in Marin County, they occur here and were mapped in a few locations along Bon Tempe Creek and Lagunitas Creek.

### **Local Environmental Description**

**Elevation:** Mean 71 m, Range 7 – 240 m

**Aspect:** Variable (3), Flat (3)

**Slope:** Mean 1 degrees, Range 0 – 3 degrees

**Macro Topography:** Lower 1/3 of slope (3), Bottom (3)

**Large Rock:** Mean 0.2%, Range 0.0 – 1.2%

**Small Rock:** Mean 0.7%, Range 0.0 – 4.0%

**Fines Cover:** Mean 14.7%, Range 1.0 – 64.0%

**Litter Cover:** Mean 79.3%, Range 35.0 – 95%

**Soil Texture (field assessed):** Medium to very fine, sandy loam (4), Moderately fine clay loam (1)

**Geology (field or map data):** Mixed alluvium (2), Sandstone (1), Sandstone and other sedimentary (1), Sandy alluvium (most alluvial fans and washes) (1), Franciscan melange (1)

**Marin County Watersheds:** none

**Other Watersheds, Sonoma Co.:** Lower Russian River (4), Middle Russian River (1), Salmon Creek (1)

### **Site Impacts**

This alliance has moderate non-native plant cover (average 23.3%) relative to native cover. Non-native species with highest frequency and abundance include *Holcus lanatus*, *Iris pseudacorus*, *Rubus armeniacus*, and *Rumex conglomeratus*.

### **Associations in Marin County**

none

### **Classification Comments**

Though no stands were surveyed in Marin County, this alliance is known from nearby counties with sample data, and it occurs here uncommonly with a few stands mapped. With more sampling in Marin County, an Association could be defined.

**References:** Buck-Diaz et al. 2012, Hickson and Keeler-Wolf 2007, Keeler-Wolf and Vahti 2000, Klein et al. 2007, Klein et al. 2015, Potter 2005

**Global Rarity Rank:** G4

**State Rarity Rank:** S3

### **Surveys Used for Description**

**Total: N=6; Marin County (n=0):**

Sonoma County (n=6): SONO0097, SONO0198, SONO0222, SONO0502, SONO0681, SONO0802

### Alliance Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Fraxinus latifolia</i>	100	68.9	27.5	5.0	40.0	X	X		X
	<i>Umbellularia californica</i>	33	7.4	3.2	1.0	18.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Fraxinus latifolia</i> *	100	79.3	5.7	0.2	15.0	X	X		X
	<i>Umbellularia californica</i> *	33	10.1	0.2	0.2	1.2				
<b>Shrub</b>										
	<i>Rubus ursinus</i>	50	28.4	5.8	5.0	15.0				X
	<i>Toxicodendron diversilobum</i>	50	6.1	1.8	1.0	5.0				X
	<i>Salix lasiolepis</i>	50	20.5	1.2	0.2	5.0				X
	<i>Rubus armeniacus</i>	33	21.4	10.0	25.0	35.0				
	<i>Rosa californica</i>	33	8.8	0.4	0.2	2.0				
	<i>Baccharis pilularis</i>	33	0.5	0.2	0.2	1.0				
	<i>Rosa</i> spp.	33	0.2	0.1	0.2	0.2				
<b>Herb</b>										
	<i>Carex</i> spp.	50	9.2	0.7	0.2	3.0				X
	<i>Holcus lanatus</i>	33	6.3	2.0	5.0	7.0				
	<i>Juncus patens</i>	33	5.1	0.7	2.0	2.0				
	<i>Iris pseudacorus</i>	33	1.8	0.5	0.2	3.0				
	<i>Polystichum munitum</i>	33	3.2	0.3	1.0	1.0				
	<i>Rumex conglomeratus</i>	33	0.3	0.1	0.2	0.2				
<b>Non-vascular</b>										
	Lichen	50	47.2	0.5	1.0	1.0				X
	Moss	50	36.1	0.4	0.2	1.0				X



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## ***Hesperocyparis (sargentii, macnabiana)* Woodland Alliance**

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**Common Name:** Ultramafic cypress woodland

**NVC Alliance Code:** A3355. *Hesperocyparis sargentii* - *Hesperocyparis macnabiana* - *Hesperocyparis bakeri* Woodland Alliance

### **Statewide Description**

*Hesperocyparis sargentii* and/or *Hesperocyparis macnabiana* is dominant in the tree canopy with *Pinus attenuata*, *Pinus sabiniana*, *Pseudotsuga menziesii*, *Quercus wislizeni*, and *Umbellularia californica*.

*Hesperocyparis sargentii* is an abundant and widespread cypress with two centers of distribution. The northern stands, centered in the San Francisco Bay area and southern North Coast Ranges, may contain *H. macnabiana* and different species of *Arctostaphylos*. *H. macnabiana* tends to grow on upper slopes, and *H. sargentii* often grows on lower slopes and in ravines. The upland stands of *H. sargentii* in the North Coast Ranges are associated with shallow water tables or impeded drainage (Alexander et al. 2007). The southern stands centered in Santa Lucia Mountains form purer stands. There are genetic differences between the two centers (Bartel et al. 2003). Stands also vary from < 5 to 15 m in height and from 20 to 60% in cover, which is probably more dependent on time since the last fire than on soil sterility and location.

*Hesperocyparis macnabiana* is the most abundant and widespread cypress in the state (Griffin and Critchfield 1972). Several large stands are scattered throughout northern California mostly on serpentine or volcanic rocks (Alexander et al. 2007, Barbour 2007). The conifer typically attains a height of 3–6 m. Trees start bearing cones by 6–14 years of age. Plants produce abundant cone crops that require 2 years to mature. The serotinous cones remain closed on the tree until opened by the heat of a fire or from desiccation due to age. Seeds establish best on bare mineral soil. Seedling mortality is high on shaded

sites with abundant litter because of damping-off fungi. Burned trees release large quantities of seed after a fire, and seedling establishment forms thickets of new trees (Esser 1994e).

Because they may occur together and share some understory species, these two cypress species (which typically occur on ultramafic soils) have been combined in a single alliance since the 2009 publication of *A Manual of California Vegetation, second edition*, where stands of these species were previously ascribed to the *Callitropsis sargentii* and *C. macnabiana* alliances.

### **Local Vegetation Description**

The Ultramafic cypress woodland Alliance forms an open to intermittent tree canopy with a sparse to intermittent shrub understory. The dominant tree is *Hesperocyparis sargentii*. Regenerating or shrubby trees that are often present include *Pseudotsuga menziesii*. Commonly associated shrubs include *Arctostaphylos montana*, and commonly associated herbs include *Zigadenus fremontii*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	29.6	0 – 52	8.6	2 – 20
Hardwood	0.2	0 – 1	7.5	5 – 10
Regenerating or Shrubby Tree	8.9	0 – 50.0	2.5	0 – 10
Shrub	14.0	0.2 – 37.0	0.8	0 – 2
Herb	1.5	0.2 – 5	0.3	0 – 1

### **Local Membership Rule**

*Hesperocyparis sargentii* dominates on slopes, ridges, or along stream benches and terraces of serpentine, volcanic, or other ultramafic substrates. *Adenostoma fasciculatum*, *Arctostaphylos* spp., *Ceanothus jepsonii*, and *Quercus durata* are commonly found in stands.

### **Local Environmental Description**

**Elevation:** Mean 444 m, Range 255 – 697 m

**Aspect:** NE (8), Flat (3), NW (3), SE (3), SW (3), Not recorded (1)

**Slope:** Mean 11 degrees, Range 0 – 33 degrees

**Macro Topography:** Upper 1/3 of slope (8), Middle 1/3 of slope (7), Lower 1/3 of slope (3), Ridge top (3)

**Large Rock:** Mean 8.2%, Range 0.0 – 46.0%

**Small Rock:** Mean 17.5%, Range 0.0 – 35.1%

**Fines Cover:** Mean 21.8%, Range 0.0 – 70.0%

**Litter Cover:** Mean 46.4%, Range 1.0 – 98%

**Soil Texture (field assessed):** Moderately fine sandy clay loam (6), Moderately fine clay loam (4), Moderately coarse, sandy loam (3), Medium silt (2), Medium to very fine, sandy loam (2), Moderately fine silty clay loam (1), Medium to very fine, loamy sand (1), Fine sandy clay (1), Unknown (1)

**Geology (field or map data):** Serpentine (9), Franciscan melange (7), Ultramafic rocks, mostly serpentine (6)

**Marin County Watersheds:** Lagunitas Creek (18), San Rafael (3), Bolinas (1)

### **Site Impacts**

This alliance has very low non-native plant cover (average 0.4%) relative to native cover.

### **Associations in Marin County**

*Hesperocyparis sargentii*

*Hesperocyparis sargentii* / *Ceanothus jepsonii* – *Arctostaphylos* spp.

*Hesperocyparis sargentii* / *Rhododendron occidentale*

**Classification Comments**

None.

**References:** Evens and Kentner 2006, Klein et al. 2015

**Global Rarity Rank:** G3

**State Rarity Rank:** S3

**Surveys Used for Description**

**Total: N=22; Marin County (n=22):** HYPM128, MARIN140, MARIN142, MMWD0075, MMWD0112, MMWD0115, MMWD0116, MMWD0117, MMWD0119, MMWD0141, MMWD0143, MMWD0144, MMWD0146, MMWD0287, MMWD0311, MOSD0110, MOSD0113, MOSD0130, MOSD0133, MOSD0136, MOSD0138, VASE0068

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Hesperocyparis sargentii</i>	82	78.1	26.5	18.0	55.0	X	X		X
	<i>Pseudotsuga menziesii</i>	23	1.3	0.4	0.1	3.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Pseudotsuga menziesii</i>	59	42.3	0.9	0.2	7.0				X
	<i>Hesperocyparis sargentii</i> *	32	23.0	7.6	0.2	50.0				
<b>Shrub</b>										
	<i>Arctostaphylos montana</i>	82	64.5	11.4	0.2	58.1	X	X		X
	<i>Ceanothus jepsonii</i>	36	3.1	0.8	0.2	14.0				
	<i>Heteromeles arbutifolia</i>	32	9.4	0.3	0.2	3.0				
	<i>Adenostoma fasciculatum</i>	23	3.6	0.7	0.2	8.9				
<b>Herb</b>										
	<i>Zigadenus fremontii</i>	64	8.8	0.2	0.2	1.0				X
	<i>Polygala californica</i>	41	3.8	0.1	0.1	0.2				
	<i>Melica torreyana</i>	36	3.6	0.1	0.2	0.2				
	<i>Calochortus umbellatus</i>	36	2.4	0.1	0.2	0.2				
	<i>Calamagrostis ophitidis</i>	32	6.1	0.2	0.2	1.0				
	<i>Galium porrigens</i>	32	1.9	0.1	0.2	0.2				
	<i>Chlorogalum pomeridianum</i>	27	4.3	0.2	0.2	3.0				
	<i>unknown Poaceae</i>	23	9.4	0.3	0.2	5.0				
	<i>Erigeron reductus</i>	23	1.9	0.0	0.2	0.2				
	<i>Navarretia</i> spp.	23	1.6	0.0	0.2	0.2				
	<i>Pedicularis densiflora</i>	23	4.2	0.0	0.2	0.2				
	<i>Aspidotis densa</i>	23	1.4	0.0	0.2	0.2				
<b>Non-vascular</b>										
	Moss	41	39.7	0.9	0.2	10.0				

## ***Hesperocyparis sargentii* Association**

**Common Name:** Sargent's Cypress Woodland Woodland

**Alliance:** *Hesperocyparis (sargentii, macnabiana)* Woodland Alliance

### **Local Vegetation Description**

The Sargent's Cypress Woodland Association forms an open to intermittent tree canopy with a sparse shrub understory. The dominant tree is *Hesperocyparis sargentii*. Regenerating or shrubby trees that are dominant and characteristic include *Pseudotsuga menziesii*, and those that are often present include *Hesperocyparis sargentii*. Commonly associated shrubs include *Heteromeles arbutifolia*, and *Toxicodendron diversilobum*, and commonly associated herbs include *Iris*, *Melica torreyana*, and *Polygala californica*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	42.2	27 – 52	13.5	5 – 20
Hardwood	0	0 – 0.2	7.5	5 – 10
Regenerating or Shrubby Tree	8.5	0 – 41.4	1.3	0 – 5
Shrub	0.7	0.2 – 2	0.6	0 – 1
Herb	1.5	0.2 – 4	0.3	0 – 0.5

### **Local Environmental Description**

**Elevation:** Mean 404 m, Range 255 – 494 m

**Aspect:** NE (5), SW (1), Not recorded (1)

**Slope:** Mean 16 degrees, Range 1 – 33 degrees

**Macro Topography:** Lower 1/3 of slope (2), Upper 1/3 of slope (2), Lower to Middle 1/3 of slope (1), Middle 1/3 of slope (1), Ridge top (1)

**Large Rock:** Mean 3.5%, Range 0 – 14.0%

**Small Rock:** Mean 12.1%, Range 0 – 35%

**Fines Cover:** Mean 14.1%, Range 0 – 32%

**Litter Cover:** Mean 68.9%, Range 30 – 98%

**Soil Texture (field assessed):** Moderately fine clay loam (2), Moderately fine sandy clay loam (2), Coarse, loamy sand (1), Medium silt (1), Moderately coarse, sandy loam (1)

**Geology (field or map data):** Franciscan melange (3), Serpentine (2), Ultramafic rocks, mostly serpentine (2)

**Marin County Watersheds:** Lagunitas Creek (2), Bolinas (1), San Rafael (1)

**Other Watersheds, San Mateo Co.: Sonoma Co.:** Gualala River (1), Lower Russian River (1), Middle Russian River (1)

### **Site Impacts**

This association has very low non-native plant cover (average 0.5%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Bromus diandrus* and *Galium murale*.

### **Classification Comments**

Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** Evens and Kentner 2006

**Global Rarity Rank:** G2

**State Rarity Rank:** SNR

**State Rare:** Y



**Surveys Used for Description**

**Total: N=7; Marin County (n=4):** MARIN140, MARIN142, MMWD0115, MMWD0287

Sonoma County (n=3): SONO0193, SONO0308, SONO0531

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Hesperocyparis sargentii</i>	86	84.9	37.0	30.0	52.0	X	X		X
<b>Regenerating or Shrubby Trees</b>										
	<i>Pseudotsuga menziesii</i>	86	32.7	0.5	0.2	1.2	X		X	X
	<i>Hesperocyparis sargentii</i> *	71	34.2	6.8	0.2	40.0				X
	<i>Umbellularia californica</i>	43	0.8	0.1	0.2	0.2				
	<i>Quercus wislizeni</i>	29	12.9	1.0	0.2	7.0				
<b>Shrub</b>										
	<i>Heteromeles arbutifolia</i>	71	37.2	0.9	0.2	3.0				X
	<i>Toxicodendron diversilobum</i>	57	10.6	0.3	0.2	1.2				X
	<i>Lonicera hispidula</i>	29	7.1	0.2	0.2	1.0				
	<i>Arctostaphylos montana</i>	29	5.4	0.1	0.2	0.2				
<b>Herb</b>										
	<i>Iris</i> spp.	57	4.4	0.1	0.2	0.2				X
	<i>Melica torreyana</i>	57	4.9	0.1	0.2	0.2				X
	<i>Polygala californica</i>	57	7.8	0.1	0.2	0.2				X
	<i>Pentagramma triangularis</i>	43	3.0	0.1	0.2	0.2				
	<i>Calamagrostis ophitidis</i>	29	6.3	0.2	0.2	1.0				
	<i>Aspidotis densa</i>	29	2.4	0.1	0.2	0.2				
	<i>Carex globosa</i>	29	15.7	0.1	0.2	0.2				
	<i>Galium californicum</i>	29	2.5	0.1	0.2	0.2				
	<i>Galium porrigens</i>	29	2.2	0.1	0.2	0.2				
<b>Non-vascular</b>										
	Moss	71	67.7	1.0	1.0	2.0				X
	Lichen	29	3.7	0.1	0.2	0.2				

## *Hesperocyparis sargentii* / *Ceanothus jepsonii* – *Arctostaphylos* spp. Association

**Common Name:** Sargent's Cypress / Musk Brush – Manzanita Woodland

**Alliance:** *Hesperocyparis* (*sargentii*, *macnabiana*) Woodland Alliance

### Local Vegetation Description

The Sargent's Cypress / Musk Brush – Manzanita Association forms an open to intermittent tree canopy with an open to intermittent shrub understory. The dominant tree is *Hesperocyparis sargentii*.

Regenerating or shrubby trees that are often present include *Pseudotsuga menziesii*. Commonly associated shrubs include *Arctostaphylos montana* and *Ceanothus jepsonii*, and commonly associated herbs include *Zigadenus fremontii*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	24.2	0 – 50	6.1	2 – 15
Hardwood	0.2	0 – 1	7.5	5 – 10
Regenerating or Shrubby Tree	8.6	0 – 50.0	3.5	1 – 10
Shrub	15.3	5.0 – 37.0	0.9	0 – 2
Herb	1.3	0.2 – 5	0.3	0 – 1

### Local Environmental Description

**Elevation:** Mean 462 m, Range 301 – 697 m

**Aspect:** NE (5), Flat (3), NW (3), SE (3), SW (2)

**Slope:** Mean 9 degrees, Range 0 – 27 degrees

**Macro Topography:** Middle 1/3 of slope (6), Upper 1/3 of slope (6), Ridge top (3), Lower 1/3 of slope (1)

**Large Rock:** Mean 8.4%, Range 0 – 46.0%

**Small Rock:** Mean 17.8%, Range 0 – 35.1%

**Fines Cover:** Mean 23.7%, Range 0.2 – 70%

**Litter Cover:** Mean 42.6%, Range 1 – 89%

**Soil Texture (field assessed):** Moderately fine clay loam (4), Moderately fine sandy clay loam (3), Medium to very fine, sandy loam (2), Moderately coarse, sandy loam (2), Medium to very fine, loamy sand (1), Medium silt (1), Fine sandy clay (1), Moderately fine silty clay loam (1), Unknown (1)

**Geology (field or map data):** Serpentine (7), Franciscan melange (5), Ultramafic rocks, mostly serpentine (4)

**Marin County Watersheds:** Lagunitas Creek (14), San Rafael (2)

### Site Impacts

This association has very low non-native plant cover (average 0.5%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Bromus diandrus* and *Cynosurus echinatus*.

### Classification Comments

Surveys from Marin Co. were previously classified as *Hesperocyparis sargentii* / *Arctostaphylos montana* Association, but they are now combined here in this broader concept.

**References:** Evens and Kentner 2006, Klein et al. 2015

**Global Rarity Rank:** G1

**State Rarity Rank:** S1.2

**State Rare:** Y

**Surveys Used for Description**

**Total: N=16; Marin County (n=16):** MMWD0075, MMWD0112, MMWD0116, MMWD0117, MMWD0119, MMWD0141, MMWD0143, MMWD0146, MMWD0311, MOSD0110, MOSD0113, MOSD0130, MOSD0133, MOSD0136, MOSD0138, VASE0068

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Hesperocyparis sargentii</i>	81	79.4	23.2	18.0	55.0	X	X		X
<b>Regenerating or Shrubby Trees</b>										
	<i>Pseudotsuga menziesii</i>	50	40.0	0.6	0.2	5.0				X
	<i>Hesperocyparis sargentii</i> *	25	24.6	7.9	10.0	50.0				
<b>Shrub</b>										
	<i>Arctostaphylos montana</i>	100	86.3	15.6	1.0	58.1	X	X		X
	<i>Ceanothus jepsonii</i>	50	4.3	1.1	0.2	14.0				X
	<i>Adenostoma fasciculatum</i>	25	3.4	0.9	0.2	8.9				
<b>Herb</b>										
	<i>Zigadenus fremontii</i>	75	11.1	0.2	0.2	1.0	X			X
	<i>Calochortus umbellatus</i>	38	2.7	0.1	0.2	0.2				
	unknown Poaceae	31	12.9	0.4	0.2	5.0				
	<i>Calamagrostis ophitidis</i>	31	5.6	0.2	0.2	1.0				
	<i>Galium porrigens</i>	31	2.1	0.1	0.2	0.2				
	<i>Melica torreyana</i>	31	3.4	0.1	0.2	0.2				
	<i>Navarretia</i> spp.	31	2.3	0.1	0.2	0.2				
	<i>Pedicularis densiflora</i>	31	5.8	0.1	0.2	0.2				
	<i>Polygala californica</i>	31	2.2	0.1	0.1	0.2				
	<i>Chlorogalum pomeridianum</i>	25	5.0	0.2	0.2	3.0				
	<i>Erigeron reductus</i>	25	2.3	0.1	0.2	0.2				
<b>Non-vascular</b>										
	Moss	31	31.3	1.0	0.2	10.0				

***Hesperocyparis sargentii* / *Rhododendron occidentale* Association**

**Common Name:** Sargent's Cypress / Western Azalea Woodland

**Alliance:** *Hesperocyparis* (*sargentii*, *macnabiana*) Woodland Alliance

**Local Vegetation Description**

The Sargent's Cypress / Western azalea Woodland Association forms an open to intermittent tree canopy with an open shrub understory. The dominant tree is *Hesperocyparis sargentii*, and those that are characteristic or often present include *Umbellularia californica*, *Pseudotsuga menziesii*, *Quercus agrifolia*, and *Quercus chrysolepis*. Regenerating or shrubby trees that are dominant and characteristic include *Pseudotsuga menziesii* and those that are often present include *Hesperocyparis sargentii*, *Quercus agrifolia*, and *Umbellularia californica*. Commonly associated shrubs include *Rhododendron occidentale*, *Calycanthus occidentalis*, *Frangula californica*, *Heteromeles arbutifolia*, *Salix breweri*, and *Salix scouleriana*, and commonly associated herbs include *Achillea millefolium*, *Aspidotis densa*, *Bromus diandrus*, *Bromus hordeaceus*, *Calliscirpus criniger*, *Calochortus umbellatus*, *Carex mendocinensis*, *Carex serratodens*, *Castilleja applegatei*, *Chlorogalum pomeridianum*, *Elymus glaucus*, *Epipactis gigantea*, *Erigeron serpentinus*, *Festuca idahoensis*, *Fritillaria affinis*, *Galium porrigens*, *Iris*, *Madia*, *Melica californica*, *Melica torreyana*, *Muhlenbergia andina*, *Parnassia palustris*, *Pentagramma triangularis*, *Polygala californica*, *Ranunculus californicus*, *Sisyrinchium bellum*, *Thermopsis californica*, and *Zigadenus fremontii*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	21	20 – 22	12.5	10 – 15
Hardwood	10	3 – 17	7.5	5 – 10
Regenerating or Shrubby Tree	5	3 – 7	3.5	2 – 5
Shrub	12.5	9 – 16	3.5	2 – 5
Herb	3.9	3 – 4.8	0.3	0 – 0.5

**Local Environmental Description**

**Elevation:** Mean 294 m, Range 212 – 376 m

**Aspect:** Flat (1), NE (1)

**Slope:** Mean 13 degrees, Range 0 – 25 degrees

**Macro Topography:** Bottom (1), Middle 1/3 of slope (1)

**Large Rock:** Mean 12.5%, Range 7 – 18%

**Small Rock:** Mean 25%, Range 15 – 35%

**Fines Cover:** Mean 36%, Range 35 – 37%

**Litter Cover:** Mean 10.5%, Range 1 – 20%

**Soil Texture (field assessed):** Moderately fine sandy clay loam (1)

**Geology (field or map data):** Franciscan melange (1), Serpentine (1)

**Marin County Watersheds:** Lagunitas Creek (1)

**Other Watersheds: Sonoma Co.:** Lower Russian River (1)

**Site Impacts**

This association has very low non-native plant cover (average 0.3%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Bromus diandrus*, and *Bromus hordeaceus*.

**Classification Comments**

Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** Evens and Kentner 2006, Klein et al. 2015

**Global Rarity Rank:** G2?

**State Rarity Rank:** S2

**State Rare:** Y

**Surveys Used for Description**

**Total: N=2; Marin County (n=1):** MMWD0144

Sonoma County (n=1): SONO2214

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Hesperocyparis sargentii</i>	100	65.5	20.0	20.0	20.0	X	X		X
	<i>Umbellularia californica</i>	100	19.3	6.5	3.0	10.0	X			X
	<i>Quercus agrifolia</i>	50	9.5	3.5	7.0	7.0				X
	<i>Pseudotsuga menziesii</i>	50	3.8	1.0	2.0	2.0				X
	<i>Quercus chrysolepis</i>	50	1.9	0.5	1.0	1.0				X
<b>Regenerating or Shrubby Trees</b>										
	<i>Pseudotsuga menziesii</i> *	100	56.7	3.7	0.4	7.0	X	X		X
	<i>Hesperocyparis sargentii</i> *	50	20.0	0.6	1.2	1.2				X
	<i>Umbellularia californica</i> *	50	20.0	0.6	1.2	1.2				X
	<i>Quercus agrifolia</i> *	50	3.3	0.1	0.2	0.2				X
<b>Shrub</b>										
	<i>Rhododendron occidentale</i>	100	22.1	2.5	2.0	3.0	X			X
	<i>Salix breweri</i>	50	36.8	5.0	10.0	10.0				X
	<i>Salix scouleriana</i>	50	38.9	3.5	7.0	7.0				X
	<i>Calycanthus occidentalis</i>	50	0.7	0.1	0.2	0.2				X
	<i>Frangula californica</i>	50	0.7	0.1	0.2	0.2				X
	<i>Heteromeles arbutifolia</i>	50	0.7	0.1	0.2	0.2				X
<b>Herb</b>										
	<i>Festuca idahoensis</i>	50	10.4	0.5	1.0	1.0				X
	<i>Achillea millefolium</i>	50	2.1	0.1	0.2	0.2				X
	<i>Aspidotis densa</i>	50	2.1	0.1	0.2	0.2				X
	<i>Bromus diandrus</i>	50	2.1	0.1	0.2	0.2				X
	<i>Bromus hordeaceus</i>	50	2.1	0.1	0.2	0.2				X
	<i>Calliscirpus criniger</i>	50	6.3	0.1	0.2	0.2				X
	<i>Calochortus umbellatus</i>	50	2.1	0.1	0.2	0.2				X
	<i>Carex mendocinensis</i>	50	6.3	0.1	0.2	0.2				X
	<i>Carex serratodens</i>	50	2.1	0.1	0.2	0.2				X
	<i>Castilleja applegatei</i>	50	6.3	0.1	0.2	0.2				X
	<i>Chlorogalum pomeridianum</i>	50	2.1	0.1	0.2	0.2				X
	<i>Elymus glaucus</i>	50	2.1	0.1	0.2	0.2				X
	<i>Epipactis gigantea</i>	50	6.3	0.1	0.2	0.2				X

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<i>Erigeron serpentinus</i>	50	6.3	0.1	0.2	0.2				X
	<i>Fritillaria affinis</i>	50	2.1	0.1	0.2	0.2				X
	<i>Galium porrigens</i>	50	2.1	0.1	0.2	0.2				X
	<i>Iris</i> spp.	50	2.1	0.1	0.2	0.2				X
	<i>Madia</i> spp.	50	2.1	0.1	0.2	0.2				X
	<i>Melica californica</i>	50	2.1	0.1	0.2	0.2				X
	<i>Melica torreyana</i>	50	6.3	0.1	0.2	0.2				X
	<i>Muhlenbergia andina</i>	50	6.3	0.1	0.2	0.2				X
	<i>Parnassia palustris</i>	50	6.3	0.1	0.2	0.2				X
	<i>Pentagramma triangularis</i>	50	2.1	0.1	0.2	0.2				X
	<i>Polygala californica</i>	50	2.1	0.1	0.2	0.2				X
	<i>Ranunculus californicus</i>	50	2.1	0.1	0.2	0.2				X
	<i>Sisyrinchium bellum</i>	50	2.1	0.1	0.2	0.2				X
	<i>Thermopsis californica</i>	50	2.1	0.1	0.2	0.2				X
	<i>Zigadenus fremontii</i>	50	2.1	0.1	0.2	0.2				X
<b>Non-vascular</b>										
	Moss	100	54.5	0.2	0.2	0.2	X	X		X
	Algae	50	45.5	1.0	2.0	2.0				X

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

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**Common Name:** Monterey cypress – Monterey pine stands

**NVC Alliance Code:** N/A.

**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 planted and can be 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.

**Local Vegetation Description**

The Monterey cypress – Monterey pine stands Alliance forms an open to continuous tree canopy with a sparse to continuous shrub understory. *Hesperocyparis macrocarpa* and *Pinus radiata* are characteristic or often present. Commonly associated shrubs include *Baccharis pilularis* and *Toxicodendron diversilobum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	47.8	8 – 70	26.3	15 – 35
Hardwood	3.3	0 – 22	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	22.3	0.0 – 75.0	1.3	0.5 – 2
Herb	32.0	0 – 90	0.3	0 – 1

### **Local Membership Rule**

*Pinus radiata* dominates the conifer canopy. Planted stands of *Pinus radiata* are found along roadsides or on slopes where they were introduced (not native to Marin Co.).

Planted *Hesperocyparis macrocarpa* dominates in patches or along roads. Stands are considered semi-natural since they are not naturally occurring (not native to Marin Co.).

### **Local Environmental Description**

**Elevation:** Mean 53 m, Range 12 – 241 m

**Aspect:** Flat (1)

**Slope:** 0 degrees

**Macro Topography:** Bottom (1)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** 44.0%

**Litter Cover:** 47%

**Soil Texture (field assessed):** no data

**Geology (field or map data):** Sandstone and other sedimentary (8), Franciscan melange (2), Alluvium (1)

**Marin County Watersheds:** Bolinas (8), Lagunitas Creek (2), Point Reyes (1), San Rafael (1)

### **Site Impacts**

This alliance has greater cover of exotics than natives, with high non-native plant cover (averages 72.0%) relative to native cover. Non-native species with highest frequency and abundance include *Ageratina adenophora*, *Briza maxima*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Conium maculatum*, *Cynosurus echinatus*, *Dactylis glomerata*, *Eucalyptus globulus*, *Foeniculum vulgare*, *Holcus lanatus*, *Phalaris aquatica*, *Plantago lanceolata*, and *Rumex acetosella*.

### **Associations in Marin County**

*Hesperocyparis macrocarpa* Ruderal

*Pinus radiata* plantations

### **Classification Comments**

Because most of the surveys are Accuracy Assessments, not much environmental information was recorded.

**References:** Buck-Diaz et al. 2019, Klein et al. 2015

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

### **Surveys Used for Description**

**Total: N=15; Marin County (n=15):** MMWD0242, PGA1098, PGA1190, PGA1360, PGA1370, PGA1640, PGA1641, PGA1644, PGA1647, PGA1673, PGA1709, PGA1729, PGA1732, PGA1733, PGA930



## Alliance Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Pinus radiata</i>	60	46.2	25.3	20.0	65.0				X
	<i>Hesperocyparis macrocarpa</i>	60	44.2	21.7	8.0	70.0				X
	<i>Eucalyptus globulus</i>	33	5.3	1.7	1.0	10.0				
	<i>Quercus agrifolia</i>	33	1.6	0.5	0.2	5.0				
	<i>Pseudotsuga menziesii</i>	27	0.7	0.4	0.2	5.0				
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	60	27.2	3.6	0.2	20.0				X
	<i>Baccharis pilularis</i>	53	18.4	4.2	0.2	35.0				X
	<i>Rubus ursinus</i>	47	16.7	4.4	0.2	32.0				
	<i>Heteromeles arbutifolia</i>	20	6.5	0.8	0.2	12.0				
	<i>Artemisia californica</i>	20	0.5	0.2	0.2	2.0				
	<i>Diplacus aurantiacus</i>	20	1.7	0.1	0.2	1.0				
<b>Herb</b>										
	<i>Galium aparine</i>	47	0.5	0.1	0.2	0.2				
	<i>Lolium perenne</i>	40	2.7	1.8	0.2	15.0				
	<i>Plantago lanceolata</i>	33	2.2	1.1	0.2	8.0				
	<i>Avena</i> spp.	33	2.0	0.8	0.2	5.0				
	<i>Holcus lanatus</i>	27	7.8	4.0	0.2	25.0				
	<i>Conium maculatum</i>	27	6.8	2.9	0.2	23.0				
	<i>Marah fabaceus</i>	27	8.4	0.7	0.2	10.0				
	<i>Carduus pycnocephalus</i>	27	0.4	0.1	0.2	1.0				
	<i>Ageratina adenophora</i>	20	11.1	6.3	0.2	65.0				
	<i>Juncus patens</i>	20	2.1	1.2	0.2	15.0				
	<i>Cynosurus echinatus</i>	20	2.9	1.1	3.0	8.0				
	<i>Briza maxima</i>	20	3.0	1.1	3.0	10.0				
	<i>Phalaris aquatica</i>	20	6.2	0.7	0.2	10.0				
	<i>Rumex acetosella</i>	20	0.8	0.6	0.2	8.0				
	<i>Bromus carinatus</i>	20	1.4	0.2	0.2	3.0				
	<i>Dactylis glomerata</i>	20	1.4	0.2	0.2	3.0				
	<i>Bromus hordeaceus</i>	20	0.1	0.0	0.2	0.2				
	<i>Foeniculum vulgare</i>	20	0.1	0.0	0.2	0.2				

## ***Hesperocyparis macrocarpa* Ruderal Provisional Semi-natural Association**

**Common Name:** Monterey cypress plantations Woodland

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

### **Local Vegetation Description**

The Monterey cypress plantations Association forms an open to continuous tree canopy with a sparse to continuous shrub understory. The dominant tree is *Hesperocyparis macrocarpa*. Commonly associated shrubs include *Toxicodendron diversilobum*, and commonly associated herbs include *Lolium perenne*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	45	8 – 70	27.5	20 – 35
Hardwood	4.7	0 – 22	no data	
Regenerating or Shrubby Tree	0	0 – 0	no data	
Shrub	26.7	0 – 75	1.3	0.5 – 2
Herb	39.4	0 – 90	0.3	0 – 1

### **Local Environmental Description**

**Elevation:** Mean 34 m, Range 13 – 52 m

**Aspect:** Flat (1)

**Slope:** 0 degrees

**Macro Topography:** Bottom (1)

**Large Rock:** 0%

**Small Rock:** 0%

**Fines Cover:** 44%

**Litter Cover:** 47%

**Soil Texture (field assessed):** no data

**Geology (field or map data):** Sandstone and other sedimentary (4), Franciscan melange (2), Alluvium (1)

**Marin County Watersheds:** Bolinas (4), Lagunitas Creek (2), Point Reyes (1)

### **Site Impacts**

This association has greater cover of exotics than natives (average 66.8% relative to native cover). *Hesperocyparis macrocarpa* is not native to Marin County but has been planted there. Other non-native species that occur with highest frequency and abundance include *Avena* spp., *Briza minor*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Cirsium vulgare*, *Conium maculatum*, *Cynosurus echinatus*, *Delairea odorata*, *Eucalyptus globulus*, *Foeniculum vulgare*, *Genista monspessulana*, *Holcus lanatus*, *Hordeum murinum*, *Lolium perenne*, *Plantago lanceolata*, and *Rumex acetosella*.

### **Classification Comments**

This association is considered provisional since it is under-sampled in its expected range. The majority of these surveys were Accuracy Assessments without environmental data recorded.

**References:** Buck-Diaz et al. 2019, Klein et al. 2015

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

**State Rare:** N

### **Surveys Used for Description**

**Total: N=9; Marin County (n=9):** MMWD0242, PGA1098, PGA1190, PGA1370, PGA1644, PGA1647, PGA1729, PGA1732, PGA930

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Hesperocyparis macrocarpa</i>	100	73.6	36.2	8.0	70.0	X	X		X
	<i>Eucalyptus globulus</i>	44	8.5	2.7	3.0	10.0				
	<i>Pinus radiata</i>	33	13.1	8.3	20.0	30.0				
	<i>Umbellularia californica</i>	22	1.7	0.8	2.0	5.0				
	<i>Quercus agrifolia</i>	22	2.5	0.7	1.0	5.0				
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	56	28.0	4.2	3.0	20.0				X
	<i>Rubus ursinus</i>	44	17.1	6.0	0.2	32.0				
	<i>Baccharis pilularis</i>	44	15.5	5.1	0.2	35.0				
	<i>Frangula californica</i>	22	6.7	0.9	3.0	5.0				
	<i>Diplacus aurantiacus</i>	22	2.7	0.1	0.2	1.0				
	<i>Genista monspessulana</i>	22	0.5	0.1	0.2	1.0				
	<i>Heteromeles arbutifolia</i>	22	0.6	0.0	0.2	0.2				
	<i>Salix lasiolepis</i>	22	0.4	0.0	0.2	0.2				
<b>Herb</b>										
	<i>Lolium perenne</i>	56	4.4	2.9	0.2	15.0				X
	<i>Holcus lanatus</i>	44	13.1	6.7	0.2	25.0				
	<i>Plantago lanceolata</i>	44	2.5	1.8	0.2	8.0				
	<i>Conium maculatum</i>	33	10.0	4.8	10.0	23.0				
	<i>Rumex acetosella</i>	33	1.3	0.9	0.2	8.0				
	<i>Avena</i> spp.	33	2.1	0.9	0.2	5.0				
	<i>Bromus hordeaceus</i>	33	0.1	0.1	0.2	0.2				
	<i>Galium aparine</i>	33	0.1	0.1	0.2	0.2				
	<i>Hordeum murinum</i>	22	4.8	3.4	11.0	20.0				
	<i>Juncus patens</i>	22	3.5	2.0	3.0	15.0				
	<i>Cirsium vulgare</i>	22	2.2	1.6	4.0	10.0				
	<i>Marah fabaceus</i>	22	13.8	1.1	0.2	10.0				
	<i>Cynosurus echinatus</i>	22	2.3	1.0	3.0	6.0				
	<i>Juncus effusus</i>	22	0.8	0.6	0.2	5.0				
	<i>Fragaria vesca</i>	22	0.9	0.2	0.2	2.0				
	<i>Carduus pycnocephalus</i>	22	0.3	0.1	0.2	1.0				
	<i>Delairea odorata</i>	22	0.3	0.1	0.2	1.0				
	<i>Briza minor</i>	22	0.1	0.0	0.2	0.2				
	<i>Foeniculum vulgare</i>	22	0.1	0.0	0.2	0.2				

***Pinus radiata* plantations Provisional Semi-natural Association**

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**Common Name:** Monterey pine plantations Woodland

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

**Local Vegetation Description**

The Monterey pine plantations Association forms an intermittent to continuous tree canopy with a sparse to intermittent shrub understory. The dominant tree is *Pinus radiata*, and those that are characteristic or often present include *Pseudotsuga menziesii* and *Quercus agrifolia*. Commonly associated shrubs include *Baccharis pilularis*, *Rubus ursinus*, and *Toxicodendron diversilobum*, and commonly associated herbs include *Galium aparine*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	52	34 – 70	25	15 – 35
Hardwood	1.3	0 – 5	no data	
Regenerating or Shrubby Tree	0	0 – 0	no data	
Shrub	15.8	0 – 45	no data	
Herb	20.8	2 – 55	0.3	0 – 0.5

**Local Environmental Description**

**Elevation:** Mean 80 m, Range 12 – 241 m

**Aspect:** no data

**Slope:** no data

**Macro Topography:** no data

**Large Rock:** no data

**Small Rock:** no data

**Fines Cover:** no data

**Litter Cover:** no data

**Soil Texture (field assessed):** no data

**Geology (field or map data):** Sandstone and other sedimentary (4)

**Marin County Watersheds:** Bolinas (4), San Rafael (1)

**Site Impacts**

This association has greater cover of exotics than natives (average 79.9% relative to native cover). *Pinus radiata* is not native to Marin County but has been planted there. Other non-native species that occur with highest frequency and abundance include *Ageratina adenophora*, *Avena* spp., *Briza maxima*, *Carduus pycnocephalus*, *Dactylis glomerata*, *Hypochaeris radicata*, and *Phalaris aquatica*.

**Classification Comments**

This association is considered provisional since it is under-sampled in its expected range. All of these surveys were Accuracy Assessments without environmental data recorded.

**References:** Buck-Diaz et al. 2019, Klein et al. 2015

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

**State Rare:** N

**Surveys Used for Description**

**Total: N=6; Marin County (n=6):** PGA1360, PGA1640, PGA1641, PGA1673, PGA1709, PGA1733

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Pinus radiata</i>	100	95.8	50.7	34.0	65.0	X	X		X
	<i>Pseudotsuga menziesii</i>	50	1.5	1.0	0.2	5.0				X
	<i>Quercus agrifolia</i>	50	0.3	0.2	0.2	1.0				X
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	67	22.8	2.9	0.2	15.0				X
	<i>Toxicodendron diversilobum</i>	67	26.0	2.6	0.2	15.0				X
	<i>Rubus ursinus</i>	50	16.2	2.0	0.2	10.0				X
	<i>Artemisia californica</i>	33	0.4	0.1	0.2	0.2				
<b>Herb</b>										
	<i>Galium aparine</i>	67	1.0	0.1	0.2	0.2				X
	<i>Ageratina adenophora</i>	33	11.0	5.0	0.2	30.0				
	<i>Briza maxima</i>	33	6.4	2.2	3.0	10.0				
	<i>Phalaris aquatica</i>	33	15.5	1.7	0.2	10.0				
	<i>Avena</i> spp.	33	1.8	0.5	0.2	3.0				
	<i>Hypochaeris radicata</i>	33	1.9	0.5	0.2	3.0				
	<i>Bromus carinatus</i>	33	2.3	0.1	0.2	0.2				
	<i>Carduus pycnocephalus</i>	33	0.6	0.1	0.2	0.2				
	<i>Dactylis glomerata</i>	33	2.3	0.1	0.2	0.2				
	<i>Marah</i> spp.	33	2.3	0.1	0.2	0.2				
	<i>Marah fabaceus</i>	33	0.4	0.1	0.2	0.2				
	<i>Sanicula crassicaulis</i>	33	2.2	0.1	0.2	0.2				

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## ***Notholithocarpus densiflorus* Forest Alliance**

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**Common Name:** Tanoak forest

**NVC Alliance Code:** A3357. *Notholithocarpus densiflorus* - *Arbutus menziesii* Forest Alliance

### **Statewide Description**

*Notholithocarpus densiflorus* is dominant or co-dominant in the tree canopy with *Acer macrophyllum*, *Alnus rubra*, *Arbutus menziesii*, *Calocedrus decurrens*, *Chamaecyparis lawsoniana*, *Chrysolepis chrysophylla*, *Cornus nuttallii*, *Pinus coulteri*, *Pinus lambertiana*, *Pseudotsuga menziesii*, *Quercus agrifolia*, *Quercus chrysolepis*, *Quercus kelloggii*, *Sequoia sempervirens*, *Torreya californica*, *Tsuga heterophylla*, and *Umbellularia californica*.

Stands of this alliance and others that contain *N. densiflorus* are often referred to as mixed evergreen forest (Sawyer 2006, 2007). Bingham's (1999) study found that stands dominated by *N. densiflorus* differed significantly in species composition and environmental conditions from stands containing a mix of *N. densiflorus* with other evergreens. Cooper's (1922) original concept of the mixed evergreen forest described mixed hardwood stands in the Santa Lucia Mountains. Munz (1959) and Whittaker (1960) expanded the term "mixed evergreen" to include *Pseudotsuga menziesii* – *Notholithocarpus densiflorus* stands. Forest ecologists have used the name "*Lithocarpus densiflorus* series" or "*Notholithocarpus densiflorus* Alliance" to refer to stands that have a low to moderate presence of conifers, such as *Pseudotsuga menziesii* or *Sequoia sempervirens* (e.g., Atzet and Wheeler 1982, Jimerson et al. 1996). Our concept of the *Notholithocarpus densiflorus* Alliance is one with minimal conifer cover and the main cover provided by tanoak with a variable proportion of other hardwoods, in which the National Vegetation Classification (NVC) will be updated to reflect this separation. The shrub form of *Notholithocarpus densiflorus* (var. *echinoides*) is in a separate alliance.

### **Local Vegetation Description**

The Tanoak forest Alliance forms an open to continuous tree canopy with a sparse to open shrub understory. The dominant tree is *Notholithocarpus densiflorus*, and *Arbutus menziesii*, *Umbellularia californica* are characteristic or often present. Commonly associated shrubs include *Toxicodendron diversilobum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	4.6	0 – 15	20.1	2 – 50
Hardwood	44.2	15 – 75	12.4	2 – 35
Regenerating or Shrubby Tree	6.4	0 – 30.0	7.5	5 – 10
Shrub	10.1	0.0 – 29.0	1.5	1 – 2
Herb	5.8	0 – 43	0.3	0 – 0.5

### **Local Membership Rule**

*Notholithocarpus densiflorus* is strongly dominant in the tree canopy, or it co-occurs with sub-dominant to co-dominant *Arbutus menziesii* or *Umbellularia californica*.

### **Local Environmental Description**

**Elevation:** Mean 443 m, Range 68 – 725 m

**Aspect:** NE (5), SE (5), NW (3), SW (1), Variable (1)

**Slope:** Mean 28 degrees, Range 2 – 40 degrees

**Macro Topography:** Middle 1/3 of slope (9), Upper 1/3 of slope (5), Ridge top (1)

**Large Rock:** Mean 1.4%, Range 0.0 – 15.0%

**Small Rock:** Mean 1.3%, Range 0.0 – 5.0%

**Fines Cover:** Mean 6.5%, Range 1.0 – 17.0%

**Litter Cover:** Mean 76.3%, Range 25.0 – 97%

**Soil Texture (field assessed):** Moderately fine clay loam (5), Moderately fine sandy clay loam (4), Moderately fine silty clay loam (2), Medium to very fine, sandy loam (1), Moderately coarse, sandy loam (1)

**Geology (field or map data):** Franciscan melange (15), Ultramafic rocks, mostly serpentine (1)

**Marin County Watersheds:** Lagunitas Creek (13), San Rafael (2), Bolinas (1)

### **Site Impacts**

This alliance has low non-native plant cover (average 1.9%) relative to native cover. Non-native species with highest frequency and abundance include *Galium aparine*.

### **Associations in Marin County**

*Notholithocarpus densiflorus* – *Arbutus menziesii*

*Notholithocarpus densiflorus* – *Quercus chrysolepis*

*Notholithocarpus densiflorus* / *Vaccinium ovatum*

### **Classification Comments**

None.

**References:** Evens and Kentner 2006, Jimerson et al. 1996, Keeler-Wolf et al. 2003a, Klein et al. 2015

**Global Rarity Rank:** G4

**State Rarity Rank:** S3



**Surveys Used for Description**

**Total: N=17; Marin County (n=17):** MMWD0099, MMWD0107A, MMWD0124, MMWD0177, MMWD0200A, MMWD0201, MMWD0210, MMWD0284A, MMWD0305, MMWD0316, MMWD0361, MMWD0401, MMWD0420, MOSD0100, PGA8633, PGA8774, PORE140

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Notholithocarpus densiflorus</i>	82	50.0	28.3	15.0	98.0	X	X		X
	<i>Arbutus menziesii</i>	76	19.8	11.4	1.0	35.0	X			X
	<i>Umbellularia californica</i>	59	9.3	4.1	1.0	20.0				X
	<i>Pseudotsuga menziesii</i>	47	5.3	2.6	2.0	15.0				
	<i>Quercus chrysolepis</i>	29	6.8	5.5	5.0	55.0				
	<i>Torreya californica</i>	24	1.2	0.8	1.0	7.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Notholithocarpus densiflorus</i> *	41	38.8	5.5	4.2	30.0				
	<i>Quercus wislizeni</i>	24	12.1	0.5	0.2	8.0				
	<i>Pseudotsuga menziesii</i> *	24	11.8	0.2	0.2	2.0				
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	65	14.7	0.2	0.2	1.0				X
	<i>Lonicera hispidula</i>	41	10.3	0.1	0.2	1.0				
	<i>Vaccinium ovatum</i>	24	18.3	2.3	0.2	22.0				
<b>Herb</b>										
	<i>Iris douglasiana</i>	41	10.2	0.2	0.2	1.0				
	<i>Carex globosa</i>	41	6.1	0.1	0.2	0.2				
	<i>Pteridium aquilinum</i>	35	6.0	0.1	0.2	0.2				
	<i>Pentagramma triangularis</i>	35	1.8	0.1	0.2	0.2				
	<i>Stachys ajugoides</i>	29	3.5	0.2	0.2	3.0				
	<i>Polystichum munitum</i>	29	7.1	0.1	0.2	1.0				
	<i>Whipplea modesta</i>	24	3.4	0.2	0.2	3.0				
	<i>Polygala californica</i>	24	8.4	0.0	0.2	0.2				
	<i>Galium aparine</i>	24	2.1	0.0	0.2	0.2				
<b>Non-vascular</b>										
	Moss	41	40.2	1.0	0.2	10.0				

***Notholithocarpus densiflorus* – *Arbutus menziesii* Association**

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**Common Name:** Tanoak – Madrone Woodland

**Alliance:** *Notholithocarpus densiflorus* Forest Alliance

**Local Vegetation Description**

The Tanoak – Madrone Association forms an intermittent to continuous tree canopy with a sparse to intermittent shrub understory. The dominant tree is *Notholithocarpus densiflorus*, and those that are characteristic or often present include *Arbutus menziesii*, *Pseudotsuga menziesii*, and *Umbellularia californica*. Commonly associated shrubs include *Lonicera hispidula* and *Toxicodendron diversilobum*, and commonly associated herbs include *Carex globosa*, *Iris douglasiana*, and *Pteridium aquilinum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	4.9	0 – 10	24.0	5 – 50
Hardwood	48	20 – 75	12.3	2 – 35
Regenerating or Shrubby Tree	5.5	0 – 20	no data	
Shrub	8.4	0 – 22	no data	
Herb	7.7	0 – 43	0.3	0 – 0.5

**Local Environmental Description**

**Elevation:** Mean 378 m, Range 68 – 682 m

**Aspect:** NE (3), SE (3), NW (2), SW (1)

**Slope:** Mean 31 degrees, Range 3 – 40 degrees

**Macro Topography:** Middle 1/3 of slope (7), Upper 1/3 of slope (2)

**Large Rock:** Mean 0.1%, Range 0 – 0.2%

**Small Rock:** Mean 1.3%, Range 0.2 – 5%

**Fines Cover:** Mean 7%, Range 1 – 17%

**Litter Cover:** Mean 69.7%, Range 25 – 93%

**Soil Texture (field assessed):** Moderately fine clay loam (3), Moderately fine silty clay loam (2), Medium to very fine, sandy loam (1), Moderately fine sandy clay loam (1), Moderately coarse, sandy loam (1)

**Geology (field or map data):** Franciscan melange (9), Ultramafic rocks, mostly serpentine (1)

**Marin County Watersheds:** Lagunitas Creek (8), San Rafael (2)

**Site Impacts**

This association has low non-native plant cover (average 2.7%) relative to native cover. Non-native species that occur with highest frequency and abundance includes *Scandix pecten-veneris*.

**Classification Comments**

None.

**References:** Evens and Kentner 2006, Keeler-Wolf et al. 2003a, Klein et al. 2015

**Global Rarity Rank:** G3

**State Rarity Rank:** S3

**State Rare:** Y

**Surveys Used for Description**

**Total: N=11; Marin County (n=11):** MMWD0099, MMWD0107A, MMWD0124, MMWD0201, MMWD0210, MMWD0284A, MMWD0361, MMWD0401, MMWD0420, PGA8633, PGA8774

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Arbutus menziesii</i>	100	29.4	16.8	1.0	35.0	X			X
	<i>Notholithocarpus densiflorus</i>	82	43.8	23.1	18.0	45.0	X		X	X
	<i>Umbellularia californica</i>	64	13.2	5.8	1.0	20.0				X
	<i>Pseudotsuga menziesii</i>	55	4.1	2.4	2.0	8.0				X
	<i>Quercus chrysolepis</i>	27	3.0	1.6	5.0	8.0				
	<i>Torreya californica</i>	27	1.7	1.2	1.0	7.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Notholithocarpus densiflorus*</i>	36	33.8	4.3	4.2	20.0				
	<i>Quercus wislizeni</i>	27	9.6	0.8	0.2	8.0				
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	73	13.0	0.1	0.2	0.2				X
	<i>Lonicera hispidula</i>	64	15.9	0.2	0.2	1.0				X
	<i>Heteromeles arbutifolia</i>	27	9.2	0.5	0.2	4.0				
<b>Herb</b>										
	<i>Iris douglasiana</i>	55	6.6	0.3	0.2	1.0				X
	<i>Carex globosa</i>	55	8.6	0.1	0.2	0.2				X
	<i>Pteridium aquilinum</i>	55	9.3	0.1	0.2	0.2				X
	<i>Pentagramma triangularis</i>	45	1.7	0.1	0.2	0.2				
	<i>Stachys ajugoides</i>	36	4.2	0.3	0.2	3.0				
	<i>Whipplea modesta</i>	36	5.2	0.3	0.2	3.0				
	<i>Polystichum munitum</i>	36	1.8	0.1	0.2	1.0				
	<i>Galium aparine</i>	27	2.4	0.1	0.2	0.2				
<b>Non-vascular</b>										
	Moss	36	36.4	0.4	0.2	2.0				

## ***Notholithocarpus densiflorus* – *Quercus chrysolepis* Association**

**Common Name:** Tanoak – Canyon Live Oak Woodland

**Alliance:** *Notholithocarpus densiflorus* Forest Alliance

### **Local Vegetation Description**

The Tanoak – Canyon Live Oak Association forms an intermittent to continuous tree canopy with a sparse to open shrub understory. The dominant tree is *Notholithocarpus densiflorus*. Characteristic or often present trees include *Quercus chrysolepis*, *Arbutus menziesii*, *Pseudotsuga menziesii*, *Torreya californica*, and *Umbellularia californica*. Regenerating or shrubby trees that are often present include *Notholithocarpus densiflorus*, *Pseudotsuga menziesii*, *Quercus chrysolepis*, and *Quercus wislizeni*. Commonly associated shrubs include *Rosa californica*, and commonly associated herbs include *Iris douglasiana* and *Polygala californica*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0	0 – 0	0	no data
Hardwood	65.0	40 – 90	7.5	5 – 10
Regenerating or Shrubby Tree	5.8	0.2 – 11.4	no data	
Shrub	11.6	0.2 – 23.0	no data	
Herb	0.2	0.2 – 0.2	0.3	0 – 0.5

### **Local Environmental Description**

**Elevation:** Mean 674 m, Range 622 – 725 m

**Aspect:** NE (1), SE (1)

**Slope:** Mean 28 degrees, Range 17 – 38 degrees

**Macro Topography:** Upper 1/3 of slope (1), Middle 1/3 of slope (1)

**Large Rock:** Mean 8%, Range 1 – 15%

**Small Rock:** Mean 2.6%, Range 0.2 – 5%

**Fines Cover:** Mean 4%, Range 4 – 4%

**Litter Cover:** Mean 78.5%, Range 72 – 85%

**Soil Texture (field assessed):** Moderately fine clay loam (1)

**Geology (field or map data):** Franciscan melange (2)

**Marin County Watersheds:** Lagunitas Creek (2)

### **Site Impacts**

This association has very low non-native plant cover (average 0.0%) relative to native cover. No non-native species were recorded by surveyors.

### **Classification Comments**

Due to hybridization and morphological similarity between the species, plants identified as *Quercus wislizeni* may be *Quercus parvula*, which has been found to be the most widespread genotype in Marin County (Dodd and Afzul-Rafii 2004, Hauser et al. 2017).

**References:** Jimerson et al. 1996

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

### **Surveys Used for Description**

**Total: N=2; Marin County (n=2):** MMWD0200A, MMWD0316

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Notholithocarpus densiflorus</i>	100	51.4	42.0	41.0	43.0	X	X		X
	<i>Quercus chrysolepis</i>	100	41.6	38.0	21.0	55.0	X		X	X
	<i>Arbutus menziesii</i>	50	3.4	3.6	7.2	7.2				X
	<i>Pseudotsuga menziesii</i>	50	1.4	1.5	3.0	3.0				X
	<i>Umbellularia californica</i>	50	1.5	1.0	2.0	2.0				X
	<i>Torreya californica</i>	50	0.7	0.5	1.0	1.0				X
<b>Regenerating or Shrubby Trees</b>										
	<i>Notholithocarpus densiflorus</i> *	50	43.9	5.0	10.0	10.0				X
	<i>Pseudotsuga menziesii</i> *	50	5.3	0.6	1.2	1.2				X
	<i>Quercus chrysolepis</i> *	50	0.9	0.1	0.2	0.2				X
	<i>Quercus wislizeni</i>	50	50.0	0.1	0.2	0.2				X
<b>Shrub</b>										
	<i>Rosa californica</i>	50	50.0	0.1	0.2	0.2				X
<b>Herb</b>										
	<i>Iris douglasiana</i>	50	50.0	0.1	0.2	0.2				X
	<i>Polygala californica</i>	50	50.0	0.1	0.2	0.2				X
<b>Non-vascular</b>										
	Moss	50	41.7	5.0	10.0	10.0				X
	Lichen	50	8.3	1.0	2.0	2.0				X

## **Notholithocarpus densiflorus / Vaccinium ovatum Association**

**Common Name:** Tanoak / Black Huckleberry Woodland

**Alliance:** *Notholithocarpus densiflorus* Forest Alliance

### **Local Vegetation Description**

The Tanoak / Black Huckleberry Association forms an open to continuous tree canopy with an open to intermittent shrub understory. The dominant tree is *Notholithocarpus densiflorus*, and those that are characteristic or often present include *Sequoia sempervirens*. Commonly associated shrubs include *Vaccinium ovatum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	3.5	0 – 10	22.5	15 – 35
Hardwood	43.2	15 – 85	18.8	10 – 35
Regenerating or Shrubby Tree	1.1	0 – 6	3.3	0.5 – 10
Shrub	31.7	10 – 55	2.5	1 – 5
Herb	1.9	0 – 10	0.3	0 – 0.5

### **Local Environmental Description**

**Elevation:** Mean 357 m, Range 123 – 555 m

**Aspect:** NW (2), SE (1), NE (1), SW (1)

**Slope:** Mean 17 degrees, Range 2 – 29 degrees

**Macro Topography:** Upper 1/3 of slope (2), Ridge top (1), Middle 1/3 of slope (1), Bottom to Lower 1/3 of slope (1)

**Large Rock:** Mean 1%, Range 0.0 – 5%

**Small Rock:** Mean 0%, Range 0 – 0.2%

**Fines Cover:** Mean 26%, Range 0 – 88%

**Litter Cover:** Mean 74.6%, Range 9 – 97%

**Soil Texture (field assessed):** Medium to very fine, loamy sand (3), Moderately fine sandy clay loam (2)

**Geology (field or map data):** Franciscan melange (2), Shale and other sedimentary (2), Sandy alluvium (most alluvial fans and washes) (1), Mixed alluvium (1), Sandstone (1)

**Marin County Watersheds:** Lagunitas Creek (2)

**Other Watersheds, San Mateo Co.:** Palo Alto (2), Ano Nuevo (1), Pescadero Creek (1); **Sonoma Co.:** Gualala River (1)

### **Site Impacts**

This association has very low non-native plant cover (average 0.0%) relative to native cover. Non-native species that occur with highest frequency and abundance includes *Genista monspessulana*.

**Classification Comments** Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** Jimerson et al. 1996

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

### **Surveys Used for Description**

**Total: N=7; Marin County (n=2):** MOSD0100, PORE140

San Mateo County (n=4): PGA803, PGA818A, SMAT0186, SMAT0684

*Notholithocarpus densiflorus / Vaccinium ovatum Association*  
*Notholithocarpus densiflorus Forest Alliance*

Sonoma County (n=1): SONO0125

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Notholithocarpus densiflorus</i>	100	91.9	51.0	15.0	98.0	X	X		X
	<i>Sequoia sempervirens</i>	57	2.9	1.7	1.0	5.0				X
	<i>Arbutus menziesii</i>	43	2.1	1.1	1.0	5.0				
	<i>Pseudotsuga menziesii</i>	29	1.8	1.0	2.0	5.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Notholithocarpus densiflorus</i> *	43	40.8	1.1	0.2	6.0				
<b>Shrub</b>										
	<i>Vaccinium ovatum</i>	100	76.3	22.6	5.0	55.0	X	X		X
	<i>Morella californica</i>	29	1.0	0.2	0.2	1.0				
	<i>Gaultheria shallon</i>	29	0.4	0.1	0.2	0.2				
<b>Herb</b>										
	<i>Pteridium aquilinum</i>	43	7.5	0.2	0.2	1.0				
	<i>Polystichum munitum</i>	29	17.5	0.5	0.2	3.0				
<b>Non-vascular</b>										
	Moss	29	28.6	2.1	5.0	10.0				



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## ***Pinus muricata* – *Pinus radiata* Forest & Woodland Alliance**

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**Common Name:** Bishop pine – Monterey pine forest and woodland

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

### **Statewide Description**

*Pinus muricata* or *Pinus radiata* is dominant or co-dominant in the tree canopy with *Abies grandis*, *Acer macrophyllum*, *Alnus rhombifolia*, *Arbutus menziesii*, *Hesperocyparis goveniana*, *Hesperocyparis pima*, *Notholithocarpus densiflorus*, *Pinus attenuata*, *Pinus contorta* ssp. *bolanderi*, *Pinus contorta* ssp. *contorta*, *Pinus muricata*, *Pinus radiata*, *Pseudotsuga menziesii*, *Quercus agrifolia*, *Quercus tomentella*, *Quercus wislizeni*, *Salix lasiolepis*, *Salix scouleriana*, *Sequoia sempervirens*, *Tsuga heterophylla* or *Umbellularia californica*.

*Pinus muricata* grows on the mainland from Santa Barbara to Humboldt Cos., as well as on the Santa Cruz and Santa Rosa islands (Barbour 2007). It grows in areas with spring and summer fog, which is important to its survival (Cope 1993e). Chaparral surrounds stands in the La Purisima Hills that occur on diatomaceous mudstone (Cole 1980, Vogl et al. 1977), in the hills north of La Honda Canyon (Schmalzer et al. 1988) in Santa Barbara Co., and near Erendira in Baja California. Stands on the Channel Islands differ in species composition from one another and from those on the mainland (Philbrick and Haller 1977). In Humboldt and Mendocino Cos., *P. muricata* commonly occurs on shallow, poorly drained soils and mixes with *Hesperocyparis pigmaea*, *P. contorta*, *Pseudotsuga menziesii*, and *Sequoia sempervirens* (Westman and Whittaker 1975).

*Pinus radiata* is a fast-growing conifer that grows on nutrient poor, acidic soils in maritime zones with summer-fog. Mainland trees occur as three discrete populations in central California (Santa Cruz/San Mateo, Monterey Peninsula, and San Luis Obispo Counties) where they grow on windy, foggy slopes and

terraces in the coastal marine layer. Trees exist in desert scrub on Guadalupe and Cedros Island (McDonald and Laacke 1990). *Pinus radiata* is a rare CNPS list 1B.1 plant.

The separate *Pinus muricata* and *Pinus radiata* alliances in the 2009 version of the *Manual of California Vegetation, second edition*, have since been combined into this alliance because of similar life histories and associated species, while associations with *P. radiata* are comparatively quite rare.

### **Local Vegetation Description**

The Bishop pine – Monterey pine forest and woodland Alliance forms a sparse to continuous tree canopy with a sparse to continuous shrub understory. The dominant tree is *Pinus muricata*. Commonly associated shrubs include *Rubus ursinus* and *Vaccinium ovatum*, and commonly associated herbs include *Pteridium aquilinum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	37.2	3 – 90	9.4	2 – 35
Hardwood	9.9	0 – 55	5.4	1 – 15
Regenerating or Shrubby Tree	15.2	0 – 90.0	0.3	0 – 0.5
Shrub	40.2	0.0 – 80.0	2.2	0 – 5
Herb	18.1	0 – 95	0.3	0 – 1

### **Local Membership Rule**

*Pinus muricata* is dominant or co-dominant in the tree overstory and/or regenerating tree layer. The understory may include moderate to dense cover of shrubs such as *Arctostaphylos* spp., *Baccharis pilularis*, *Gaultheria shallon*, *Toxicodendron diversilobum* and *Vaccinium ovatum*.

### **Local Environmental Description**

**Elevation:** Mean 184 m, Range 12 – 395 m

**Aspect:** SW (5), NE (4), NW (3), SE (3)

**Slope:** Mean 19 degrees, Range 0 – 35 degrees

**Macro Topography:** Upper 1/3 of slope (5), Middle 1/3 of slope (4), Ridge top (4), Draw (1)

**Large Rock:** Mean 0.4%, Range 0.0 – 2.0%

**Small Rock:** Mean 2.6%, Range 0.0 – 15.0%

**Fines Cover:** Mean 10.1%, Range 0.0 – 37.0%

**Litter Cover:** Mean 81.1%, Range 35.0 – 100%

**Soil Texture (field assessed):** Moderately coarse, sandy loam (4), Coarse, loamy sand (3), Medium to very fine, sandy loam (2), Moderately fine sandy clay loam (2), Moderately fine clay loam (1), Moderately fine silty clay loam (1), Medium to very fine, loamy sand (1)

**Geology (field or map data):** Granitic (41), Sandstone and other sedimentary (6), Franciscan melange (5), Granitic (generic) (5)

**Marin County Watersheds:** Point Reyes (29), Inverness (22), Lagunitas Creek (5), Bolinas (2)

### **Site Impacts**

This alliance has low non-native plant cover (average 5.3%) relative to native cover. Non-native species with highest frequency and abundance include *Holcus lanatus*.

### **Associations in Marin County**

*Pinus muricata*

*Pinus muricata* – (*Arbutus menziesii*) / *Vaccinium ovatum*

*Pinus muricata* / *Arctostaphylos glandulosa*

*Pinus muricata* / *Ceanothus thyrsiflorus* – *Baccharis pilularis*

**Classification Comments**

None.

**References:** Buck-Diaz et al. 2019, Evens and Kentner 2006, Keeler-Wolf et al. 2003a, Klein et al. 2015, VegCAMP 2018

**Global Rarity Rank:** G3

**State Rarity Rank:** S3

**Surveys Used for Description**

**Total: N=62; Marin County (n=62):** HYPM154, HYPM155, MARIN130, MARIN131, MARIN132, MARIN149, MARINSP09, MMWD0122, MMWD0233, MMWD0237, MMWD0353, MMWD0354, PGA1422, PGA1427, PGA1428, PGA1430, PGA1435, PGA1440, PGA1447, PGA1453, PGA1454, PGA1456, PGA1459, PGA1516, PGA1640A, PGA1641A, PGA165, PGA193, PGA216, PGA227, PGA235, PGA237, PGA250, PGA2847, PGA2856, PGA2859, PGA3744, PGA3812, PGA3848, PGA3964, PGA4023, PGA4029, PGA4069, PGA4109, PGA4146, PGA4175, PGA4201, PGA4263, PGA4326, PGA4361, PGA4369, PGA4428, PGA4738, PGA4954, PGA5029, PGA5306, PGA5470, PORE066, PORE093, PORE114, PORE179, PORE205

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Pinus muricata</i>	77	53.0	24.6	3.0	87.0	X	X		X
	<i>Umbellularia californica</i>	44	8.0	2.3	0.2	30.0				
	<i>Arbutus menziesii</i>	44	3.1	1.6	0.1	15.0				
	<i>Quercus agrifolia</i>	35	10.4	4.0	0.2	45.0				
	<i>Notholithocarpus densiflorus</i>	26	5.4	2.9	0.2	40.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Pinus muricata</i> *	27	24.2	12.6	0.2	90.0				
<b>Shrub</b>										
	<i>Vaccinium ovatum</i>	58	19.8	9.3	0.2	70.0				X
	<i>Rubus ursinus</i>	56	14.0	6.4	0.2	60.0				X
	<i>Frangula californica</i>	47	10.4	5.8	0.2	48.0				
	<i>Toxicodendron diversilobum</i>	44	8.6	2.9	0.2	65.0				
	<i>Baccharis pilularis</i>	37	10.3	4.4	0.2	45.0				
	<i>Ceanothus thyrsiflorus</i>	34	9.7	3.8	0.2	45.0				
	<i>Lonicera hispidula</i>	34	1.4	0.8	0.2	7.0				
	<i>Diplacus aurantiacus</i>	31	2.7	1.0	0.2	10.0				
	<i>Corylus cornuta</i>	29	3.7	1.8	0.2	25.0				
	<i>Rubus parviflorus</i>	26	2.1	1.1	0.2	11.0				
	<i>Gaultheria shallon</i>	23	4.2	2.3	0.2	80.2				
<b>Herb</b>										
	<i>Pteridium aquilinum</i>	63	28.1	2.8	0.2	15.0				X
	<i>Polystichum munitum</i>	44	18.0	3.5	0.2	40.0				
	<i>Holcus lanatus</i>	40	15.1	5.2	0.2	70.0				
	<i>Clinopodium douglasii</i>	21	1.4	0.2	0.2	5.0				
	<i>Stachys ajugoides</i>	21	0.8	0.1	0.2	3.0				

## ***Pinus muricata* Provisional Association**

**Common Name:** Bishop pine Woodland

**Alliance:** *Pinus muricata* – *Pinus radiata* Forest & Woodland Alliance

### **Local Vegetation Description**

The Bishop pine Association forms an open to continuous tree canopy with a sparse to intermittent shrub understory. Characteristic or often present trees include *Pinus muricata*. Commonly associated shrubs include *Toxicodendron diversilobum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	56.7	15 – 90	8	2 – 20
Hardwood	2.5	0 – 15	12.5	10 – 15
Regenerating or Shrubby Tree	28.1	0 – 90	0.3	0 – 0.5
Shrub	12.4	0.0 – 60	0.7	0 – 2
Herb	15.7	0 – 45.5	0.4	0 – 1

### **Local Environmental Description**

**Elevation:** Mean 228 m, Range 73 – 365 m

**Aspect:** NE (1), SW (1)

**Slope:** Mean 2 degrees, Range 0 – 4 degrees

**Macro Topography:** Ridge top (2)

**Large Rock:** 0%

**Small Rock:** Mean 0.1%, Range 0.0 – 0.2%

**Fines Cover:** Mean 12.3%, Range 0.0 – 37.0%

**Litter Cover:** Mean 79.3%, Range 60 – 99%

**Soil Texture (field assessed):** Moderately coarse, sandy loam (1), Moderately fine silty clay loam (1)

**Geology (field or map data):** Granitic (5), Franciscan melange (1)

**Marin County Watersheds:** Point Reyes (5), Lagunitas Creek (1)

### **Site Impacts**

This association has low non-native plant cover (average 6.8%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Cynosurus echinatus* and *Holcus lanatus*.

### **Classification Comments**

This association is considered provisional since it is under-sampled in its expected range.

**References:** Klein et al. 2015

**Global Rarity Rank:** G3?

**State Rarity Rank:** S3?

**State Rare:** Y

### **Surveys Used for Description**

**Total: N=7; Marin County (n=7):** HYPM154, MARIN132, MMWD0122, PGA1641A, PGA165, PGA4175, PGA4428

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Pinus muricata</i>	71	64.1	33.4	15.0	72.5				X
	<i>Quercus agrifolia</i>	29	5.7	1.5	0.2	10.0				
	<i>Notholithocarpus densiflorus</i>	29	0.5	0.4	0.2	2.5				
	<i>Arbutus menziesii</i>	29	0.2	0.1	0.2	0.2				
<b>Regenerating or Shrubby Trees</b>										
	<i>Pinus muricata</i> *	29	28.6	25.7	90.0	90.0				
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	57	35.4	5.1	0.2	25.0				X
	<i>Rubus ursinus</i>	43	19.2	1.9	1.0	10.0				
	<i>Baccharis pilularis</i>	29	4.3	0.9	3.0	3.0				
	<i>Vaccinium ovatum</i>	29	14.3	0.1	0.2	0.2				
<b>Herb</b>										
	<i>Pteridium aquilinum</i>	43	16.6	1.9	1.0	10.0				
	<i>Holcus lanatus</i>	29	14.8	3.9	7.0	20.0				
	<i>Anaphalis margaritacea</i>	29	6.2	0.6	1.0	3.0				
	<i>Cynosurus echinatus</i>	29	6.8	0.6	2.0	2.0				

***Pinus muricata* – (*Arbutus menziesii* – *Notholithocarpus densiflorus*) / *Vaccinium ovatum* Association**

**Common Name:** Bishop pine – Pacific Madrone / Black Huckleberry Woodland

**Alliance:** *Pinus muricata* – *Pinus radiata* Forest & Woodland Alliance

**Local Vegetation Description**

The Bishop pine – Pacific Madrone / Black Huckleberry Association forms an open to continuous tree canopy with a sparse to continuous shrub understory. The dominant tree is *Pinus muricata*, and those that are characteristic or often present include *Arbutus menziesii*, *Quercus agrifolia*, and *Umbellularia californica*. Commonly associated shrubs include *Vaccinium ovatum*, *Frangula californica* and *Lonicera hispidula*, and commonly associated herbs include *Pteridium aquilinum* and *Polystichum munitum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	30.1	3 – 90	14.3	2 – 35
Hardwood	22.7	0 – 96	6.3	2 – 15
Regenerating or Shrubby Tree	6.9	0 – 90	0	no data
Shrub	48.9	2.0 – 75	2.6	0.5 – 5
Herb	16.7	0.2 – 65	0.3	0 – 0.5

**Local Environmental Description**

**Elevation:** Mean 154 m, Range 16 – 328 m

**Aspect:** NE (3), NW (3), SE (2), SW (1)

**Slope:** Mean 22 degrees, Range 2 – 35 degrees

**Macro Topography:** Upper 1/3 of slope (3), Middle 1/3 of slope (2), Ridge top (2), Draw (1),

**Large Rock:** 0%

**Small Rock:** Mean 2.3%, Range 0 – 15%

**Fines Cover:** Mean 5.3%, Range 0 – 13%

**Litter Cover:** Mean 85.5%, Range 70 – 100%

**Soil Texture (field assessed):** Coarse, loamy sand (3), Moderately coarse, sandy loam (3), Medium to very fine, sandy loam (2), Moderately fine sandy clay loam (1)

**Geology (field or map data):** Granitic (19), Granitic (generic) (4), Sandstone and other sedimentary (1), Franciscan melange (1)

**Marin County Watersheds:** Inverness (18), Point Reyes (5), Bolinas (1), Lagunitas Creek (1)

**Site Impacts**

This association has low non-native plant cover (average 1.4%) relative to native cover. The non-native species that occurs with highest frequency and abundance is *Holcus lanatus*.

**Classification Comments**

This association name has been updated from *Pinus muricata* – (*Arbutus menziesii*) / *Vaccinium ovatum* and has been expanded to include stands that had been provisionally named *Pinus muricata* – *Notholithocarpus densiflorus* Association.

**References:** Buck-Diaz et al. 2019, Evens and Kentner 2006, Keeler-Wolf et al. 2003a, Klein et al. 2015, VegCAMP 2018

**Global Rarity Rank:** G2

**State Rarity Rank:** S2

**State Rare:** Y

**Surveys Used for Description**

**Total: N=27; Marin County (n=27):** MARIN131, MARIN149, MARINSP09, MMWD0353, PGA1422, PGA1427, PGA1430, PGA1435, PGA1440, PGA1447, PGA1453, PGA1454, PGA1456, PGA1459, PGA1516, PGA193, PGA235, PGA2847, PGA2856, PGA2859, PGA4069, PGA4146, PORE066, PORE093, PORE114, PORE179, PORE205

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Pinus muricata</i>	96	58.1	28.0	3.0	87.0	X	X		X
	<i>Arbutus menziesii</i>	79	7.2	3.9	0.1	15.0	X			X
	<i>Umbellularia californica</i>	54	7.4	3.7	0.2	18.0				X
	<i>Quercus agrifolia</i>	50	11.5	6.9	2.0	45.0				X
	<b><i>Notholithocarpus densiflorus</i></b>	<b>42</b>	<b>8.7</b>	<b>4.1</b>	<b>0.2</b>	<b>20.0</b>				
	<i>Chrysolepis chrysophylla</i> var. <i>chrysophylla</i>	21	1.3	0.7	0.2	10.0				
<b>Shrub</b>										
	<b><i>Vaccinium ovatum</i></b>	<b>96</b>	<b>39.3</b>	<b>19.6</b>	<b>1.0</b>	<b>70.0</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<i>Frangula californica</i>	58	16.2	9.1	0.2	35.2				X
	<i>Lonicera hispidula</i>	54	2.7	1.6	0.2	7.0				X
	<i>Rubus ursinus</i>	46	6.7	4.1	0.4	20.0				
	<i>Corylus cornuta</i>	42	5.3	2.8	0.2	15.0				
	<i>Rubus parviflorus</i>	42	3.1	1.9	0.2	11.0				
	<i>Toxicodendron diversilobum</i>	42	1.9	1.0	0.2	6.0				
	<i>Diplacus aurantiacus</i>	38	4.4	1.1	0.2	7.0				
	<i>Gaultheria shallon</i>	33	5.8	4.4	0.2	80.2				
	<i>Heteromeles arbutifolia</i>	33	4.6	2.5	3.0	15.0				
	<i>Morella californica</i>	29	1.7	1.1	0.2	9.0				
	<i>Ceanothus thyrsiflorus</i>	25	3.9	1.3	1.0	8.0				
<b>Herb</b>										
	<i>Pteridium aquilinum</i>	75	37.3	3.9	0.2	15.0	X		X	X
	<i>Polystichum munitum</i>	71	34.6	6.7	0.2	40.0				X
	<i>Holcus lanatus</i>	29	4.8	1.6	0.2	15.0				
	<i>Stachys ajugoides</i>	29	1.6	0.2	0.2	3.0				
	<i>Bromus carinatus</i>	25	2.1	0.6	0.2	3.0				
	<i>Elymus glaucus</i>	21	3.4	0.4	0.2	3.0				



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

**Common Name:** Bishop pine / Eastwood Manzanita Woodland

**Alliance:** *Pinus muricata* – *Pinus radiata* Forest & Woodland Alliance

### **Local Vegetation Description**

The Bishop pine / Eastwood Manzanita Association forms an open to intermittent tree canopy with an open to continuous shrub understory. The dominant tree is *Pinus muricata*, and those that are characteristic or often present include *Quercus wislizeni*. Commonly associated shrubs include *Arctostaphylos glandulosa*, *Vaccinium ovatum* and *Adenostoma fasciculatum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	20.6	8 – 30	14.2	10 – 20
Hardwood	7	0 – 15	5.5	2 – 10
Regenerating or Shrubby Tree	0.7	0 – 3	0	no data
Shrub	49.8	31 – 80	2.4	0.5 – 5
Herb	2.2	0 – 5	0.3	0 – 0.5

### **Local Environmental Description**

**Elevation:** Mean 303 m, Range 175 – 395 m

**Aspect:** SW (2), SE (1)

**Slope:** Mean 27 degrees, Range 15 – 35 degrees

**Macro Topography:** Middle 1/3 of slope (2), Upper 1/3 of slope (1)

**Large Rock:** Mean 1.3%, Range 1 – 2%

**Small Rock:** Mean 5%, Range 2 – 10%

**Fines Cover:** Mean 15%, Range 5 – 20%

**Litter Cover:** Mean 75.7%, Range 67 – 90%

**Soil Texture (field assessed):** Medium to very fine, loamy sand (1), Moderately fine clay loam (1)

**Geology (field or map data):** Franciscan melange (3), Granitic (1)

**Marin County Watersheds:** Lagunitas Creek (3), Inverness (1)

### **Site Impacts**

This association has very low non-native plant cover (average 0.0%) relative to native cover. No non-native species were recorded by surveyors.

### **Classification Comments**

This association is considered provisional since it is under-sampled in its expected range. Due to hybridization and morphological similarity between the species, plants identified as *Quercus wislizeni* may be *Quercus parvula*, which has been found to be the most widespread genotype in Marin County (Dodd and Afzul-Rafii 2004, Hauser et al. 2017).

**References:** Evens and Kentner 2006

**Global Rarity Rank:** G2

**State Rarity Rank:** S2

**State Rare:** Y

### **Surveys Used for Description**

**Total: N=5; Marin County (n=5):** MMWD0233, MMWD0237, MMWD0354, PGA237, PGA250

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Pinus muricata</i>	100	52.2	14.6	8.0	20.0	X	X		X
	<i>Quercus wislizeni</i>	60	9.1	3.0	3.0	7.0				X
	<i>Pseudotsuga menziesii</i>	40	17.5	6.4	15.0	17.0				
	<i>Chrysolepis chrysophylla</i> var. <i>minor</i>	40	17.6	4.4	8.0	14.0				
	<i>Arbutus menziesii</i>	40	2.3	0.4	0.2	2.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Notholithocarpus densiflorus</i>	40	26.7	0.6	0.2	3.0				
<b>Shrub</b>										
	<i>Arctostaphylos glandulosa</i>	100	70.2	30.4	25.0	35.0	X	X		X
	<i>Vaccinium ovatum</i>	100	10.9	5.8	1.0	15.0	X			X
	<i>Adenostoma fasciculatum</i>	60	1.9	0.6	0.2	2.0				X
	<i>Gaultheria shallon</i>	40	6.0	4.0	5.0	15.0				
	<i>Toxicodendron diversilobum</i>	40	0.6	0.2	0.2	1.0				
	<i>Dendromecon rigida</i>	40	0.3	0.1	0.2	0.2				
	<i>Symphoricarpos mollis</i>	40	0.2	0.1	0.2	0.2				
<b>Non-vascular</b>										
	Lichen	40	31.7	0.8	1.0	3.0				
	Moss	40	8.3	0.2	0.2	1.0				

***Pinus muricata* / *Ceanothus thyrsiflorus* – *Baccharis pilularis* Association**

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**Common Name:** Bishop pine / Blueblossom Woodland

**Alliance:** *Pinus muricata* – *Pinus radiata* Forest & Woodland Alliance

**Local Vegetation Description**

The Bishop pine / Blueblossom Association forms an open to continuous tree canopy with an open to intermittent shrub understory. The dominant tree is *Pinus muricata*, while *Umbellularia californica* is often present. Commonly associated shrubs include *Baccharis pilularis*, *Rubus ursinus*, *Ceanothus thyrsiflorus* and *Frangula californica*, and commonly associated herbs include *Holcus lanatus* and *Pteridium aquilinum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	42	12 – 90	5.1	2 – 20
Hardwood	2.4	0 – 10	3.2	1 – 5
Regenerating or Shrubby Tree	24.3	0 – 90	0	no data
Shrub	38	15 – 65	2.8	1 – 5
Herb	25.7	0 – 95	0.3	0 – 1

**Local Environmental Description**

**Elevation:** Mean 191 m, Range 44 – 383 m

**Aspect:** SW (1)

**Slope:** 28 degrees

**Macro Topography:** Upper 1/3 of slope (1)

**Large Rock:** 0%

**Small Rock:** 0%

**Fines Cover:** 13%

**Litter Cover:** 85%

**Soil Texture (field assessed):** Moderately fine sandy clay loam (1)

**Geology (field or map data):** Granitic (16), Sandstone and other sedimentary (5)

**Marin County Watersheds:** Point Reyes (18), Inverness (3)

**Site Impacts**

This association has low non-native plant cover (average 11.6%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Holcus lanatus*.

**Classification Comments**

The association is newly described here. The majority of these surveys were Accuracy Assessments without environmental data recorded. This is a relatively early seral association of the alliance.

**References:** none

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

**Total: N=21; Marin County (n=21):** MARIN130, PGA1428, PGA216, PGA227, PGA3744, PGA3812, PGA3848, PGA3964, PGA4023, PGA4029, PGA4109, PGA4201, PGA4263, PGA4326, PGA4361, PGA4369, PGA4738, PGA4954, PGA5029, PGA5306, PGA5470

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Umbellularia californica</i>	52	13.2	1.0	0.2	10.0				X
	<b><i>Pinus muricata</i></b>	<b>48</b>	<b>44.5</b>	<b>17.6</b>	<b>15.0</b>	<b>70.0</b>				
	<i>Quercus agrifolia</i>	29	13.8	1.6	0.2	13.0				
<b>Regenerating or Shrubby Trees</b>										
	<b><i>Pinus muricata</i>*</b>	<b>57</b>	<b>56.8</b>	<b>24.2</b>	<b>9.0</b>	<b>90.0</b>				X
<b>Shrub</b>										
	<i>Rubus ursinus</i>	86	24.2	11.9	2.0	60.0	X			X
	<b><i>Baccharis pilularis</i></b>	<b>81</b>	<b>28.1</b>	<b>12.5</b>	<b>1.0</b>	<b>45.0</b>	X			X
	<b><i>Ceanothus thyrsiflorus</i></b>	<b>57</b>	<b>20.5</b>	<b>9.4</b>	<b>0.2</b>	<b>45.0</b>				X
	<i>Frangula californica</i>	52	8.8	4.9	0.2	48.0				X
	<i>Diplacus aurantiacus</i>	48	3.0	1.6	0.2	10.0				
	<i>Toxicodendron diversilobum</i>	38	6.2	2.2	0.2	15.0				
	<i>Rubus parviflorus</i>	24	2.6	1.0	1.0	8.0				
	<i>Corylus cornuta</i>	24	2.4	0.9	0.2	10.0				
	<i>Lonicera hispidula</i>	24	0.8	0.5	0.2	6.0				
<b>Herb</b>										
	<i>Holcus lanatus</i>	71	33.7	12.3	0.2	70.0				X
	<i>Pteridium aquilinum</i>	67	22.6	2.5	0.2	9.0				X
	<i>Clinopodium douglasii</i>	38	1.8	0.4	0.2	5.0				
	<i>Polystichum munitum</i>	33	8.2	2.2	0.2	15.0				
	<i>Agrostis</i> spp.	33	3.7	1.4	0.2	10.0				
	<i>Iris douglasiana</i>	24	2.5	0.9	1.0	7.0				
	<i>Stachys ajugoides</i>	24	0.3	0.0	0.2	0.2				

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## ***Platanus racemosa* – *Quercus agrifolia* Woodland Alliance**

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**Common Name:** California sycamore – Coast live oak riparian woodlands

**NVC Alliance Code:** A3750. *Platanus racemosa* - *Quercus agrifolia* - *Juglans californica* Riparian Woodland Alliance

### **Statewide Description**

*Platanus racemosa* and/or *Quercus agrifolia* is dominant or co-dominant in the tree canopy in riparian habitats with *Alnus rhombifolia*, *Juglans californica*, *Populus fremontii*, *Quercus lobata*, *Salix exigua*, *Salix gooddingii*, *Salix laevigata*, *Salix lasiolepis*, *Salix lutea*, *Schinus molle*, and *Umbellularia californica*.

This alliance includes *Platanus racemosa* woodlands whose status and distribution throughout California were summarized by Keeler-Wolf et al. (1997). We have also included stands of co-dominant *P. racemosa* and *Populus fremontii* within this alliance, though Klein and Evens (2005) placed these stands in a separate *Platanus racemosa*-*Populus fremontii* alliance. In addition, this alliance has been expanded since the 2009 publication, *A Manual of California Vegetation, second edition*, to include riparian stands dominated by *Quercus agrifolia*. Upland stands of *Q. agrifolia* remain in the *Quercus agrifolia* Alliance.

### **Local Vegetation Description**

The California sycamore – Coast live oak riparian woodlands Alliance forms an intermittent to continuous tree canopy with an open shrub understory. The dominant tree is *Quercus agrifolia*, and *Salix gooddingii* is often present. Commonly associated shrubs include *Toxicodendron diversilobum*, and commonly associated herbs include *Bromus diandrus*, *Bromus hordeaceus*, *Epipactis helleborine*, *Equisetum arvense*, and *Lolium perenne*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	30.0	5 – 55	no data	
Regenerating or Shrubby Tree	44.0	0 – 88	no data	
Shrub	22.5	10 – 35	no data	
Herb	21.0	2 – 40	0.3	0 – 0.5

### **Local Membership Rule**

*Quercus agrifolia* dominates in a riparian setting, often with *Salix* spp. and *Toxicodendron diversilobum*.

### **Local Environmental Description**

**Elevation:** Mean 60 m, Range 14 – 106 m

**Aspect:** NW (1)

**Slope:** 19 degrees

**Macro Topography:** Middle 1/3 of slope (1)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** no data

**Litter Cover:** 85%

**Soil Texture (field assessed):** Medium to very fine, sandy loam (1)

**Geology (field or map data):** Alluvium (1), Sandstone and other sedimentary (1)

**Marin County Watersheds:** Bolinas (1)

**Other Watersheds, San Mateo Co.:** San Mateo Bayside (1)

### **Site Impacts**

This alliance has moderate non-native plant cover (average 21.2%) relative to native cover. Non-native species with highest frequency and abundance include *Bromus diandrus*, *Bromus hordeaceus*, *Cytisus scoparius*, *Genista monspessulana*, *Lolium perenne*, *Malus fusca*, *Rubus armeniacus*, *Rumex crispus*, and *Solanum physalifolium*.

### **Associations in Marin County**

*Quercus agrifolia* / *Salix lasiolepis*

### **Classification Comments**

Since Marin County has fewer than five surveys of this alliance, data from nearby counties were included.

**References:** AECOM 2013, Evens and San 2005, Hickson and Keeler-Wolf 2007, Keeler-Wolf and Evens 2006, Klein and Evens 2005, Sproul et al. 2011

**Global Rarity Rank:** G3

**State Rarity Rank:** S3

### **Surveys Used for Description**

**Total: N=2; Marin County (n=1):** PGA8153

San Mateo County (n=1): GGNRA317

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Quercus agrifolia</i>	100	100.0	27.5	5.0	50.0	X	X		X
<b>Regenerating or Shrubby Trees</b>										
	<i>Quercus agrifolia</i> *	50	36.9	32.6	65.2	65.2				X
	<i>Salix gooddingii</i>	50	13.0	11.5	23.0	23.0				X
	<i>Malus fusca</i>	50	0.1	0.1	0.2	0.2				X
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	100	24.3	2.6	0.2	5.0	X			X
	<i>Rubus armeniacus</i>	50	23.4	8.0	16.0	16.0				X
	<i>Cytisus scoparius</i>	50	14.6	5.0	10.0	10.0				X
	<i>Salix lasiolepis</i>	50	11.7	4.0	8.0	8.0				X
	<i>Rubus ursinus</i>	50	24.0	2.5	5.0	5.0				X
	<i>Baccharis pilularis</i>	50	1.0	0.1	0.2	0.2				X
	<i>Genista monspessulana</i>	50	1.0	0.1	0.2	0.2				X
<b>Herb</b>										
	<i>Lolium perenne</i>	50	16.9	4.0	8.0	8.0				X
	<i>Equisetum arvense</i>	50	11.0	2.6	5.2	5.2				X
	<i>Bromus diandrus</i>	50	10.6	2.5	5.0	5.0				X
	<i>Bromus hordeaceus</i>	50	10.6	2.5	5.0	5.0				X
	<i>Epipactis helleborine</i>	50	31.2	0.5	1.0	1.0				X
	<i>Cyperus</i> spp.	50	0.4	0.1	0.2	0.2				X
	<i>Solanum physalifolium</i>	50	6.3	0.1	0.2	0.2				X
	<i>Rumex crispus</i>	50	0.4	0.1	0.2	0.2				X
	<i>Iris douglasiana</i>	50	6.3	0.1	0.2	0.2				X
	<i>Juncus patens</i>	50	6.3	0.1	0.2	0.2				X

***Quercus agrifolia* / *Salix lasiolepis* Association**

**Common Name:** Coast Live Oak / Arroyo Willow Woodland

**Alliance:** *Platanus racemosa* – *Quercus agrifolia* Riparian Woodland Alliance

**Classification Comments**

The association circumscription is the same as that of the alliance. See above for detailed description. Since the number of surveys of this association in Marin County is low, data from nearby counties were included.

**Global Rarity Rank:** G3

**State Rarity Rank:** S3

**State Rare:** Y



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***Pseudotsuga menziesii* – (*Notholithocarpus densiflorus* – *Arbutus menziesii*)  
Forest and Woodland Alliance**

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**Common Name:** Douglas fir – (Tanok – Madrone) forest and woodland

**NVC Alliance Code:** A0106. *Pseudotsuga menziesii* - *Notholithocarpus densiflorus* Forest Alliance

**Statewide Description**

*Pseudotsuga menziesii* is dominant or co-dominant in the tree canopy with *Acer macrophyllum*, *Alnus rhombifolia*, *Arbutus menziesii*, *Chamaecyparis lawsoniana*, *Chrysolepis chrysophylla*, *Cornus nuttallii*, *Notholithocarpus densiflorus*, *Quercus agrifolia*, *Quercus chrysolepis*, *Quercus garryana*, *Quercus kelloggii*, and *Sequoia sempervirens*.

The ecological literature applies the term “Douglas fir forest” to stands of varying species composition (Fites-Kaufman et al. 2007, Sawyer 2006, 2007). Bingham (1999) developed a region-wide alliance-level classification for late-seral-stage forests based on relationships between species composition and major environmental gradients. Stands dominated by *Pseudotsuga menziesii* segregated significantly from other alliances. However, upon reinterpretation of data, *P. menziesii* is often mixed with other conifers in the montane zone.

The complex relationship between *Pseudotsuga menziesii* and other conifers and hardwoods throughout northern California has led to the recognition of two additional alliances, defined by the combinations of co-dominants: the *Abies concolor* – *Pseudotsuga menziesii* Alliance and the *Pinus ponderosa* – *Calocedrus decurrens* – *Pseudotsuga menziesii* Alliance. Other combinations, such as in the case of the *Pseudotsuga menziesii* – *Quercus chrysolepis* Association and *Pseudotsuga menziesii* – *Notholithocarpus densiflorus* associations, are included in this *Pseudotsuga menziesii* – (*Notholithocarpus densiflorus* – *Arbutus menziesii*) Alliance, such as in the North Coast region.

### Local Vegetation Description

The Douglas fir – (Tanoak – Madrone) forest and woodland Alliance forms an open to continuous tree canopy with a sparse to continuous shrub understory. The dominant tree is *Pseudotsuga menziesii*, and *Umbellularia californica* and/or *Notholithocarpus densiflorus* are characteristic or often present. Commonly associated shrubs include *Toxicodendron diversilobum* and *Rubus ursinus*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	33.5	0 – 95	21.6	0.5 – 50
Hardwood	15.0	0 – 83	11.4	0.5 – 35
Regenerating or Shrubby Tree	2.5	0 – 49.0	6.0	1 – 15
Shrub	29.7	0.0 – 95.0	2.7	0.5 – 10
Herb	20.2	0 – 95.5	0.3	0 – 2

### Local Membership Rule

*Pseudotsuga menziesii* is dominant or is co-dominant with *Arbutus menziesii*, *Quercus agrifolia*, *Q. chrysolepis*, *Notholithocarpus densiflorus*, or *Umbellularia californica*. When *P. menziesii* co-dominates with hardwoods, key to *P. menziesii*, except with *Quercus garryana* or *Q. kelloggii* (see *Q. garryana* or *Q. kelloggii* Alliance below) where this conifer often encroaches during time periods without disturbance.

### Local Environmental Description

**Elevation:** Mean 256 m, Range 16 – 728 m

**Aspect:** NE (23), SE (18), NW (16), SW (11), Variable (4), Flat (1)

**Slope:** Mean 24 degrees, Range 2 – 48 degrees

**Macro Topography:** Middle 1/3 of slope (30), Upper 1/3 of slope (22), Lower 1/3 of slope (9), Ridge top (5), Not recorded (3), Bottom (3), Draw (1)

**Large Rock:** Mean 1.0%, Range 0.0 – 21.0%

**Small Rock:** Mean 5.9%, Range 0.0 – 97.0%

**Fines Cover:** Mean 8.3%, Range 0.0 – 94.0%

**Litter Cover:** Mean 73.2%, Range 0.0 – 100%

**Soil Texture (field assessed):** Moderately fine sandy clay loam (22), Moderately fine clay loam (16), Medium to very fine, sandy loam (9), Moderately coarse, sandy loam (7), Coarse, loamy sand (5), Medium loam (4), Moderately fine silty clay loam (4), Medium silt loam (2), Medium silt (2), Medium to very fine, loamy sand (1), Loam, (class unknown) (1)

**Geology (field or map data):** Franciscan melange (58), Sandstone and other sedimentary (44), Large landslides (13), Shale (5), Ultramafic rocks, mostly serpentine (5), Granitic (4), Volcanic and metavolcanic rocks (3), Sandstone (2), Alluvium (1), Greenstone (1), Serpentine (1)

**Marin County Watersheds:** Bolinas (58), Lagunitas Creek (58), San Rafael (11), Point Reyes (7), Inverness (2), Novato (1)

### Site Impacts

This alliance has low non-native plant cover (average 4.7%) relative to native cover. Non-native species with highest frequency and abundance include *Avena* spp., *Cynosurus echinatus*, and *Holcus lanatus*.

## Associations in Marin County

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

## Classification Comments

Associations included here were formerly in two alliances, *Pseudotsuga menziesii* Alliance and *Pseudotsuga menziesii* – *Notholithocarpus densiflorus* Alliance. In this region, Douglas-fir stands usually include a hardwood component, and this new alliance name encompasses the vegetation types in the county. Mapping of mixed Douglas-fir – Tanoak stands is being done at a sub-alliance level in Marin County.

**References:** Evens and Kentner 2006, Jimerson et al. 1995, Jimerson et al. 1996, Keeler-Wolf et al. 2003a, Keeler-Wolf et al. 2003b, Klein et al. 2007, Klein et al. 2015, Laidlaw-Holmes 1981, Sawyer and Stillman 1977, Simpson 1980, Stuart et al. 1992, Stuart et al. 1996, Taylor and Teare 1979b, Wainwright and Barbour 1984

**Global Rarity Rank:** G5

**State Rarity Rank:** S4

## Surveys Used for Description

**Total: N=155; Marin County (n=155):** GGNRA257, GGNRA275, GGNRA280, GGNRA283, GGNRA285, GGNRA386, HYPM113, HYPM115, HYPM174, HYPM185, HYPM186, HYPM33.1, HYPM33.2, MARIN164, MARIN165, MARIN167, MARINSP06, MARINSP08, MARINSP19, MARINSP20, MMWD0062, MMWD0079, MMWD0098A, MMWD0102A, MMWD0159A, MMWD0168A, MMWD0175A, MMWD0176, MMWD0178A, MMWD0186, MMWD0196, MMWD0207A, MMWD0224A, MMWD0228, MMWD0229, MMWD0238, MMWD0245A, MMWD0246A, MMWD0247, MMWD0248, MMWD0258, MMWD0260A, MMWD0262, MMWD0278, MMWD0290A, MMWD0293, MMWD0295, MMWD0296, MMWD0320, MMWD0349, MMWD0355, MMWD0397, MMWD0407, MMWD0418A, MOSD0033, MOSD0083, MOSD0092, MOSD0093, MOSD0095, MOSD0097, MOSD0115, MOSD0119, MOSD0150, MOSD0350, MOSD0355, MOSD0359, MOSD0360, MOSD0404, MOSD0405, PGA10615, PGA1216, PGA1254, PGA1257, PGA1260, PGA1277, PGA1283, PGA1289, PGA1291, PGA1292, PGA1305A, PGA1306, PGA1308, PGA1311, PGA1311a, PGA1320, PGA1337, PGA1354, PGA1361, PGA1363, PGA1365, PGA1369, PGA1376, PGA1485, PGA1504, PGA1507B, PGA1537, PGA1553, PGA1592, PGA1620, PGA1650, PGA4200, PGA4859, PGA4951, PGA5147, PGA5294, PGA5586, PGA5698, PGA5900, PGA6278, PGA6293, PGA6895, PGA6945, PGA7013, PGA7027, PGA7129, PGA7625, PGA7671, PGA7680, PGA7758, PGA7800, PGA7801A, PGA7820, PGA7829, PGA7861, PGA7891, PGA8017, PGA8045, PGA8084, PGA8152, PGA8163, PGA8273, PGA8325, PGA8331, PGA8332, PGA8393, PGA8398, PGA8409, PGA8425, PGA8428, PGA8454, PGA8632, PGA8635, PGA8983, PGA9473, PORE082, PORE083, PORE092, PORE095, PORE105, PORE106, PORE120, PORE142, PORE148, PORE149, PORE150

### Alliance Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Pseudotsuga menziesii</i>	99	69.9	35.8	4.0	98.0	X	X		X
	<i>Umbellularia californica</i>	61	14.8	8.6	0.2	75.0				X
	<i>Quercus agrifolia</i>	30	4.2	2.4	0.2	35.0				
	<i>Notholithocarpus densiflorus</i>	22	3.4	2.4	0.2	80.0				
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	78	22.4	6.0	0.1	70.0	X			X
	<i>Rubus ursinus</i>	52	12.6	5.1	0.2	72.0				X
	<i>Baccharis pilularis</i>	39	13.1	6.9	0.2	55.0				
	<i>Frangula californica</i>	36	8.2	4.2	0.2	60.0				
	<i>Lonicera hispidula</i>	34	4.4	0.3	0.2	7.0				
	<i>Corylus cornuta</i>	26	5.8	1.2	0.2	25.0				
	<i>Diplacus aurantiacus</i>	26	2.5	0.6	0.2	15.0				
<b>Herb</b>										
	<i>Polystichum munitum</i>	49	19.4	4.0	0.2	55.0				
	<i>Pteridium aquilinum</i>	34	8.2	0.8	0.2	9.0				
	<i>Stachys ajugoides</i>	28	2.4	0.4	0.2	20.0				
	<i>Iris douglasiana</i>	23	3.0	0.4	0.2	10.0				
	<i>Clinopodium douglasii</i>	21	3.8	0.4	0.2	15.0				

## ***Pseudotsuga menziesii* – (*Umbellularia californica*) / *Frangula californica* Association**

**Common Name:** Douglas-fir – California Bay / California Coffeeberry Woodland

**Alliance:** *Pseudotsuga menziesii* – (*Notholithocarpus densiflorus* – *Arbutus menziesii*) Forest & Woodland Alliance

### **Local Vegetation Description**

The Douglas-fir – California Bay / California Coffeeberry Association forms an open to continuous tree canopy with a sparse to continuous shrub understory. The dominant tree is *Pseudotsuga menziesii*. Characteristic or often present trees include *Umbellularia californica*. Commonly associated shrubs include *Frangula californica*, *Baccharis pilularis*, *Rubus ursinus* and *Toxicodendron diversilobum* and commonly associated herbs include *Polystichum munitum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	34.1	0 – 60	24.6	2 – 50
Hardwood	5.7	0 – 20	0.8	0.5 – 1
Regenerating or Shrubby Tree	0.9	0 – 12.4	7.5	5 – 10
Shrub	57	3– 95	2.7	0.5 – 5
Herb	11.1	0 – 20	0.5	0 – 2

### **Local Environmental Description**

**Elevation:** Mean 175 m, Range 54 – 334 m

**Aspect:** NE (2), NW (1), SW (1)

**Slope:** Mean 19 degrees, Range 8 – 26 degrees

**Macro Topography:** Lower 1/3 of slope (1), Middle 1/3 of slope (1), Ridge top (1), Upper 1/3 of slope (1)

**Large Rock:** Mean 0.1%, Range 0 – 0.2%

**Small Rock:** Mean 13.9%, Range 0.4 – 50%

**Fines Cover:** Mean 0.2%, Range 0.2 – 0.2%

**Litter Cover:** Mean 72.8%, Range 40– 100%

**Soil Texture (field assessed):** Loam, (class unknown) (1), Medium to very fine, loamy sand (1), Moderately coarse, sandy loam (1), Moderately fine clay loam (1)

**Geology (field or map data):** Sandstone and other sedimentary (7), Large landslides (5), Franciscan melange (1), Greenstone (1), Sandstone (1), Shale (1)

**Marin County Watersheds:** Bolinas (14), Lagunitas Creek (1), Point Reyes (1)

### **Site Impacts**

This association has low non-native plant cover (average 2.3%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Festuca arundinacea* and *Holcus lanatus*

### **Classification Comments**

This association was formerly placed in the *Pseudotsuga menziesii* Alliance.

**References:** Keeler-Wolf et al. 2003a

**Global Rarity Rank:** G4

**State Rarity Rank:** S4?

**State Rare:** N

**Surveys Used for Description**

**Total: N=17; Marin County (n=17):** MOSD0097, PGA1254, PGA1289, PGA1292, PGA1305A, PGA1504, PGA4951, PGA7625, PGA7671, PGA7758, PGA8152, PGA8163, PGA8332, PGA8398, PORE092, PORE106, PORE120

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Pseudotsuga menziesii</i>	100	85.8	36.6	8.0	90.0	X	X		X
	<i>Umbellularia californica</i>	59	13.5	4.7	3.0	15.0				X
<b>Shrub</b>										
	<i>Frangula californica</i>	100	32.0	20.0	2.0	60.0	X		X	X
	<i>Toxicodendron diversilobum</i>	82	22.5	15.9	2.0	60.0	X			X
	<i>Baccharis pilularis</i>	76	16.1	11.2	2.0	35.0	X			X
	<i>Rubus ursinus</i>	76	13.7	8.0	0.4	30.0	X			X
	<i>Diplacus aurantiacus</i>	47	2.0	1.5	0.2	8.0				
	<i>Sambucus racemosa</i>	29	4.4	2.4	1.0	30.0				
	<i>Lonicera hispidula</i>	24	1.1	0.9	0.2	7.0				
	<i>Artemisia californica</i>	24	1.0	0.8	0.2	10.0				
<b>Herb</b>										
	<i>Polystichum munitum</i>	71	27.2	2.4	0.2	12.0				X
	<i>Pteridium aquilinum</i>	35	9.2	1.3	0.2	8.0				
	<i>Marah fabaceus</i>	24	5.6	1.5	0.2	15.0				
	<i>Scrophularia californica</i>	24	10.9	0.6	0.2	6.0				

***Pseudotsuga menziesii* – *Arbutus menziesii* Association**

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**Common Name:** Douglas-fir / Madrone Woodland

**Alliance:** *Pseudotsuga menziesii* – (*Notholithocarpus densiflorus* – *Arbutus menziesii*) Forest & Woodland Alliance

**Local Vegetation Description**

The Douglas-fir / Madrone Association forms an open to intermittent tree canopy with a sparse to intermittent shrub understory. The dominant tree is *Pseudotsuga menziesii*. Characteristic or often present trees include *Arbutus menziesii* and *Umbellularia californica*. Commonly associated shrubs include *Toxicodendron diversilobum* and commonly associated herbs include *Pentagramma triangularis*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	28.8	10 – 48	28.8	15 – 50
Hardwood	13.8	7 – 20	11.5	2 – 20
Regenerating or Shrubby Tree	7.0	0 – 18.2	5.5	2 – 10
Shrub	9.8	0.2 – 34	2.1	0.5 – 5
Herb	7.8	0.2 – 18	0.3	0 – 0.5

**Local Environmental Description**

**Elevation:** Mean 271 m, Range 128 – 440 m

**Aspect:** NE (1), Variable (1), SW (1), SE (1)

**Slope:** Mean 29 degrees, Range 24 – 38 degrees

**Macro Topography:** Middle 1/3 of slope (2), Upper 1/3 of slope (1), Lower 1/3 of slope (1)

**Large Rock:** Mean 0.2%, Range 0 – 1%

**Small Rock:** Mean 1.9%, Range 0 – 6%

**Fines Cover:** Mean 7.6%, Range 0 – 21%

**Litter Cover:** Mean 84.6%, Range 76 – 93%

**Soil Texture (field assessed):** Moderately fine clay loam (2), Medium loam (1), Moderately coarse, sandy loam (1)

**Geology (field or map data):** Franciscan melange (4), Ultramafic rocks, mostly serpentine (1)

**Marin County Watersheds:** Lagunitas Creek (5)

**Site Impacts**

This association has very low non-native plant cover (average 0.1%) relative to native cover. Non-native species that occur with highest frequency and abundance includes *Torilis arvensis*.

**Classification Comments**

This association was formerly placed in the *Pseudotsuga menziesii* Alliance.

**References:** Klein et al. 2015, Laidlaw-Holmes 1981, Sawyer and Stillman 1977

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

**Total: N=5; Marin County (n=5):** HYPM33.2, MARIN167, MMWD0228, MMWD0407, MOSD0350

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Pseudotsuga menziesii</i>	100	70.0	27.7	10.0	48.0	X	X		X
	<i>Arbutus menziesii</i>	80	23.4	6.8	5.0	13.0	X			X
	<i>Umbellularia californica</i>	60	5.1	1.9	0.3	7.0				X
<b>Regenerating or Shrubby Trees</b>										
	<i>Notholithocarpus densiflorus</i>	40	15.9	2.8	4.0	10.0				
	<i>Arbutus menziesii</i> *	40	10.4	1.8	4.0	5.0				
	<i>Quercus wislizeni</i>	40	10.2	0.1	0.2	0.2				
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	60	40.7	0.9	0.2	3.3				X
	<i>Lonicera hispidula</i>	40	4.1	0.1	0.2	0.2				
<b>Herb</b>										
	<i>Pentagramma triangularis</i>	60	7.4	0.1	0.2	0.2				X
	<i>Polystichum munitum</i>	40	5.8	0.4	0.2	2.0				
	<i>Iris douglasiana</i>	40	7.0	0.1	0.2	0.2				
	<i>Stachys ajugoides</i>	40	2.4	0.1	0.2	0.2				
	<i>Zigadenus fremontii</i>	40	7.0	0.1	0.2	0.2				



***Pseudotsuga menziesii* – *Chrysolepis chrysophylla* – *Notholithocarpus densiflorus*  
Association**

**Common Name:** Douglas-fir – Chinquapin – Tanoak Woodland

**Alliance:** *Pseudotsuga menziesii* – (*Notholithocarpus densiflorus* – *Arbutus menziesii*) Forest & Woodland Alliance

**Local Vegetation Description**

The Douglas-fir – Chinquapin – Tanoak Association forms an open to continuous tree canopy with a sparse to intermittent shrub understory. The dominant trees are *Chrysolepis chrysophylla* var. *chrysophylla* and *Pseudotsuga menziesii*. Characteristic or often present tree include *Arbutus menziesii*. Regenerating or shrubby trees that are dominant and characteristic include *Notholithocarpus densiflorus*. Commonly associated shrubs include *Vaccinium ovatum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	17.1	5 – 50	18.3	5 – 50
Hardwood	22.0	5 – 65	11.8	2 – 35
Regenerating or Shrubby Tree	11.0	0 – 49.0	3.5	1 – 10
Shrub	17.3	0.2 – 57.0	3.7	0 – 10
Herb	1.8	0 – 5	0.3	0 – 0.5

**Local Environmental Description**

**Elevation:** Mean 434 m, Range 319 – 636 m

**Aspect:** NW (3), NE (2), SE (2)

**Slope:** Mean 20 degrees, Range 14 – 28 degrees

**Macro Topography:** Middle 1/3 of slope (3), Upper 1/3 of slope (2), Lower 1/3 of slope (1), Not recorded (1)

**Large Rock:** Mean 0.2%, Range 0 – 1%

**Small Rock:** Mean 10.6%, Range 0 – 28%

**Fines Cover:** Mean 13%, Range 0 – 38%

**Litter Cover:** Mean 61.3%, Range 0 – 96%

**Soil Texture (field assessed):** Moderately fine sandy clay loam (1), Not recorded (1), Moderately fine silty clay loam (1), Medium sand (1), Medium silt (1), Moderately fine clay loam (1), Moderately coarse, sandy loam (1)

**Geology (field or map data):** Franciscan melange (2), Sandstone (2), Sandstone and other sedimentary (1), Shale (1), Ultramafic rocks, mostly serpentine (1)

**Marin County Watersheds:** San Rafael (3)

**Other Watersheds, San Mateo Co.:** Pescadero Creek (2), Palo Alto (1), San Gregorio Creek (1);

**Site Impacts**

This association has very low non-native plant cover (average 0.0%) relative to native cover. No non-native species were recorded by surveyors.

**Classification Comments**

This association was formerly placed in the *Pseudotsuga menziesii* Alliance. Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** Evens and Kentner 2006, Jimerson et al. 1996

**Global Rarity Rank:** G3

**State Rarity Rank:** S3

**State Rare:** Y

**Surveys Used for Description**

Total: N=7; Marin County (n=3): MMWD0278, MMWD0293, MOSD0119

San Mateo County (n=4): SMAT0050, SMAT0288, SMAT0683, SMATR0656

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Pseudotsuga menziesii</i>	100	49.2	17.1	5.0	50.0	X		X	X
	<i>Chrysolepis chrysophylla</i> var. <i>chrysophylla</i>	86	38.5	17.9	8.0	60.0	X		X	X
	<i>Arbutus menziesii</i>	71	9.0	3.1	0.2	12.0				X
	<i>Quercus chrysolepis</i>	43	0.5	0.1	0.2	0.2				
	<i>Notholithocarpus densiflorus</i>	29	1.4	1.0	0.2	7.0				
	<i>Pinus attenuata</i>	29	1.2	0.3	0.2	2.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Notholithocarpus densiflorus</i> *	57	32.0	4.1	0.2	20.0				X
	<i>Chrysolepis chrysophylla</i> var. <i>minor</i>	43	18.0	4.9	0.4	28.0				
	<i>Pseudotsuga menziesii</i> *	29	13.7	1.3	1.2	8.0				
	<i>Arbutus menziesii</i> *	29	3.5	0.3	0.4	2.0				
	<i>Quercus wislizeni</i>	29	1.9	0.3	1.0	1.0				
<b>Shrub</b>										
	<i>Vaccinium ovatum</i>	86	20.7	3.5	0.2	15.0	X			X
	<i>Arctostaphylos crustacea</i>	43	19.1	2.1	3.0	9.0				
	<i>Arctostaphylos sensitiva</i>	29	8.8	2.3	1.0	15.0				
	<i>Arctostaphylos glandulosa</i>	29	22.3	2.1	7.0	8.0				
	<i>Eriodictyon californicum</i>	29	0.6	0.1	0.2	0.2				
	<i>Heteromeles arbutifolia</i>	29	0.6	0.1	0.2	0.2				
	<i>Lonicera hispidula</i>	29	0.6	0.1	0.2	0.2				
	<i>Rosa gymnocarpa</i>	29	0.6	0.1	0.2	0.2				
<b>Herb</b>										
	<i>Pteridium aquilinum</i>	43	30.2	0.3	0.2	1.0				
	<i>Lotus junceus</i>	29	28.6	0.2	0.2	1.0				
	<i>Hypericum concinnum</i>	29	3.2	0.1	0.2	0.2				
<b>Non-vascular</b>										
	Moss	57	42.9	1.5	0.2	10.0				X
	Lichen	29	14.3	0.1	0.2	0.2				

***Pseudotsuga menziesii* – *Notholithocarpus densiflorus* – *Umbellularia californica* /  
*Toxicodendron diversilobum* Association**

**Common Name:** Douglas-fir – Tanoak – California Bay / Poison-oak Woodland

**Alliance:** *Pseudotsuga menziesii* – (*Notholithocarpus densiflorus* – *Arbutus menziesii*) Forest & Woodland Alliance

**Local Vegetation Description**

The Douglas-fir – Tanoak – California Bay / Poison-oak Association forms an intermittent to continuous tree canopy with a sparse to continuous shrub understory. The co-dominant trees are *Notholithocarpus densiflorus* and *Pseudotsuga menziesii*. Characteristic or often present trees include *Umbellularia californica*. Commonly associated shrubs include *Toxicodendron diversilobum*, *Corylus cornuta* and *Rubus ursinus* and commonly associated herbs include *Polystichum munitum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	25	10 – 80	35.0	20 – 50
Hardwood	29.8	10 – 70	13.8	10 – 20
Regenerating or Shrubby Tree	7.2	0 – 35	5.5	2 – 10
Shrub	26.6	0.0 – 89	3.5	2 – 5
Herb	13.4	0 – 37	0.5	0 – 1

**Local Environmental Description**

**Elevation:** Mean 273 m, Range 157 – 692 m

**Aspect:** NW (2), Flat (1), SE (1), SW (1)

**Slope:** Mean 22 degrees, Range 4 – 48 degrees

**Macro Topography:** Middle 1/3 of slope (3), Ridge top (1), Upper 1/3 of slope (1)

**Large Rock:** Mean 0.2%, Range 0 – 1%

**Small Rock:** Mean 2.1%, Range 0 – 7%

**Fines Cover:** Mean 9.9%, Range 0.2 – 21%

**Litter Cover:** Mean 84.4%, Range 70 – 94.8%

**Soil Texture (field assessed):** Moderately fine sandy clay loam (4), Medium silt loam (1)

**Geology (field or map data):** Franciscan melange (5), Sandstone and other sedimentary (4), Volcanic and metavolcanic rocks (1)

**Marin County Watersheds:** Lagunitas Creek (8), Bolinas (2)

**Site Impacts**

This association has very low non-native plant cover (average 0.3%) relative to native cover.

**Classification Comments**

This association was previously placed in the *Pseudotsuga menziesii* – *Notholithocarpus densiflorus* Alliance.

**References:** Jimerson et al. 1996

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

**Total: N=10; Marin County (n=10):** HYPM113, MARIN164, MARIN165, MMWD0168A, MMWD0238, MMWD0248, PGA1257, PGA1485, PGA1537, PGA1592

*Pseudotsuga menziesii* – *Notholithocarpus densiflorus* – *Umbellularia californica* / *Toxicodendron diversilobum* Association

*Pseudotsuga menziesii* – (*Notholithocarpus densiflorus* – *Arbutus menziesii*) Forest & Woodland Alliance

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Pseudotsuga menziesii</i>	100	38.4	22.5	10.0	70.0	X		X	X
	<i>Notholithocarpus densiflorus</i>	100	30.3	17.1	5.0	40.0	X		X	X
	<i>Umbellularia californica</i>	90	24.7	13.4	3.0	25.0	X			X
	<i>Quercus agrifolia</i>	40	2.7	1.6	3.0	7.0				
	<i>Arbutus menziesii</i>	40	2.2	0.9	0.4	4.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Umbellularia californica</i> *	40	13.9	1.5	0.2	12.0				
	<i>Notholithocarpus densiflorus</i> *	30	24.9	2.1	5.0	10.0				
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	80	30.9	7.3	0.1	45.0	X		X	X
	<i>Rubus ursinus</i>	70	8.3	2.0	0.2	10.0				X
	<i>Corylus cornuta</i>	60	15.6	4.5	0.2	20.0				X
	<i>Vaccinium ovatum</i>	40	13.9	2.5	1.0	15.0				
	<i>Frangula californica</i>	30	7.6	0.5	1.0	2.0				
	<i>Lonicera hispidula</i>	30	1.5	0.1	0.2	0.2				
<b>Herb</b>										
	<i>Polystichum munitum</i>	60	35.9	7.5	1.0	30.0				X
	<i>Pteridium aquilinum</i>	30	3.4	0.5	0.2	3.0				
	<i>Hierochloe occidentalis</i>	30	5.8	0.4	0.2	3.0				
	<i>Marah fabaceus</i>	30	9.6	0.4	1.0	2.0				
	<i>Adenocaulon bicolor</i>	30	1.1	0.1	0.2	0.2				
<b>Non-vascular</b>										
	Moss	40	28.3	0.7	0.2	6.0				
	Lichen	30	11.7	0.1	0.2	0.2				

*Pseudotsuga menziesii* – *Notholithocarpus densiflorus* – *Umbellularia californica* / *Toxicodendron diversilobum* Association  
*Pseudotsuga menziesii* – (*Notholithocarpus densiflorus* – *Arbutus menziesii*) Forest & Woodland Alliance

## *Pseudotsuga menziesii* – *Notholithocarpus densiflorus* / *Vaccinium ovatum* Association

**Common Name:** Douglas-fir – Tanoak / Black Huckleberry (Moist Shrub) Woodland

**Alliance:** *Pseudotsuga menziesii* – (*Notholithocarpus densiflorus* – *Arbutus menziesii*) Forest & Woodland Alliance

### Local Vegetation Description

The Douglas-fir – Tanoak / Black Huckleberry (Moist Shrub) Association forms an intermittent to continuous tree canopy with a sparse to open shrub understory. The dominant tree is *Notholithocarpus densiflorus* and *Pseudotsuga menziesii* is co-dominant. Characteristic or often present trees include *Arbutus menziesii* and *Quercus agrifolia*. Regenerating or shrubby trees that are often present include *Notholithocarpus densiflorus*, *Pseudotsuga menziesii*, and *Umbellularia californica*. Commonly associated shrubs include *Rubus ursinus*, *Toxicodendron diversilobum*, *Frangula californica*, *Lonicera hispidula*, and *Vaccinium ovatum* and commonly associated herbs include *Polystichum munitum*, *Adenocaulon bicolor*, *Dryopteris arguta* and *Galium aparine*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	49.2	25 – 95	37.5	20 – 50
Hardwood	40.2	18 – 83	15.8	10 – 20
Regenerating or Shrubby Tree	2.0	0 – 4.4	2.8	1 – 5
Shrub	12	2 – 27	0.8	0 – 2
Herb	9.8	2 – 20	0.4	0 – 1

### Local Environmental Description

**Elevation:** Mean 473 m, Range 192 – 639 m

**Aspect:** NW (1), SE (1), SW (1), Variable (1)

**Slope:** Mean 20 degrees, Range 11 – 30 degrees

**Macro Topography:** Middle to Upper 1/3 of slope (2), Middle 1/3 of slope (1), Upper 1/3 of slope (1)

**Large Rock:** Mean 0.7%, Range 0 – 1.4%

**Small Rock:** Mean 0.9%, Range 0 – 3%

**Fines Cover:** Mean 3.4%, Range 0.2 – 5%

**Litter Cover:** Mean 93.8%, Range 88.0 – 100%

**Soil Texture (field assessed):** Medium sand (1), Medium to very fine, sandy loam (1), Moderately fine clay loam (1), Moderately fine sandy clay loam (1)

**Geology (field or map data):** Sandstone (3), Shale and other sedimentary (2), Franciscan melange (1)

**Marin County Watersheds:** Lagunitas Creek (1)

**Other Watersheds, San Mateo Co.:** Pescadero Creek (2), San Gregorio Creek (1), San Mateo Bayside (1), San Mateo Coastal (1)

### Site Impacts

This association has very low non-native plant cover (average 0.3%) relative to native cover.

### Classification Comments

This association was previously placed in the *Pseudotsuga menziesii* – *Notholithocarpus densiflorus* Alliance. *Gaultheria shallon* has been removed from the name of the association because of low constancy for this type in Marin and elsewhere. Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** Simpson 1980, Thornburgh 1982

Global Rarity Rank: GNR

State Rarity Rank: SNR

State Rare: Y

**Surveys Used for Description**

Total: N=6; Marin County (n=1): PORE149

San Mateo County (n=5): PGA1045, PGA791, SMAT0237, SMAT0263, SMAT0293

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Pseudotsuga menziesii</i>	100	54.9	49.2	25.0	95.0	X	X		X
	<i>Notholithocarpus densiflorus</i>	100	43.7	39.5	15.0	80.0	X		X	X
	<i>Quercus agrifolia</i>	50	1.1	0.7	0.2	3.0				X
	<i>Arbutus menziesii</i>	50	0.2	0.2	0.2	1.0				X
<b>Regenerating or Shrubby Trees</b>										
	<i>Notholithocarpus densiflorus</i> *	67	43.7	1.4	0.2	3.2				X
	<i>Umbellularia californica</i>	50	5.9	0.2	0.2	1.0				X
	<i>Pseudotsuga menziesii</i> *	50	8.4	0.1	0.2	0.4				X
	<i>Quercus agrifolia</i> *	33	7.1	0.1	0.2	0.4				
<b>Shrub</b>										
	<i>Rubus ursinus</i>	100	36.8	6.5	0.2	15.0	X		X	X
	<i>Toxicodendron diversilobum</i>	83	5.9	0.8	0.2	3.0	X			X
	<i>Vaccinium ovatum</i>	67	25.4	2.5	0.2	5.0				X
	<i>Lonicera hispidula</i>	67	4.0	0.3	0.2	1.0				X
	<i>Frangula californica</i>	50	7.2	1.6	0.2	9.0				X
	<i>Corylus cornuta</i>	33	2.1	0.5	1.0	2.0				
<b>Herb</b>										
	<i>Polystichum munitum</i>	100	34.1	4.6	0.2	10.0	X		X	X
	<i>Dryopteris arguta</i>	67	10.0	1.1	0.2	5.0				X
	<i>Adenocaulon bicolor</i>	50	1.8	0.1	0.2	0.2				X
	<i>Galium aparine</i>	50	0.8	0.1	0.2	0.2				X
	<i>Marah fabaceus</i>	33	7.3	0.4	0.2	2.2				
	<i>Iris</i> spp.	33	1.4	0.1	0.2	0.2				
<b>Non-vascular</b>										
	Lichen	50	25.0	0.1	0.2	0.2				X
	Moss	50	25.0	0.1	0.2	0.2				X

## ***Pseudotsuga menziesii* – *Quercus agrifolia* Association**

**Common Name:** Douglas-fir / Coast Live Oak Woodland

**Alliance:** *Pseudotsuga menziesii* – (*Notholithocarpus densiflorus* – *Arbutus menziesii*) Forest & Woodland Alliance

### **Local Vegetation Description**

The Douglas-fir / Coast Live Oak Association forms an intermittent to continuous tree canopy with a sparse to intermittent shrub understory. The dominant tree is *Pseudotsuga menziesii*, and those that are characteristic or often present include *Quercus agrifolia* and *Umbellularia californica*. Commonly associated shrubs include *Toxicodendron diversilobum*, *Lonicera hispidula* and *Rubus ursinus*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	45.1	15 – 90	25	10 – 50
Hardwood	24.3	8 – 55	12.2	5 – 20
Regenerating or Shrubby Tree	1.9	0 – 14	5.1	2 – 10
Shrub	7.6	0 – 40	2.8	1 – 5
Herb	10.9	0.2 – 68	0.3	0 – 2

### **Local Environmental Description**

**Elevation:** Mean 292 m, Range 161 – 601 m

**Aspect:** SE (7), NE (5), NW (3), SW (1), Variable (1)

**Slope:** Mean 18 degrees, Range 2 – 30 degrees

**Macro Topography:** Middle 1/3 of slope (8), Upper 1/3 of slope (7), Lower 1/3 of slope (1), Ridge top (1)

**Large Rock:** Mean 0.9%, Range 0 – 5%

**Small Rock:** Mean 1.5%, Range 0 – 10%

**Fines Cover:** Mean 11.1%, Range 0 – 94%

**Litter Cover:** Mean 70.1%, Range 0 – 100%

**Soil Texture (field assessed):** Moderately fine sandy clay loam (7), Moderately fine clay loam (5), Medium to very fine, sandy loam (3), Moderately fine silty clay loam (1), Moderately coarse, sandy loam (1)

**Geology (field or map data):** Franciscan melange (15), Sandstone (1), Sandstone and other sedimentary (1), Shale (1), Volcanic and metavolcanic rocks (1)

**Marin County Watersheds:** Lagunitas Creek (10), Bolinas (5), San Rafael (4)

### **Site Impacts**

This association has low non-native plant cover (average 2.0%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Avena* spp. and *Genista monspessulana*.

### **Classification Comments**

This association was formerly placed in the *Pseudotsuga menziesii* Alliance.

**References:** Evens and Kentner 2006, Keeler-Wolf et al. 2003a, Klein et al. 2015

**Global Rarity Rank:** G3

**State Rarity Rank:** S3?

**State Rare:** Y



**Surveys Used for Description**

**Total: N=21; Marin County (n=21):** GGNRA280, MARINSP06, MARINSP19, MMWD0098A, MMWD0176, MMWD0224A, MMWD0260A, MMWD0320, MOSD0033, MOSD0083, MOSD0092, MOSD0093, MOSD0360, MOSD0404, PGA1354, PGA1361, PGA1620, PGA5900, PORE082, PORE142, PORE150

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Pseudotsuga menziesii</i>	100	62.1	47.7	4.0	90.0	X	X		X
	<i>Quercus agrifolia</i>	95	21.9	14.1	5.0	35.0	X			X
	<i>Umbellularia californica</i>	62	9.2	6.4	0.2	30.0				X
	<i>Arbutus menziesii</i>	33	3.3	1.7	1.0	10.0				
	<i>Notholithocarpus densiflorus</i>	24	2.0	2.0	0.2	30.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Pseudotsuga menziesii</i> *	33	20.3	1.1	0.2	13.0				
	<i>Quercus agrifolia</i> *	33	15.2	0.6	0.2	10.0				
	<i>Umbellularia californica</i> *	33	12.3	0.1	0.2	1.2				
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	100	32.4	3.5	0.2	16.2	X		X	X
	<i>Lonicera hispidula</i>	57	5.1	0.2	0.2	1.0				X
	<i>Rubus ursinus</i>	52	12.9	3.2	0.2	35.0				X
	<i>Corylus cornuta</i>	48	6.9	1.6	0.2	8.0				
	<i>Frangula californica</i>	38	6.7	3.2	0.2	51.0				
	<i>Heteromeles arbutifolia</i>	24	7.6	0.7	0.2	7.0				
<b>Herb</b>										
	<i>Polystichum munitum</i>	48	14.7	1.1	0.2	7.2				
	<i>Clinopodium douglasii</i>	43	8.1	0.7	0.2	8.0				
	<i>Iris douglasiana</i>	38	6.0	0.8	0.2	8.0				
	<i>Pteridium aquilinum</i>	38	6.8	0.1	0.2	0.2				
	<i>Sanicula crassicaulis</i>	38	3.5	0.1	0.2	0.2				
	<i>Stachys ajugoides</i>	38	2.9	0.1	0.2	0.2				
	<i>Osmorhiza berteroi</i>	29	6.0	0.1	0.2	1.0				
	<i>Elymus glaucus</i>	24	1.3	0.0	0.2	0.2				
	<i>Galium aparine</i>	24	1.1	0.0	0.2	0.2				

## ***Pseudotsuga menziesii* – *Quercus chrysolepis* Association**

**Common Name:** Douglas-fir – Canyon Live Oak Woodland

**Alliance:** *Pseudotsuga menziesii* – (*Notholithocarpus densiflorus* – *Arbutus menziesii*) Forest & Woodland Alliance

### **Local Vegetation Description**

The Douglas-fir – Canyon Live Oak Association forms an open to continuous tree canopy with a sparse to open shrub understory. The dominant trees are *Pseudotsuga menziesii*, *Quercus chrysolepis* and *Umbellularia californica*. Characteristic or often present trees include *Notholithocarpus densiflorus*. Commonly associated shrubs include *Lonicera hispidula* and *Toxicodendron diversilobum* and commonly associated herbs include *Polystichum munitum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	38.8	10 – 75	21.7	10 – 35
Hardwood	35.3	15 – 70	8.3	5 – 15
Regenerating or Shrubby Tree	3.3	0 – 14.2	no data	
Shrub	2.6	0.0 – 10.2	no data	
Herb	12.2	2.375 – 24	0.3	0 – 0.5

### **Local Environmental Description**

**Elevation:** Mean 502 m, Range 304 – 643 m

**Aspect:** NW (3), SE (1), SW (1), NE (1)

**Slope:** Mean 18 degrees, Range 6 – 37 degrees

**Macro Topography:** Middle 1/3 of slope (2), Upper 1/3 of slope (2), Lower 1/3 of slope (1), Draw (1)

**Large Rock:** Mean 1.9%, Range 0 – 12%

**Small Rock:** Mean 2.2%, Range 0.2 – 5%

**Fines Cover:** Mean 7.5%, Range 0.2 – 23%

**Litter Cover:** Mean 76.2%, Range 40 – 97%

**Soil Texture (field assessed):** Moderately fine clay loam (1), Coarse, loamy sand (1), Medium loam (1), Medium silt (1), Medium to very fine, sandy loam (1), Moderately coarse, sandy loam (1)

**Geology (field or map data):** Franciscan melange (5), Volcanic and metavolcanic rocks (1)

**Marin County Watersheds:** Lagunitas Creek (5), Bolinas (1)

### **Site Impacts**

This association has low non-native plant cover (average 2.0%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Carduus pycnocephalus*, *Cynosurus echinatus*, and *Torilis nodosa*.

### **Classification Comments**

This association was formerly placed in the *Pseudotsuga menziesii* Alliance.

**References:** Evens and Kentner 2006, Jimerson et al. 1996, Keeler-Wolf et al. 2003b, Klein et al. 2007, Klein et al. 2015, Taylor and Teare 1979b

**Global Rarity Rank:** G3?

**State Rarity Rank:** S3?

**State Rare:** Y

### **Surveys Used for Description**

**Total: N=9; Marin County (n=9):** GGNRA275, GGNRA283, HYPM115, MMWD0175A, MMWD0178A, MMWD0186, MMWD0355, PGA1337, PGA8454

*Pseudotsuga menziesii* – *Quercus chrysolepis* Association

*Pseudotsuga menziesii* – (*Notholithocarpus densiflorus* – *Arbutus menziesii*) Forest & Woodland Alliance

## Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Pseudotsuga menziesii</i>	100	44.3	34.4	15.0	75.0	X		X	X
	<i>Quercus chrysolepis</i>	100	26.2	23.6	4.0	60.0	X			X
	<i>Umbellularia californica</i>	89	16.8	14.7	1.8	50.0	X			X
	<i>Notholithocarpus densiflorus</i>	56	7.1	4.5	0.2	15.0				X
	<i>Arbutus menziesii</i>	33	2.5	2.0	5.0	8.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Notholithocarpus densiflorus</i> *	44	19.4	0.5	0.2	4.0				
	<i>Pseudotsuga menziesii</i> *	22	18.5	1.2	3.0	8.0				
	<i>Quercus chrysolepis</i> *	22	10.2	1.2	0.2	10.2				
	<i>Umbellularia californica</i> *	22	5.3	0.4	0.2	3.0				
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	67	22.5	0.7	0.2	5.0				X
	<i>Lonicera hispidula</i>	56	19.8	0.2	0.2	1.0				X
	<i>Heteromeles arbutifolia</i>	33	15.8	0.7	0.2	5.0				
	<i>Symphoricarpos mollis</i>	22	3.6	0.0	0.2	0.2				
<b>Herb</b>										
	<i>Polystichum munitum</i>	56	16.2	2.2	0.2	15.0				X
	<i>Elymus glaucus</i>	44	6.1	1.0	0.2	7.0				
	<i>Melica torreyana</i>	33	6.4	1.2	0.2	10.0				
	<i>Cynosurus echinatus</i>	33	8.1	0.9	1.0	5.0				
	<i>Carduus pycnocephalus</i>	33	2.8	0.5	0.2	3.0				
	<i>Stachys ajugoides</i>	33	2.8	0.5	0.2	3.0				
	<i>Iris douglasiana</i>	22	11.6	0.7	3.0	3.0				
	<i>Galium aparine</i>	22	3.1	0.4	1.0	3.0				
	<i>Bromus laevipes</i>	22	2.4	0.2	0.2	2.0				
	<i>Torilis nodosa</i>	22	2.3	0.2	0.2	2.0				
	<i>Bromus carinatus</i>	22	0.6	0.0	0.2	0.2				
	<i>Osmorhiza berteroi</i>	22	0.2	0.0	0.2	0.2				
	<i>Pteridium aquilinum</i>	22	0.6	0.0	0.2	0.2				
	<i>Sanicula crassicaulis</i>	22	0.4	0.0	0.2	0.2				

***Pseudotsuga menziesii* – *Umbellularia californica* / (*Toxicodendron diversilobum*)  
Association**

**Common Name:** Douglas-fir – California Bay Woodland

**Alliance:** *Pseudotsuga menziesii* – (*Notholithocarpus densiflorus* – *Arbutus menziesii*) Forest & Woodland Alliance

**Local Vegetation Description**

The Douglas-fir – California Bay Association forms an open to continuous tree canopy with an sparse to open shrub understory. The dominant trees are *Pseudotsuga menziesii* and *Umbellularia californica*. Commonly associated shrubs include *Toxicodendron diversilobum* and *Lonicera hispidula*, and commonly associated herbs include *Polystichum munitum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	30.6	4 – 70	27.3	10 – 50
Hardwood	25.9	4 – 65	13.7	5 – 35
Regenerating or Shrubby Tree	2.5	0 – 27	7.7	2 – 15
Shrub	5.5	0.2 – 30	2.4	0.5 – 5
Herb	13.1	0 – 60	0.3	0 – 2

**Local Environmental Description**

**Elevation:** Mean 326 m, Range 51 – 728 m

**Aspect:** SE (7), NE (5), SW (4), NW (3), Variable (2)

**Slope:** Mean 32 degrees, Range 17 – 46 degrees

**Macro Topography:** Middle 1/3 of slope (8), Upper 1/3 of slope (5), Bottom (3), Lower 1/3 of slope (2), Not recorded (2), Ridge top (1)

**Large Rock:** Mean 1.9%, Range 0 – 21%

**Small Rock:** Mean 9.7%, Range 0 – 97%

**Fines Cover:** Mean 7.1%, Range 0 – 35%

**Litter Cover:** Mean 74.7%, Range 18 – 99%

**Soil Texture (field assessed):** Moderately fine sandy clay loam (7), Medium to very fine, sandy loam (4), Coarse, loamy sand (3), Moderately fine silty clay loam (2), Moderately fine clay loam (2), Medium silt (1), Medium loam (1), Moderately coarse, sandy loam (1)

**Geology (field or map data):** Franciscan melange (16), Ultramafic rocks, mostly serpentine (3), Sandstone and other sedimentary (2), Shale (1), Serpentine (1), Alluvium (1), Granitic (1)

**Marin County Watersheds:** Lagunitas Creek (18), San Rafael (4), Bolinas (2), Novato (1)

**Site Impacts**

This association has low non-native plant cover (average 2.3%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Cynosurus echinatus* and *Genista monspessulana*.

**Classification Comments**

This association was formerly placed in the *Pseudotsuga menziesii* Alliance. The name of the association has been updated to reflect the combination of two previously used names, *Pseudotsuga menziesii* – *Umbellularia californica* and *Pseudotsuga menziesii* – *Umbellularia californica* / *Toxicodendron diversilobum* Associations, into a single type.

**References:** Evens and Kentner 2006, Jimerson et al. 1995, Jimerson et al. 1996, Klein et al. 2015, Wainwright and Barbour 1984

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

**Total: N=28; Marin County (n=28):** GGNRA386, HYPM33.1, MMWD0062, MMWD0102A, MMWD0159A, MMWD0196, MMWD0207A, MMWD0229, MMWD0246A, MMWD0247, MMWD0262, MMWD0290A, MMWD0295, MMWD0349, MMWD0397, MMWD0418A, MOSD0095, MOSD0115, MOSD0150, MOSD0359, MOSD0405, PGA1650, PGA4200, PGA5586, PGA8425, PGA8428, PGA8635, PORE083

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Pseudotsuga menziesii</i>	100	54.5	30.7	4.0	70.0	X	X		X
	<i>Umbellularia californica</i>	100	35.3	20.9	3.0	57.0	X		X	X
	<i>Quercus agrifolia</i>	29	2.6	1.2	0.2	20.0				
	<i>Notholithocarpus densiflorus</i>	29	1.7	1.0	1.0	8.0				
	<i>Arbutus menziesii</i>	25	1.8	1.2	0.4	15.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Notholithocarpus densiflorus</i> *	25	14.2	0.5	0.2	4.0				
	<i>Umbellularia californica</i> *	25	7.2	0.3	0.2	5.0				
	<i>Pseudotsuga menziesii</i> *	21	9.6	0.5	0.2	12.0				
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	75	24.8	1.0	0.2	12.5	X			X
	<i>Lonicera hispidula</i>	50	9.5	0.3	0.2	2.0				X
	<i>Heteromeles arbutifolia</i>	36	12.3	0.5	0.2	3.0				
	<i>Rubus ursinus</i>	29	8.4	0.9	0.2	15.0				
	<i>Corylus cornuta</i>	29	8.0	0.5	0.2	5.0				
	<i>Diplacus aurantiacus</i>	25	5.1	0.1	0.2	2.0				
<b>Herb</b>										
	<i>Polystichum munitum</i>	50	13.5	0.9	0.2	5.0				X
	<i>Iris douglasiana</i>	39	4.5	0.6	0.2	10.0				
	<i>Melica torreyana</i>	36	10.7	1.2	0.2	15.0				
	<i>Stachys ajugoides</i>	36	2.2	0.1	0.2	2.0				
	<i>Pentagramma triangularis</i>	32	2.6	0.1	0.2	1.0				
	<i>Pteridium aquilinum</i>	29	7.4	0.5	0.2	8.0				
	<i>Carex globosa</i>	25	6.2	1.0	0.2	27.0				
	<i>Osmorhiza berteroi</i>	21	2.6	0.1	0.2	2.0				
	<i>Galium triflorum</i>	21	1.3	0.1	0.2	1.0				
	<i>Cynoglossum grande</i>	21	1.1	0.0	0.2	0.2				
<b>Non-vascular</b>										
	Moss	21	17.7	0.3	0.2	5.0				

*Pseudotsuga menziesii* – *Umbellularia californica* / (*Toxicodendron diversilobum*) Association  
*Pseudotsuga menziesii* – (*Notholithocarpus densiflorus* – *Arbutus menziesii*) Forest & Woodland Alliance

## *Pseudotsuga menziesii* – *Umbellularia californica* / *Polystichum munitum* Association

**Common Name:** Douglas-fir – California Bay / Sword Fern Woodland

**Alliance:** *Pseudotsuga menziesii* – (*Notholithocarpus densiflorus* – *Arbutus menziesii*) Forest & Woodland Alliance

### Local Vegetation Description

The Douglas-fir – California Bay / Sword Fern Association forms an open to continuous tree canopy with a sparse to intermittent shrub understory. The dominant tree is *Pseudotsuga menziesii*. Characteristic or often present trees include *Umbellularia californica*. Commonly associated shrubs include *Rubus ursinus* and *Toxicodendron diversilobum* and commonly associated herbs include *Polystichum munitum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	42.6	12 – 75	29.5	2 – 50
Hardwood	23.7	2 – 80	3.5	2 – 5
Regenerating or Shrubby Tree	1.0	0 – 11.6	no data	
Shrub	31.0	0 – 60	3.5	2 – 5
Herb	50.7	2 – 95.5	0.3	0 – 0.5

### Local Environmental Description

**Elevation:** Mean 215 m, Range 75 – 372 m

**Aspect:** NE (6)

**Slope:** Mean 24 degrees, Range 12 – 45 degrees

**Macro Topography:** Upper 1/3 of slope (3), Middle 1/3 of slope (2), Lower 1/3 of slope (1)

**Large Rock:** Mean 0.1%, Range 0 – 0.4%

**Small Rock:** Mean 0.4%, Range 0 – 2%

**Fines Cover:** Mean 0.5%, Range 0 – 2%

**Litter Cover:** Mean 65%, Range 5 – 100%

**Soil Texture (field assessed):** Moderately fine sandy clay loam (2), Coarse, loamy sand (1), Medium loam (1), Medium silt loam (1), Medium to very fine, sandy loam (1)

**Geology (field or map data):** Sandstone and other sedimentary (7), Franciscan melange (4), Granitic (2), Large landslides (1), Shale (1)

**Marin County Watersheds:** Bolinas (7), Lagunitas Creek (4), Inverness (2), Point Reyes (2)

### Site Impacts

This association has low non-native plant cover (average 2.8%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Erechtites minimus*.

### Classification Comments

This association was formerly placed in the *Pseudotsuga menziesii* Alliance.

**References:** Evens and Kentner 2006, Keeler-Wolf et al. 2003a, Klein et al. 2015

**Global Rarity Rank:** G4

**State Rarity Rank:** S4?

**State Rare:** N

### Surveys Used for Description

**Total: N=15; Marin County (n=15):** GGNRA257, HYPM174, HYPM185, HYPM186, MARINSP08, MARINSP20, MMWD0245A, PGA1291, PGA1306, PGA1507B, PGA5147, PGA5294, PGA9473, PORE095, PORE148

### **Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

<b>Layer</b>	<b>Taxon</b>	<b>Con</b>	<b>Rel</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>	<b>Ch</b>	<b>D</b>	<b>cD</b>	<b>Oft</b>
<b>Tree</b>										
	<i>Pseudotsuga menziesii</i>	100	74.1	50.0	6.0	88.8	X	X		X
	<i>Umbellularia californica</i>	93	20.9	14.4	3.0	75.0	X			X
	<i>Quercus agrifolia</i>	27	2.0	0.4	0.2	3.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Umbellularia californica</i> *	27	11.7	0.1	0.2	1.0				
<b>Shrub</b>										
	<i>Rubus ursinus</i>	67	20.3	9.8	0.2	46.0				X
	<i>Toxicodendron diversilobum</i>	67	15.1	4.3	0.2	25.2				X
	<i>Vaccinium ovatum</i>	47	15.7	3.1	0.2	40.0				
	<i>Sambucus racemosa</i>	40	4.4	1.6	0.2	12.0				
	<i>Frangula californica</i>	40	6.1	1.2	0.2	15.0				
	<i>Corylus cornuta</i>	27	4.4	2.3	0.2	20.0				
	<i>Rubus parviflorus</i>	27	2.5	1.4	0.2	10.0				
<b>Herb</b>										
	<i>Polystichum munitum</i>	80	57.4	22.2	3.0	55.0	X	X		X
	<i>Stachys ajugoides</i>	40	2.3	0.8	0.2	5.0				
	<i>Pteridium aquilinum</i>	33	3.2	0.8	0.2	5.0				
	<i>Dryopteris arguta</i>	27	2.0	0.6	0.2	8.0				
	<i>Erechtites minimus</i>	27	0.6	0.3	0.2	4.0				

## ***Pseudotsuga menziesii* / (*Toxicodendron diversilobum*) Association**

**Common Name:** Douglas-fir / (Poison oak) Woodland

**Alliance:** *Pseudotsuga menziesii* – (*Notholithocarpus densiflorus* – *Arbutus menziesii*) Forest & Woodland Alliance

### **Local Vegetation Description**

The Douglas-fir / (Poison oak) Association forms an intermittent to continuous tree canopy with a sparse to intermittent shrub understory. The dominant tree is *Pseudotsuga menziesii*. Commonly associated shrubs include *Rubus ursinus* and *Toxicodendron diversilobum*, and commonly associated herbs include *Clinopodium douglasii*, *Polystichum munitum* and *Stachys ajugoides*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	49.5	9 – 80	15.3	2 – 35
Hardwood	0	0 – 0	no data	
Regenerating or Shrubby Tree	2.3	0 – 9.0	1.5	1 – 2
Shrub	12.0	0.0 – 60.0	no data	
Herb	36.0	0.2 – 77	0.3	0 – 0.5

### **Local Environmental Description**

**Elevation:** Mean 322 m, Range 226 – 391 m

**Aspect:** NW (3), NE (1), SW (1)

**Slope:** Mean 22 degrees, Range 3 – 32 degrees

**Macro Topography:** Upper 1/3 of slope (2), Lower 1/3 of slope (1), Not recorded (1), Ridge top (1)

**Large Rock:** 0%

**Small Rock:** Mean 15.3%, Range 0 – 75.0%

**Fines Cover:** Mean 8.6%, Range 0.2 – 20%

**Litter Cover:** Mean 69.8%, Range 15– 95%

**Soil Texture (field assessed):** Moderately fine clay loam (2), Moderately fine sandy clay loam (1), Moderately fine silty clay loam (1), Moderately coarse, sandy loam (1)

**Geology (field or map data):** Franciscan melange (4), Sandstone and other sedimentary (2)

**Marin County Watersheds:** Lagunitas Creek (4), Bolinas (1), Point Reyes (1)

### **Site Impacts**

This association has low non-native plant cover (average 10.0%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Carduus pycnocephalus*, *Cirsium vulgare*, *Cynosurus echinatus*, *Festuca arundinacea* and *Holcus lanatus*.

### **Classification Comments**

This association was formerly placed in the *Pseudotsuga menziesii* Alliance. It has been renamed from *Pseudotsuga menziesii* Association to conform to the NVC.

**References:** Evens and Kentner 2006, Klein et al. 2007, Stuart et al. 1992, Stuart et al. 1996

**Global Rarity Rank:** G4

**State Rarity Rank:** S4

**State Rare:** N

### **Surveys Used for Description**

**Total: N=7; Marin County (n=7):** GGNRA285, MMWD0079, MMWD0258, MMWD0296, MOSD0355, PGA6278, PGA7129



## Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Pseudotsuga menziesii</i>	86	85.7	54.7	45.0	98.0	X	X		X
<b>Regenerating or Shrubby Trees</b>										
	<i>Pseudotsuga menziesii</i> *	43	33.3	1.9	0.2	9.0				
	<i>Notholithocarpus densiflorus</i>	29	21.4	0.3	0.2	2.0				
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	71	17.5	0.9	0.2	4.0				X
	<i>Rubus ursinus</i>	57	43.8	17.7	0.2	72.0				X
	<i>Lonicera hispidula</i>	43	4.7	0.1	0.2	0.2				
	<i>Baccharis pilularis</i>	29	0.5	0.3	0.2	2.0				
	<i>Heteromeles arbutifolia</i>	29	5.5	0.2	0.2	1.0				
	<i>Vaccinium ovatum</i>	29	2.1	0.2	0.2	1.0				
	<i>Diplacus aurantiacus</i>	29	4.7	0.1	0.2	0.2				
<b>Herb</b>										
	<i>Stachys ajugoides</i>	71	13.8	3.0	0.2	20.0				X
	<i>Polystichum munitum</i>	57	11.3	2.3	0.2	15.0				X
	<i>Clinopodium douglasii</i>	57	4.2	0.2	0.2	1.0				X
	<i>Cynosurus echinatus</i>	43	1.7	0.1	0.2	0.2				
	<i>Iris douglasiana</i>	43	3.2	0.1	0.2	0.2				
	<i>Sanicula crassicaulis</i>	43	3.2	0.1	0.2	0.2				
	<i>Festuca arundinacea</i>	29	3.2	1.1	3.0	5.0				
	<i>Holcus lanatus</i>	29	6.5	1.1	1.0	7.0				
	<i>Dryopteris arguta</i>	29	2.0	0.7	0.2	5.0				
	<i>Achillea millefolium</i>	29	1.0	0.2	0.2	1.0				
	<i>Cirsium vulgare</i>	29	1.2	0.2	0.2	1.0				
	<i>Marah fabaceus</i>	29	5.2	0.2	0.2	1.0				
	<i>Carduus pycnocephalus</i>	29	0.8	0.1	0.2	0.5				
	<i>Claytonia perfoliata</i>	29	2.3	0.1	0.2	0.2				

## ***Pseudotsuga menziesii* / *Baccharis pilularis* Association**

**Common Name:** Douglas-fir / Coyote Brush Woodland

**Alliance:** *Pseudotsuga menziesii* – (*Notholithocarpus densiflorus* – *Umbellularia californica*) Forest & Woodland Alliance

### **Local Vegetation Description**

The Douglas-fir / Coyote Brush Association forms an open to continuous tree canopy with an open to continuous shrub understory. The dominant tree is *Pseudotsuga menziesii*. Commonly associated shrubs include *Baccharis pilularis*, *Toxicodendron diversilobum* and *Rubus ursinus*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	26.6	0 – 90	5.2	0.5 – 15
Hardwood	3.6	0 – 30	5.7	2 – 15
Regenerating or Shrubby Tree	0.8	0 – 15	no data	
Shrub	54.8	7 – 95	2.0	0.5 – 5
Herb	27.1	0 – 85	0.4	0 – 2

### **Local Environmental Description**

**Elevation:** Mean 133 m, Range 16 – 232 m

**Aspect:** SE (1)

**Slope:** 30 degrees

**Macro Topography:** Middle 1/3 of slope (1)

**Large Rock:** 0%

**Small Rock:** 0%

**Fines Cover:** no data

**Litter Cover:** 40%

**Soil Texture (field assessed):** Moderately fine clay loam (1)

**Geology (field or map data):** Sandstone and other sedimentary (19), Large landslides (7), Granitic (1), Shale (1)

**Marin County Watersheds:** Bolinas (24), Point Reyes (3), Lagunitas Creek (1)

### **Site Impacts**

This association has low non-native plant cover (average 10.2%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Holcus lanatus*.

### **Classification Comments**

This association was formerly placed in the *Pseudotsuga menziesii* Alliance. The majority of these surveys were Accuracy Assessments without environmental data recorded.

**References:** Keeler-Wolf et al. 2003a

**Global Rarity Rank:** G4

**State Rarity Rank:** S4?

**State Rare:** N

### **Surveys Used for Description**

**Total: N=35; Marin County (n=35):** PGA10615, PGA1216, PGA1308, PGA1311, PGA1311a, PGA1320, PGA1363, PGA1365, PGA1369, PGA1553, PGA4859, PGA5698, PGA6293, PGA6895, PGA6945, PGA7013, PGA7027, PGA7680, PGA7800, PGA7801A, PGA7820, PGA7829, PGA7861, PGA7891, PGA8017, PGA8045, PGA8084, PGA8273, PGA8325, PGA8331, PGA8393, PGA8409, PGA8632, PGA8983, PORE105

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Pseudotsuga menziesii</i>	97	87.8	26.8	7.0	90.0	X	X		X
	<i>Umbellularia californica</i>	23	3.9	1.0	0.2	14.0				
	<i>Quercus agrifolia</i>	23	1.7	0.4	0.2	5.0				
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	100	45.9	24.3	5.0	55.0	X		X	X
	<i>Toxicodendron diversilobum</i>	80	17.4	11.0	0.2	70.0	X			X
	<i>Rubus ursinus</i>	60	11.3	6.5	0.2	33.0				X
	<i>Artemisia californica</i>	46	8.3	5.2	0.2	22.0				
	<i>Frangula californica</i>	43	8.3	5.3	1.0	41.2				
	<i>Diplacus aurantiacus</i>	40	3.0	1.6	0.2	15.0				
<b>Herb</b>										
	<i>Pteridium aquilinum</i>	43	14.2	1.5	0.2	9.0				
	<i>Holcus lanatus</i>	37	18.8	7.4	0.2	70.0				
	<i>Elymus glaucus</i>	34	5.6	1.8	0.2	15.0				
	<i>Clinopodium douglasii</i>	26	8.4	1.1	0.2	15.0				

## ***Pseudotsuga menziesii* / *Corylus cornuta* / *Polystichum munitum* Association**

**Common Name:** Douglas-fir / Hazel / Sword Fern Woodland

**Alliance:** *Pseudotsuga menziesii* – (*Notholithocarpus densiflorus* – *Umbellularia californica*) Forest & Woodland Alliance

### **Local Vegetation Description**

The Douglas-fir / Hazel / Sword Fern Association forms an open to continuous tree canopy with an open to continuous shrub understory. The dominant tree is *Pseudotsuga menziesii*. Commonly associated shrubs include *Corylus cornuta*, *Frangula californica*, *Rubus ursinus*, *Toxicodendron diversilobum*, *Vaccinium ovatum*, *Holodiscus discolor* and *Sambucus racemosa*, and commonly associated herbs include *Polystichum munitum*, *Urtica dioica*, *Dryopteris arguta* and *Pteridium aquilinum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	50.4	20 – 75	32.5	20 – 50
Hardwood	7.3	0 – 35	8.8	5 – 15
Regenerating or Shrubby Tree	0.4	0 – 2.6	3.5	2 – 5
Shrub	51.6	10 – 80	2.8	1 – 5
Herb	30.3	0.2 – 70	0.8	0 – 2

### **Local Environmental Description**

**Elevation:** Mean 361 m, Range 224 – 537 m

**Aspect:** SE (1), SW (1)

**Slope:** Mean 21 degrees, Range 14 – 28 degrees

**Macro Topography:** Ridge top (1), Lower 1/3 of slope (1)

**Large Rock:** Mean 0.1%, Range 0.0 – 0.2%

**Small Rock:** Mean 2.0%, Range 0.0 – 4.0%

**Fines Cover:** Mean 3.0%, Range 0.0 – 6.0%

**Litter Cover:** Mean 91.5%, Range 88.0 – 95%

**Soil Texture (field assessed):** Moderately coarse, sandy loam (1), Medium to very fine, sandy loam (1)

**Geology (field or map data):** Granitic (2), Sandstone and other sedimentary (2), Sandstone, shale, and conglomerate (1), Franciscan melange (1)

**Marin County Watersheds:** Bolinas (1), Lagunitas Creek (1)

**Other Watersheds, San Mateo Co.:** San Mateo Coastal (3); **Sonoma Co.:** Lower Russian River (1)

### **Site Impacts**

This association has low non-native plant cover (average 4.0%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Epipactis helleborine*, *Holcus lanatus* and *Myosotis latifolia*.

### **Classification Comments**

This association was formerly placed in the *Pseudotsuga menziesii* Alliance. The name of the association has been updated to include *Polystichum munitum*. Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** Jimerson et al. 1996, Simpson 1980

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

**Total: N=8; Marin County (n=3):** PGA1260, PGA1277, PGA1283

San Mateo County (n=4): PGA12003, PGA12292, PGA736, SMAT0152

Sonoma County (n=1): SONO0121

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Pseudotsuga menziesii</i>	100	86.9	50.4	20.0	75.0	X	X		X
	<i>Umbellularia californica</i>	38	6.5	3.8	5.0	20.0				
	<i>Notholithocarpus densiflorus</i>	38	2.0	1.1	1.0	5.0				
	<i>Quercus agrifolia</i>	25	4.6	2.5	5.0	15.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Notholithocarpus densiflorus</i> *	25	17.9	0.3	0.4	2.0				
	<i>Umbellularia californica</i> *	25	5.1	0.1	0.2	0.2				
<b>Shrub</b>										
	<i>Rubus ursinus</i>	88	19.5	11.9	0.2	30.0	X			X
	<i>Toxicodendron diversilobum</i>	88	13.0	7.7	0.2	15.0	X			X
	<b><i>Corylus cornuta</i></b>	<b>75</b>	<b>27.1</b>	<b>14.8</b>	<b>9.0</b>	<b>35.0</b>	<b>X</b>			<b>X</b>
	<i>Vaccinium ovatum</i>	75	12.3	7.4	0.2	25.0	X			X
	<i>Frangula californica</i>	75	5.4	3.9	0.2	15.0	X			X
	<i>Sambucus racemosa</i>	63	16.8	10.7	0.2	35.0				X
	<i>Holodiscus discolor</i>	50	0.8	0.4	0.2	2.0				X
	<i>Lonicera hispidula</i>	38	1.1	0.7	0.2	5.0				
	<i>Rubus parviflorus</i>	25	1.3	0.8	0.2	6.0				
	<i>Ribes sanguineum</i>	25	0.1	0.1	0.2	0.2				
<b>Herb</b>										
	<b><i>Polystichum munitum</i></b>	<b>88</b>	<b>43.0</b>	<b>13.1</b>	<b>3.0</b>	<b>30.0</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<i>Urtica dioica</i>	75	6.5	2.7	0.2	10.0	X			X
	<i>Pteridium aquilinum</i>	50	5.3	2.3	0.2	8.0				X
	<i>Dryopteris arguta</i>	50	17.7	1.5	0.2	8.0				X
	<i>Holcus lanatus</i>	38	5.2	3.4	0.2	25.0				
	<i>Stachys ajugoides</i>	38	2.2	0.7	0.2	5.0				
	<i>Galium aparine</i>	38	0.3	0.1	0.2	0.2				
	<i>Marah fabaceus</i>	38	0.8	0.1	0.2	0.2				
	<i>Myosotis latifolia</i>	25	7.9	3.2	0.2	25.0				
	<i>Claytonia perfoliata</i>	25	0.7	0.1	0.2	0.2				
	<i>Epipactis helleborine</i>	25	0.2	0.1	0.2	0.2				
<b>Non-vascular</b>										
	Moss	25	23.2	3.8	0.2	30.0				

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## ***Quercus (agrifolia, douglasii, garryana, kelloggii, lobata, wislizeni) Forest & Woodland Alliance***

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**Common Name:** Mixed oak forest and woodland

**NVC Alliance Code:** A0371. *Quercus agrifolia* - *Quercus douglasii* - *Quercus kelloggii* Coastal Forest Alliance

### **Statewide Description**

*Quercus agrifolia*, *Quercus douglasii*, *Quercus garryana*, *Quercus kelloggii*, *Quercus lobata* and/or *Quercus wislizeni* are co-dominant in the tree canopy with *Aesculus californica*, *Arbutus menziesii*, *Pinus sabiniana*, *Pseudotsuga menziesii*, and *Umbellularia californica*.

Allen et al. (1989, 1991) recognized a mixed oak series with 10 subspecies; they based the subspecies on the species composition of the woody plants since they lacked information on the herbaceous species. Their definition was followed in the 1995 edition of the *Manual of California Vegetation* (MCV) (Sawyer et al. 1995) and the subspecies were listed as associations.

A careful study of the key (Allen et al. 1989, 1991) permitted some of the subspecies to be placed in other alliances if the definitions allow the characteristic oak be co-dominant. For example, “valley oak and blue oak are co-dominant; coast live oak is present” becomes the *Quercus lobata* – *Quercus douglasii* Association in the *Quercus lobata* Alliance. The *Quercus wislizeni* – *Quercus douglasii* – *Pinus sabiniana* Association was placed in the *Quercus wislizeni* Alliance because the third tree is not an oak. However, some subspecies remain within this alliance, specifically when three or more oaks co-dominate.

### **Local Vegetation Description**

The Mixed oak forest and woodland Alliance forms an open to continuous tree canopy with a sparse to intermittent shrub understory. The characteristic trees are *Quercus agrifolia*, *Quercus garryana*, and

*Quercus kelloggii*, while *Umbellularia californica* and *Arbutus menziesii* are often present. Regenerating or shrubby trees that are often present include *Quercus agrifolia* and *Umbellularia californica*. Commonly associated shrubs include *Toxicodendron diversilobum*, and commonly associated herbs include *Elymus glaucus* and *Cynosurus echinatus*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.6	0 – 5	22.5	15 – 35
Hardwood	38.2	21 – 75	14.2	5 – 35
Regenerating or Shrubby Tree	3.3	0 – 10.2	3.1	0 – 10
Shrub	5.6	0 – 50.0	1.9	0 – 5
Herb	32.1	4 – 72.5	0.5	0 – 2

### **Local Membership Rule**

*Quercus agrifolia*, *Quercus garryana*, and/or *Quercus kelloggii* are present and these oak species typically co-dominate. Other oaks such as *Q. chrysolepis*, *Q. douglasii*, *Q. lobata*, may also be present. This mixed type is for stands where multiple *Quercus* tree species (at least three) intermix and it is difficult to assign to an alliance defined by one oak species.

### **Local Environmental Description**

**Elevation:** Mean 239 m, Range 62 – 520 m

**Aspect:** Variable (5), NE (4), NW (2), SE (2)

**Slope:** Mean 11 degrees, Range 2 – 27 degrees

**Macro Topography:** Upper 1/3 of slope (5), Middle 1/3 of slope (2), Middle to Upper 1/3 of slope (2), Bottom (1), Lower to Middle 1/3 of slope (1), Ridgetop (1), Upper 1/3 of slope to Ridgetop (1)

**Large Rock:** Mean 0.9%, Range 0.0 – 10.9%

**Small Rock:** Mean 1.9%, Range 0.0 – 12.0%

**Fines Cover:** Mean 17.2%, Range 0.0 – 60.0%

**Litter Cover:** Mean 72.0%, Range 15.0 – 97%

**Soil Texture (field assessed):** Moderately coarse, sandy loam (2), Moderately fine sandy clay loam (2), Fine sandy clay (1), Medium to very fine, sandy loam (1), Moderately fine silty clay loam (1)

**Geology (field or map data):** General volcanic extrusives (3), Franciscan mélange (2), Volcanic flow rocks (2), Blueschist and semi-schist (1), Clayey alluvium (1), Greenstone (1), Mixed alluvium (1), Sandstone (1), Sandstone and other sedimentary (1), Siltstone (1). Ultramafic rocks, mostly serpentine (1)

**Marin County Watersheds:** Novato (1), Petaluma River (1)

**Other Watersheds, Sonoma Co.:** Middle Russian River (5), Sonoma Creek (5), Petaluma River (3)

### **Site Impacts**

This alliance has moderate non-native plant cover (average 26.0%) relative to native cover. Non-native species with highest frequency and abundance include *Avena* spp., *Briza maxima*, *Carduus pycnocephalus*, *Cynosurus echinatus*, and *Torilis arvensis*.

### **Associations in Marin County**

*Quercus agrifolia* – *Quercus garryana* – *Quercus kelloggii*

### **Classification Comments**

Since Marin County has fewer than five surveys of this alliance, data from nearby counties were included.

**References:** Klein et al. 2015

**Global Rarity Rank:** G4

**State Rarity Rank:** S4

## Surveys Used for Description

Total: N=15; Marin County (n=2): MARIN111, MOSD0318

Sonoma County (n=13): HYP5032, HYP5150, SONO0056, SONO0086, SONO0182, SONO0219, SONO0220, SONO0639, SONO0643, SONO0690, SONO0717, SONO0829, SONO0865

## Alliance Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Quercus kelloggii</i>	100	22.1	9.7	2.0	20.0	X			X
	<i>Quercus agrifolia</i>	93	23.0	10.6	2.0	25.0	X			X
	<i>Quercus garryana</i>	93	24.7	10.1	3.0	18.0	X			X
	<i>Umbellularia californica</i>	73	9.6	4.3	0.2	17.5				X
	<i>Arbutus menziesii</i>	53	3.5	2.0	0.2	10.0				X
	<i>Quercus douglasii</i>	27	5.3	1.7	2.0	10.0				
	<i>Quercus chrysolepis</i>	27	1.9	0.9	0.2	8.0				
	<i>Quercus lobata</i>	20	3.2	0.9	1.0	7.0				
	<i>Pseudotsuga menziesii</i>	20	1.5	0.5	0.8	4.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Umbellularia californica</i> *	67	33.8	1.5	0.2	7.0				X
	<i>Quercus agrifolia</i> *	53	4.4	0.2	0.2	1.2				X
	<i>Pseudotsuga menziesii</i> *	27	13.3	0.8	0.2	9.0				
	<i>Arbutus menziesii</i> *	27	7.3	0.5	0.2	4.2				
	<i>Quercus kelloggii</i> *	20	8.7	0.2	0.2	2.2				
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	73	43.0	2.1	0.2	10.0				X
	<i>Lonicera hispidula</i>	33	3.4	0.2	0.2	1.0				
	<i>Baccharis pilularis</i>	27	1.0	0.1	0.2	0.2				
	<i>Arctostaphylos manzanita</i>	20	14.0	0.9	2.0	7.0				
	<i>Heteromeles arbutifolia</i>	20	4.5	0.2	0.2	2.3				
<b>Herb</b>										
	<i>Cynosurus echinatus</i>	73	18.9	5.5	0.2	20.0				X
	<i>Elymus glaucus</i>	60	2.6	0.5	0.2	3.0				X
	<i>Briza maxima</i>	40	16.6	10.1	0.2	80.0				
	<i>Avena</i> spp.	40	11.1	2.1	0.2	25.0				
	<i>Chlorogalum pomeridianum</i>	33	0.6	0.2	0.2	1.0				
	<i>Carduus pycnocephalus</i>	27	0.9	0.2	0.2	3.0				
	<i>Torilis arvensis</i>	27	0.6	0.1	0.2	0.2				
	<i>Festuca californica</i>	20	3.4	0.4	0.2	5.0				
	<i>Bromus carinatus</i>	20	0.6	0.1	0.2	1.0				
	<i>Iris macrosiphon</i>	20	0.6	0.1	0.2	1.0				
<b>Non-vascular</b>										
	Moss	40	35.6	0.3	0.2	2.0				



**Quercus agrifolia – Quercus garryana – Quercus kelloggii Provisional Association**

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**Common Name:** Coast Live Oak – Oregon White Oak – California Black Oak Woodland

**Alliance:** *Quercus (agrifolia, douglasii, garryana, kelloggii, lobata, wislizeni)* Forest & Woodland Alliance

**Classification Comments**

The association circumscription is the same as that of the alliance. See above for detailed description. This association is considered provisional. Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

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## ***Quercus agrifolia* Forest & Woodland Alliance**

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**Common Name:** Coast live oak woodland and forest

**NVC Alliance Code:** A3346. *Quercus agrifolia* Woodland Alliance

### **Statewide Description**

*Quercus agrifolia* is dominant or co-dominant in the tree canopy with *Acer macrophyllum*, *Acer negundo*, *Arbutus menziesii*, *Juglans californica*, *Platanus racemosa*, *Populus fremontii*, *Quercus douglasii*, *Quercus engelmannii*, *Quercus kelloggii*, *Quercus lobata*, *Salix lasiolepis*, and *Umbellularia californica*.

Stands of this extensive alliance vary from upland savannas and woodlands to moist north-facing slope forests with closed tree canopies (Allen-Diaz et al. 2007). Genetic variation is high in the species, with two main recognized varieties. Most plants represent *Quercus agrifolia* var. *agrifolia*; plants recognized as *Quercus agrifolia* var. *oxyadenia* in the Peninsular Ranges of southern California have hairs completely covering the lower leaf surfaces (Roberts 1995). *Quercus agrifolia* hybrids include *Quercus xganderi* (*Q. agrifolia* var. *oxyadenia* × *Q. kelloggii*) in San Diego County and *Quercus xchasei* (*Q. agrifolia* var. *agrifolia* × *Q. kelloggii*) in Monterey and Santa Cruz Counties. The species also hybridizes with *Quercus dumosa*, *Q. lobata*, and *Q. wislizeni* to varying degrees (Kathleen et al. 2002, Dodd et al. 1993, Brophy and Parnell 1974). A shrub form, *Quercus agrifolia* var. *frutescens*, may only represent frequently burned or salt-spray-pruned plants. See the mixed oak (*Quercus wislizeni* – *Quercus chrysolepis*) shrub alliance for that distinction.

### **Local Vegetation Description**

The Coast live oak woodland and forest Alliance forms an open to continuous tree canopy with a sparse to continuous shrub understory. The dominant tree is *Quercus agrifolia*, and *Umbellularia californica* are characteristic or often present. Commonly associated shrubs include *Toxicodendron diversilobum* and *Lonicera hispidula*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.7	0 – 10	11.5	2 – 35
Hardwood	41.7	0 – 85	10.0	2 – 20
Regenerating or Shrubby Tree	0.9	0 – 32.2	4.0	1 – 15
Shrub	15.4	0.0 – 95.0	1.7	0 – 10
Herb	28.3	0 – 99	0.3	0 – 1

### **Local Membership Rule**

*Quercus agrifolia* dominates or co-dominates with *Arbutus menziesii* in the tree canopy. If *Q. douglasii* (or hybrid *Q. xeplingii*), *Q. lobata*, or *Umbellularia californica* is co-dominant to dominant, key to one of these other alliances instead of *Q. agrifolia*. The understory herbaceous layer often contains a mixture of native and non-native herbs and/or shrubs.

### **Local Environmental Description**

**Elevation:** Mean 171 m, Range 13 – 500 m

**Aspect:** SW (24), SE (14), NE (10), Variable (10), NW (8), Flat (1)

**Slope:** Mean 22 degrees, Range 0 – 70 degrees

**Macro Topography:** Middle 1/3 of slope (17), Lower 1/3 of slope (16), Upper 1/3 of slope (15), Ridge top (8), Entire slope (1), Not recorded (1)

**Large Rock:** Mean 0.5%, Range 0.0 – 5.0%

**Small Rock:** Mean 2.5%, Range 0.0 – 24.0%

**Fines Cover:** Mean 7.1%, Range 0.0 – 40.0%

**Litter Cover:** Mean 76.4%, Range 1.0 – 99%

**Soil Texture (field assessed):** Moderately fine clay loam (14), Moderately coarse, sandy loam (9), Medium loam (8), Moderately fine sandy clay loam (7), Medium to very fine, sandy loam (5), Moderately fine silty clay loam (4), Fine sandy clay (3), Fine clay (2), Medium silt (1), Fine silty clay (1), Not recorded (1), Unknown (1), Coarse, loamy sand (1), Medium to very fine, loamy sand (1)

**Geology (field or map data):** Franciscan melange (39), Sandstone and other sedimentary (34), Alluvium (3), Large landslides (2), Volcanic flow rocks (2), Granitic (1), Conglomerate (1), Clayey alluvium (1), Blueschist and semi-schist (1), Granitic (generic) (1)

**Marin County Watersheds:** San Rafael (27), Novato (24), Lagunitas Creek (15), Bolinas (13), Inverness (2), Petaluma River (2), Walker Creek (2)

### **Site Impacts**

This alliance has low non-native plant cover (average 16.0%) relative to native cover. Non-native species with highest frequency and abundance include *Briza maxima*, *Bromus diandrus*, *Carduus pycnocephalus*, and *Cynosurus echinatus*.

### **Associations in Marin County**

*Quercus agrifolia* – *Arbutus menziesii* – *Umbellularia californica*

*Quercus agrifolia* – *Arbutus menziesii* / *Corylus cornuta* – *Rubus* spp.

*Quercus agrifolia* – *Quercus kelloggii*

*Quercus agrifolia* – *Umbellularia californica* / *Heteromeles arbutifolia* – *Quercus berberidifolia*

*Quercus agrifolia* / *Adenostoma fasciculatum* – (*Salvia mellifera*)

*Quercus agrifolia* / grass

*Quercus agrifolia* / *Toxicodendron diversilobum*

### **Classification Comments**

None.

**References:** AECOM 2013, Allen et al. 1989, Buck and Evens 2010, Buck-Diaz and Evens 2011b, Evens and Kentner 2006, Evens and San 2004, Evens and San 2005, Keeler-Wolf and Evens 2006, Keeler-Wolf et al. 2003a, Kittel et al. 2012, Klein and Evens 2005, Klein et al. 2015, Shuford and Timossi 1989, Sproul et al. 2011, Wainwright and Barbour 1984

**Global Rarity Rank:** G5

**State Rarity Rank:** S4

**Surveys Used for Description**

**Total: N=88; Marin County (n=88):** GGNRA385, GGNRA388, HYPM037, HYPM043, HYPM053, HYPM063, HYPM079, MARIN158, MMWD0045, MMWD0067, MMWD0094, MMWD0108A, MMWD0114A, MMWD0136A, MMWD0138, MMWD0151, MMWD0181A, MMWD0183, MMWD0195, MMWD0219A, MMWD0226, MMWD0230, MMWD0275, MMWD0282, MMWD0321A, MMWD0323, MMWD0326, MMWD0335, MMWD0338A, MMWD0340A, MMWD0351, MMWD0375, MOSD0018, MOSD0056, MOSD0058, MOSD0068, MOSD0069, MOSD0159, MOSD0161, MOSD0162, MOSD0163, MOSD0166, MOSD0170, MOSD0175, MOSD0179, MOSD0181, MOSD0186, MOSD0190, MOSD0204, MOSD0215, MOSD0216, MOSD0217, MOSD0223, MOSD0243, MOSD0250, MOSD0252, MOSD0267, MOSD0277, MOSD0282, MOSD0352, MOSD0374, PGA1170, PGA1324, PGA1543, PGA1545, PGA1625, PGA1661, PGA1703, PGA1713, PGA1716, PGA4793, PGA5489, PGA653, PGA6780, PGA7074, PGA7630, PGA7832, PORE069, PORE158, PORE175, SFANO01, SFANO02, SFANO04, SFANO08, SFANO09, SFANO10, SFANO11, WRBL023

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Quercus agrifolia</i>	99	76.0	39.1	1.0	100.0	X	X		X
	<i>Umbellularia californica</i>	69	9.2	4.1	0.2	20.0				X
	<i>Arbutus menziesii</i>	41	8.7	4.6	0.2	50.0				
	<i>Pseudotsuga menziesii</i>	25	2.6	0.9	0.2	13.2				
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	83	28.1	4.0	0.2	29.2	X			X
	<i>Lonicera hispidula</i>	51	8.8	0.6	0.2	8.3				X
	<i>Diplacus aurantiacus</i>	45	9.1	1.0	0.2	10.0				
	<i>Baccharis pilularis</i>	33	5.9	1.7	0.2	30.0				
	<i>Heteromeles arbutifolia</i>	32	6.8	1.4	0.1	64.6				
	<i>Rubus ursinus</i>	30	10.3	5.2	0.2	76.4				
<b>Herb</b>										
	<i>Briza maxima</i>	44	17.6	5.2	0.2	50.0				
	<i>Cynosurus echinatus</i>	38	3.8	0.7	0.2	10.0				
	<i>Stachys ajugoides</i>	35	1.8	0.3	0.2	8.2				
	<i>Carduus pycnocephalus</i>	31	1.8	0.3	0.2	5.0				
	<i>Elymus glaucus</i>	30	3.1	0.6	0.2	18.2				
	<i>Avena</i> spp.	26	3.3	1.3	0.2	45.0				
	<i>Bromus diandrus</i>	25	4.0	1.2	0.2	15.0				
	<i>Chlorogalum pomeridianum</i>	24	2.2	0.3	0.1	10.0				

## ***Quercus agrifolia* – *Arbutus menziesii* – *Umbellularia californica* Association**

**Common Name:** Coast Live Oak – Madrone – California Bay Woodland

**Alliance:** *Quercus agrifolia* Forest & Woodland Alliance

### **Local Vegetation Description**

The Coast Live Oak – Madrone – California Bay Association forms an intermittent to continuous tree canopy with a sparse to intermittent shrub understory. The dominant tree is *Quercus agrifolia* and those that are characteristic or often present include *Arbutus menziesii* and *Umbellularia californica*. Commonly associated shrubs include *Toxicodendron diversilobum*, *Diplacus aurantiacus* and *Lonicera hispidula*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.9	0 – 5	10.7	2 – 20
Hardwood	48.8	17 – 85	10.3	2 – 20
Regenerating or Shrubby Tree	1.0	0 – 10.2	3.5	1 – 10
Shrub	9.5	0 – 50	1.6	0 – 5
Herb	20.2	0 – 80	0.3	0 – 1

### **Local Environmental Description**

**Elevation:** Mean 215 m, Range 13 – 461 m

**Aspect:** NE (6), SW (6), SE (5), NW (4), Variable (4)

**Slope:** Mean 22 degrees, Range 2 – 70 degrees

**Macro Topography:** Middle 1/3 of slope (8), Upper 1/3 of slope (6), Ridge top (5), Lower 1/3 of slope (3), Bottom (1), Entire slope (1)

**Large Rock:** Mean 0.6%, Range 0 – 5.0%

**Small Rock:** Mean 2.4%, Range 0 – 24.0%

**Fines Cover:** Mean 6.8%, Range 0.2 – 30.0%

**Litter Cover:** Mean 77.1%, Range 1 – 96%

**Soil Texture (field assessed):** Medium loam (6), Moderately fine clay loam (6), Moderately coarse, sandy loam (4), Moderately fine sandy clay loam (3), Moderately fine silty clay loam (3), Medium to very fine, loamy sand (1)

**Geology (field or map data):** Franciscan melange (20), Sandstone and other sedimentary (9), Clayey alluvium (1), Conglomerate (1)

**Marin County Watersheds:** San Rafael (18), Novato (7), Lagunitas Creek (3), Bolinas (2), Walker Creek (1)

### **Site Impacts**

This association has low non-native plant cover (average 11.6%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Briza maxima*, *Carduus pycnocephalus* and *Cynosurus echinatus*.

### **Classification Comments**

None.

**References:** Evens and Kentner 2006, Keeler-Wolf et al. 2003a, Klein et al. 2015

**Global Rarity Rank:** G3

**State Rarity Rank:** S3

**State Rare:** Y

**Surveys Used for Description**

**Total: N=31; Marin County (n=31):** HYPM037, HYPM043, HYPM079, MARIN158, MMWD0094, MMWD0114A, MMWD0136A, MMWD0138, MMWD0183, MMWD0219A, MMWD0230, MMWD0275, MMWD0282, MMWD0321A, MMWD0323, MMWD0326, MMWD0335, MMWD0351, MOSD0018, MOSD0056, MOSD0058, MOSD0069, MOSD0159, MOSD0186, MOSD0204, MOSD0217, MOSD0223, PGA1545, PGA1661, PGA1703, PORE069

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Quercus agrifolia</i>	100	58.8	31.9	6.0	97.0	X	X		X
	<i>Arbutus menziesii</i>	94	23.7	12.8	0.2	50.0	X			X
	<i>Umbellularia californica</i>	81	12.3	5.4	0.2	20.0	X			X
	<i>Pseudotsuga menziesii</i>	32	1.6	0.7	0.2	5.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Pseudotsuga menziesii*</i>	26	18.9	0.1	0.2	0.4				
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	77	25.1	1.7	0.2	10.0	X			X
	<i>Diplacus aurantiacus</i>	61	14.5	0.9	0.2	8.0				X
	<i>Lonicera hispidula</i>	61	9.1	0.5	0.2	3.0				X
	<i>Heteromeles arbutifolia</i>	26	8.0	0.4	0.2	5.0				
<b>Herb</b>										
	<i>Stachys ajugoides</i>	48	2.2	0.1	0.2	1.0				
	<i>Briza maxima</i>	45	16.2	3.9	0.2	50.0				
	<i>Cynosurus echinatus</i>	45	6.2	0.7	0.2	7.0				
	<i>Iris douglasiana</i>	42	7.4	0.6	0.2	5.0				
	<i>Chlorogalum pomeridianum</i>	39	1.8	0.1	0.1	1.0				
	<i>Zigadenus fremontii</i>	29	2.5	0.1	0.2	0.2				
	<i>Elymus glaucus</i>	26	1.7	0.3	0.2	5.0				
	<i>Cynoglossum grande</i>	26	2.3	0.1	0.2	1.0				
	<i>Carduus pycnocephalus</i>	23	1.6	0.1	0.2	1.0				

## **Quercus agrifolia – Arbutus menziesii / Corylus cornuta – Rubus spp. Association**

**Common Name:** Coast Live Oak – Madrone / Hazel – Blackberry Woodland

**Alliance:** *Quercus agrifolia* Forest & Woodland Alliance

### **Local Vegetation Description**

The Coast Live Oak – Madrone / Hazel – Blackberry Association forms an open to continuous tree canopy with an intermittent to continuous shrub understory. The dominant tree is *Quercus agrifolia* and those that are characteristic or often present include *Umbellularia californica*. Commonly associated shrubs include *Corylus cornuta*, *Rubus ursinus*, *Toxicodendron diversilobum*, *Baccharis pilularis*, *Frangula californica*, *Heteromeles arbutifolia*, and *Lonicera hispidula* and commonly associated herbs include *Clinopodium douglasii*, *Dryopteris arguta*, *Galium aparine*, *Polystichum munitum*, and *Stachys ajugoides*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	3.8	0 – 15	42.5	35 – 50
Hardwood	32.0	8 – 65		–
Regenerating or Shrubby Tree	0.6	0 – 3.4		–
Shrub	57.5	45.0 – 65.0	2.4	0.5 – 5
Herb	33.8	20 – 60	0.6	0 – 2

### **Local Environmental Description**

**Elevation:** Mean 110 m, Range 87 – 135 m

**Aspect:** SE (1), SW (1)

**Slope:** Mean 19 degrees, Range 18 – 20 degrees

**Macro Topography:** Lower 1/3 of slope (1)

**Large Rock:** 0%

**Small Rock:** 18%

**Fines Cover:** 2.7%

**Litter Cover:** 82%

**Soil Texture (field assessed):** Moderately coarse, sandy loam (1)

**Geology (field or map data):** Sandstone and other sedimentary (3), Sandstone, shale, and gravel deposits (1)

**Marin County Watersheds:** Bolinas (2), Lagunitas Creek (1)

**Other Watersheds, San Mateo Co.:** San Mateo Bayside (1)

### **Site Impacts**

This association has low non-native plant cover (average 2.1%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Anagallis arvensis*.

### **Classification Comments**

Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** Allen et al. 1989, Keeler-Wolf et al. 2003a

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** N



**Surveys Used for Description**

**Total: N=6; Marin County (n=4):** GGNRA385, PGA1713, PGA1716, SFANO04

San Mateo County (n=1): PGA1868

County unknown (n=1): PGA556

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Quercus agrifolia</i>	100	89.9	52.7	17.0	84.0	X	X		X
	<i>Umbellularia californica</i>	50	3.2	2.9	0.2	10.0				X
	<i>Arbutus menziesii</i>	33	4.0	1.8	3.0	8.0				
<b>Shrub</b>										
	<i>Corylus cornuta</i>	100	42.5	20.8	4.9	40.0	X		X	X
	<i>Rubus ursinus</i>	100	24.7	9.2	1.0	16.0	X			X
	<i>Toxicodendron diversilobum</i>	100	11.1	5.9	1.0	15.0	X			X
	<i>Baccharis pilularis</i>	67	10.9	6.7	0.2	20.0				X
	<i>Lonicera hispidula</i>	50	4.6	1.7	2.0	5.0				X
	<i>Heteromeles arbutifolia</i>	50	1.8	0.9	0.2	5.0				X
	<i>Frangula californica</i>	50	1.2	0.7	0.2	4.0				X
	<i>Symphoricarpos albus</i>	33	0.8	0.5	0.2	3.0				
	<i>Diplacus aurantiacus</i>	33	0.4	0.2	0.2	1.0				
<b>Herb</b>										
	<i>Dryopteris arguta</i>	50	18.8	4.7	5.0	18.0				X
	<i>Polystichum munitum</i>	50	8.6	3.8	1.0	20.0				X
	<i>Clinopodium douglasii</i>	50	2.5	0.4	0.2	2.0				X
	<i>Galium aparine</i>	50	0.7	0.3	0.2	1.3				X
	<i>Stachys ajugoides</i>	50	0.3	0.1	0.2	0.2				X
	<i>Maianthemum racemosum</i>	33	14.3	5.0	10.0	20.0				
	<i>Chlorogalum pomeridianum</i>	33	2.3	0.7	1.3	3.0				
	<i>Elymus glaucus</i>	33	3.6	0.4	0.2	2.0				
	<i>Pteridium aquilinum</i>	33	2.6	0.2	0.2	1.0				
	<i>Fragaria vesca</i>	33	1.9	0.2	0.2	0.9				
	<i>Anagallis arvensis</i>	33	0.2	0.1	0.2	0.2				
	<i>Angelica hendersonii</i>	33	0.2	0.1	0.2	0.2				
	<i>Osmorhiza berteroi</i>	33	1.6	0.1	0.2	0.2				



## Quercus agrifolia – Quercus kelloggii Association

**Common Name:** Coast Live Oak – Black Oak Woodland

**Alliance:** *Quercus agrifolia* Forest & Woodland Alliance

### Local Vegetation Description

The Coast Live Oak – Black Oak Association forms an intermittent to continuous tree canopy with a sparse to open shrub understory. The dominant tree is *Quercus agrifolia*, and those that are characteristic or often present include *Quercus kelloggii* and *Umbellularia californica*. Regenerating or shrubby trees that are that are often present include *Quercus agrifolia*, *Quercus kelloggii*, and *Umbellularia californica*. Commonly associated shrubs include *Lonicera hispidula*, *Toxicodendron diversilobum*, and *Heteromeles arbutifolia*, and commonly associated herbs include *Cynosurus echinatus*, *Avena* spp., *Briza maxima*, *Carduus pycnocephalus*, and *Sanicula crassicaulis*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	60.3	35 – 75	14.2	10 – 20
Regenerating or Shrubby Tree	2.3	0 – 6.2	1.5	0 – 5
Shrub	6.4	0.2 – 16.0	2.4	0 – 5
Herb	24.0	13 – 45	0.4	0 – 1

### Local Environmental Description

**Elevation:** Mean 208 m, Range 164 – 288 m

**Aspect:** NE (1), SE (1), SW (1)

**Slope:** Mean 12 degrees, Range 7 – 19 degrees

**Macro Topography:** Middle 1/3 of slope (1), Middle to Upper 1/3 of slope (1), Upper 1/3 of slope to Ridgetop (1)

**Large Rock:** Mean 1.3%, Range 0– 4%

**Fines Cover:** Mean 6.1%, Range 0.2 – 10%

**Small Rock:** Mean 0.8%, Range 0.2 – 2%

**Litter Cover:** Mean 89%, Range 84 – 96%

**Soil Texture (field assessed):** Coarse, loamy sand (1), Moderately fine sandy clay loam (1), Medium to very fine, sandy loam (1)

**Geology (field or map data):** Volcanic flow rocks (1), Shale and other sedimentary (1), Sandstone and other sedimentary (1)

**Marin County Watersheds:** Novato (1)

**Other Watersheds, San Mateo Co.:** Palo Alto (1); **Sonoma Co.:** Sonoma Creek (1)

### Site Impacts

This association has low non-native plant cover (average 17.5%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Avena* spp., *Briza maxima*, *Bromus diandrus*, *Bromus madritensis*, *Carduus pycnocephalus*, *Cynosurus echinatus*, *Lolium perenne* and *Torilis arvensis*.

### Classification Comments

Since the number of surveys of this association in Marin are low, data from nearby counties are included.

**References:** Buck and Evens 2010, Evens and San 2005, Wainwright and Barbour 1984

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

### Surveys Used for Description

**Total: N=3; Marin County (n=1):** MOSD0163

San Mateo County (n=1): SMAT0247    Sonoma County (n=1): SONO0383

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Quercus agrifolia</i>	100	57.2	36.7	20.0	50.0	X	X		X
	<i>Quercus kelloggii</i>	100	17.2	11.3	6.0	20.0	X			X
	<i>Umbellularia californica</i>	67	15.2	9.3	8.0	20.0				X
	<i>Quercus douglasii</i>	33	3.8	2.7	8.0	8.0				
	<i>Quercus lobata</i>	33	2.3	1.7	5.0	5.0				
	<i>Quercus garryana</i>	33	2.6	1.0	3.0	3.0				
	<i>Arbutus menziesii</i>	33	1.7	0.7	2.0	2.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Umbellularia californica</i> *	67	32.6	1.4	0.2	4.0				X
	<i>Quercus agrifolia</i> *	67	21.9	0.7	0.2	2.0				X
	<i>Quercus kelloggii</i> *	67	12.2	0.1	0.2	0.2				X
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	100	27.8	3.7	0.2	10.0	X			X
	<i>Lonicera hispidula</i>	100	52.4	2.0	1.0	3.0	X	X		X
	<i>Heteromeles arbutifolia</i>	67	5.1	0.7	0.2	2.0				X
	<i>Symphoricarpos mollis</i>	33	7.9	1.7	5.0	5.0				
	<i>Sambucus nigra</i>	33	3.2	0.7	2.0	2.0				
	<i>Rhamnus crocea</i>	33	1.6	0.3	1.0	1.0				
	<i>Arctostaphylos manzanita</i>	33	2.0	0.1	0.2	0.2				
<b>Herb</b>										
	<i>Cynosurus echinatus</i>	100	39.2	4.7	2.0	7.0	X		X	X
	<i>Briza maxima</i>	67	17.2	6.7	0.2	20.0				X
	<i>Carduus pycnocephalus</i>	67	10.7	2.3	2.0	5.0				X
	<i>Avena</i> spp.	67	4.9	1.0	1.0	2.0				X
	<i>Sanicula crassicaulis</i>	67	0.8	0.1	0.2	0.2				X
	<i>Bromus diandrus</i>	33	8.3	3.3	10.0	10.0				
	<i>Festuca californica</i>	33	12.1	1.3	4.0	4.0				
	<i>Bromus madritensis</i>	33	0.8	0.3	1.0	1.0				
	<i>Achillea millefolium</i>	33	0.7	0.1	0.2	0.2				
	<i>Bromus carinatus</i>	33	0.7	0.1	0.2	0.2				
	<i>Chlorogalum pomeridianum</i>	33	0.7	0.1	0.2	0.2				
	<i>Elymus glaucus</i>	33	0.7	0.1	0.2	0.2				
	<i>Galium porrigens</i>	33	0.7	0.1	0.2	0.2				
	<i>Lolium perenne</i>	33	0.7	0.1	0.2	0.2				
	<i>Pedicularis densiflora</i>	33	0.7	0.1	0.2	0.2				
	<i>Perideridia kelloggii</i>	33	0.7	0.1	0.2	0.2				
	<i>Torilis arvensis</i>	33	0.7	0.1	0.2	0.2				
<b>Non-vascular</b>										
	Moss	67	50.0	0.4	0.2	1.0				X
	Lichen	33	16.7	0.1	0.2	0.2				

***Quercus agrifolia* – *Umbellularia californica* / *Heteromeles arbutifolia* – *Quercus berberidifolia* Association**

**Common Name:** Coast Live Oak – California Bay / Toyon – Scrub Oak Woodland

**Alliance:** *Quercus agrifolia* Forest & Woodland Alliance

**Local Vegetation Description**

The Coast Live Oak – California Bay / Toyon – Scrub Oak Association forms an intermittent tree canopy with an open shrub understory. The dominant tree is *Quercus agrifolia*, and *Umbellularia californica* is characteristically present. Commonly associated shrubs include *Heteromeles arbutifolia*, *Toxicodendron diversilobum*, *Diplacus aurantiacus* and *Lonicera hispidula*. The herbaceous layer typically includes *Stachys ajugoides*, while *Avena* spp., *Briza maxima*, *Chlorogalum pomeridianum*, *Lathyrus vestitus*, *Lolium perenne*, and *Sanicula crassicaulis* are often present.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	48.8	37 – 66	7.5	5 – 10
Regenerating or Shrubby Tree	1.4	1 – 1.8	3.5	2 – 5
Shrub	4.5	1 – 8	3.5	2 – 5
Herb	33.0	1 – 65	0.8	0.5 – 1

**Local Environmental Description**

**Elevation:** Mean 280 m, Range 132 – 428 m

**Aspect:** SE (2)

**Slope:** Mean 35 degrees, Range 29 – 40 degrees

**Macro Topography:** Lower to Middle 1/3 of slope (1), Upper 1/3 of slope (1),

**Large Rock:** Mean 0.2%, Range 0.2 – 0.2%

**Small Rock:** Mean 0.2%, Range 0 – 0.4%

**Fines Cover:** Mean 10.5%, Range 0 – 21%

**Litter Cover:** Mean 50.0%, Range 25 – 75%

**Soil Texture (field assessed):** Moderately fine clay loam (1), Fine clay (1)

**Geology (field or map data):** Franciscan melange (1), Ultramafic rocks, mostly serpentine (1)

**Marin County Watersheds:** San Rafael (1)

**Other Watersheds, Sonoma Co.:** Sonoma Creek (1)

**Site Impacts**

This association has low non-native plant cover (average 17.2%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Briza maxima*, *Bromus diandrus*, *Carduus pycnocephalus*, *Cynosurus echinatus*, *Genista monspessulana*, *Lolium perenne*, and *Torilis arvensis*.

**Classification Comments**

Since the number of surveys of this association in Marin County is low, data from nearby counties were included.

**References:** Allen et al. 1989, Evens and San 2004

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** N

**Surveys Used for Description**

Total: N=2; Marin County (n=1): MMWD0340A

Sonoma County (n=1): SONO0110

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Quercus agrifolia</i>	100	85.7	43.0	35.0	51.0	X	X		X
	<i>Umbellularia californica</i>	100	14.1	8.5	2.0	15.0	X			X
	<i>Arbutus menziesii</i>	50	0.3	0.1	0.2	0.2				X
<b>Regenerating or Shrubby Trees</b>										
	<i>Quercus agrifolia</i> *	100	55.6	0.6	0.2	1.0	X	X		X
	<i>Umbellularia californica</i> *	50	33.3	0.6	1.2	1.2				X
	<i>Arbutus menziesii</i> *	50	5.6	0.1	0.2	0.2				X
	<i>Pseudotsuga menziesii</i>	50	5.6	0.1	0.2	0.2				X
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	100	26.3	1.0	1.0	1.0	X			X
	<i>Heteromeles arbutifolia</i>	50	38.0	3.5	7.0	7.0				X
	<i>Diplacus aurantiacus</i>	50	20.8	0.5	1.0	1.0				X
	<i>Lonicera hispidula</i>	50	5.4	0.5	1.0	1.0				X
	<i>Arctostaphylos manzanita</i>	50	1.1	0.1	0.2	0.2				X
	<i>Baccharis pilularis</i>	50	4.2	0.1	0.2	0.2				X
	<i>Genista monspessulana</i>	50	4.2	0.1	0.2	0.2				X
<b>Herb</b>										
	<i>Stachys ajugoides</i>	100	7.4	0.2	0.2	0.2	X			X
	<i>Briza maxima</i>	50	40.9	17.5	35.0	35.0				X
	<i>Lathyrus vestitus</i>	50	3.5	1.5	3.0	3.0				X
	<i>Avena</i> spp.	50	1.2	0.5	1.0	1.0				X
	<i>Chlorogalum pomeridianum</i>	50	1.2	0.5	1.0	1.0				X
	<i>Lolium perenne</i>	50	1.2	0.5	1.0	1.0				X
	<i>Sanicula crassicaulis</i>	50	1.2	0.5	1.0	1.0				X
	<i>Bromus carinatus</i>	50	7.1	0.1	0.2	0.2				X
	<i>Bromus diandrus</i>	50	0.2	0.1	0.2	0.2				X
	<i>Carduus pycnocephalus</i>	50	0.2	0.1	0.2	0.2				X
	<i>Cynosurus echinatus</i>	50	7.1	0.1	0.2	0.2				X
	<i>Elymus glaucus</i>	50	7.1	0.1	0.2	0.2				X
	<i>Melica torreyana</i>	50	7.1	0.1	0.2	0.2				X
	<i>Nassella pulchra</i>	50	0.2	0.1	0.2	0.2				X
	<i>Pentagramma triangularis</i>	50	7.1	0.1	0.2	0.2				X
	<i>Torilis arvensis</i>	50	7.1	0.1	0.2	0.2				X

***Quercus agrifolia* / *Adenostoma fasciculatum* – (*Salvia mellifera*) Association**

**Common Name:** Coast Live Oak / Chamise – Black Sage Woodland

**Alliance:** *Quercus agrifolia* Forest & Woodland Alliance

**Local Vegetation Description**

The Coast Live Oak / Chamise – Black Sage Association forms an open to intermittent tree canopy with an open to intermittent shrub understory. The dominant tree is *Quercus agrifolia*. Commonly associated shrubs include *Adenostoma fasciculatum*, *Diplacus aurantiacus*, *Baccharis pilularis*, and *Toxicodendron diversilobum* and commonly associated herbs include *Briza maxima*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0	0 – 0	no data	
Hardwood	28.3	15 – 40	7.8	2 – 15
Regenerating or Shrubby Tree	0	0 – 0	no data	
Shrub	36.7	15.0 – 60.0	0.8	0.5 – 1
Herb	12.0	1 – 20	0.3	0 – 0.5

**Local Environmental Description**

**Elevation:** Mean 193 m, Range 104 – 362 m

**Aspect:** SE (2)

**Slope:** Mean 34 degrees, Range 32 – 35 degrees

**Macro Topography:** Upper 1/3 of slope (2)

**Large Rock:** Mean 0.0%, Range 0.0 – 0.0%

**Small Rock:** Mean 0.5%, Range 0.0 – 1.0%

**Fines Cover:** Mean 9.0%, Range 3.0 – 15.0%

**Litter Cover:** Mean 86.5%, Range 80.0 – 93%

**Soil Texture (field assessed):** Medium loam (1), Moderately fine sandy clay loam (1)

**Geology (field or map data):** Sandstone and other sedimentary (3)

**Marin County Watersheds:** Novato (2), Bolinas (1)

**Site Impacts**

This association has low non-native plant cover (average 16.4%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Avena* spp., *Brachypodium distachyon*, *Briza maxima*, *Bromus diandrus*, *Carduus pycnocephalus*, *Cynosurus echinatus*, and *Hypochaeris radicata*.

**Classification Comments**

None.

**References:** Allen et al. 1989, Buck-Diaz and Evens 2011b, Keeler-Wolf and Evens 2006, Klein and Evens 2005

**Global Rarity Rank:** G3

**State Rarity Rank:** S3

**State Rare:** Y

**Surveys Used for Description**

**Total: N=3; Marin County (n=3):** MOSD0175, MOSD0250, PGA653

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Quercus agrifolia</i>	100	93.3	26.3	15.0	40.0	X	X		X
	<i>Umbellularia californica</i>	33	6.7	2.0	6.0	6.0				
<b>Shrub</b>										
	<i>Adenostoma fasciculatum</i>	100	46.8	16.0	8.0	30.0	X		X	X
	<i>Diplacus aurantiacus</i>	100	22.0	5.0	3.0	7.0	X			X
	<i>Baccharis pilularis</i>	67	11.7	5.0	5.0	10.0				X
	<i>Toxicodendron diversilobum</i>	67	2.0	1.1	0.2	3.0				X
	<i>Artemisia californica</i>	33	5.7	3.3	10.0	10.0				
	<i>Arctostaphylos glandulosa</i>	33	5.9	1.7	5.0	5.0				
	<i>Ceanothus thyrsiflorus</i>	33	3.5	1.0	3.0	3.0				
	<i>Heteromeles arbutifolia</i>	33	2.4	0.7	2.0	2.0				
<b>Herb</b>										
	<i>Briza maxima</i>	67	26.8	4.3	5.0	8.0				X
	<i>Avena</i> spp.	33	13.9	3.3	10.0	10.0				
	<i>Brachypodium distachyon</i>	33	6.9	1.7	5.0	5.0				
	<i>Bromus diandrus</i>	33	12.4	1.7	5.0	5.0				
	<i>Lotus</i> spp.	33	2.8	0.7	2.0	2.0				
	<i>Carduus pycnocephalus</i>	33	1.4	0.3	1.0	1.0				
	<i>Chlorogalum pomeridianum</i>	33	23.8	0.3	1.0	1.0				
	<i>Bromus carinatus</i>	33	0.3	0.1	0.2	0.2				
	<i>Cynosurus echinatus</i>	33	0.3	0.1	0.2	0.2				
	<i>Daucus pusillus</i>	33	0.3	0.1	0.2	0.2				
	<i>Dichelostemma congestum</i>	33	0.5	0.1	0.2	0.2				
	<i>Hypochaeris radicata</i>	33	0.5	0.1	0.2	0.2				
	<i>Marah fabaceus</i>	33	4.8	0.1	0.2	0.2				
	<i>Stachys ajugoides</i>	33	4.8	0.1	0.2	0.2				
	<i>Vicia</i> spp.	33	0.3	0.1	0.2	0.2				

## ***Quercus agrifolia* / grass Association**

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**Common Name:** California Live Oak / Annual Grass-Herb Woodland

**Alliance:** *Quercus agrifolia* Forest & Woodland Alliance

### **Local Vegetation Description**

The California Live Oak / Annual Grass-Herb Woodland Association forms an open to continuous tree canopy with a sparse to open shrub understory. The dominant tree is *Quercus agrifolia*, and those that are characteristic or often present include *Umbellularia californica*. Commonly associated shrubs include *Toxicodendron diversilobum* and commonly associated herbs include *Briza maxima*, *Avena* spp., *Bromus diandrus*, *Carduus pycnocephalus*, and *Elymus glaucus*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.1	0 – 1	7.5	5 – 10
Hardwood	37.8	6 – 80	10.6	5 – 20
Regenerating or Shrubby Tree	0.4	0 – 5	4.7	2 – 15
Shrub	2.1	0 – 10	1.4	0 – 10
Herb	45	8 – 99	0.4	0 – 1

### **Local Environmental Description**

**Elevation:** Mean 175 m, Range 18 – 421 m

**Aspect:** SW (9), Variable (6), SE (3), Flat (1), NE (1), NW (1)

**Slope:** Mean 21 degrees, Range 0 – 40 degrees

**Macro Topography:** Lower 1/3 of slope (7), Middle 1/3 of slope (6), Upper 1/3 of slope (5), Not recorded (1), Ridge top (1)

**Large Rock:** Mean 0.4%, Range 0 – 3%

**Small Rock:** Mean 1.5%, Range 0 – 18%

**Fines Cover:** Mean 6.8%, Range 0 – 40%

**Litter Cover:** Mean 76.2%, Range 1 – 96%

**Soil Texture (field assessed):** Moderately fine clay loam (5), Medium to very fine, sandy loam (3), Moderately coarse, sandy loam (3), Fine sandy clay (3), Fine clay (2), Medium loam (1), Medium silt (1), Fine silty clay (1), Moderately fine sandy clay loam (1)

**Geology (field or map data):** Sandstone and other sedimentary (10), Franciscan melange (7), Large landslides (2), Blueschist and semi-schist (1), Volcanic flow rocks (1)

**Marin County Watersheds:** Novato (12), Lagunitas Creek (4), San Rafael (3), Bolinas (1), Petaluma River (1)

### **Site Impacts**

This association has moderate non-native plant cover (average 33.6%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Avena* spp., *Brachypodium distachyon*, *Briza maxima*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Cynosurus echinatus*, *Erodium botrys*, *Genista monspessulana*, *Hypochaeris glabra*, and *Lolium perenne*.

### **Classification Comments**

None.

**References:** AECOM 2013, Allen et al. 1989, Evens and Kentner 2006, Evens and San 2005, Keeler-Wolf and Evens 2006, Kittel et al. 2012, Klein and Evens 2005, Klein et al. 2015, Shuford and Timossi 1989

Global Rarity Rank: GNR

State Rarity Rank: SNR

State Rare: N

**Surveys Used for Description**

**Total: N=21; Marin County (n=21):** MMWD0045, MMWD0067, MMWD0181A, MMWD0226, MMWD0338A, MOSD0161, MOSD0162, MOSD0166, MOSD0170, MOSD0179, MOSD0181, MOSD0215, MOSD0216, MOSD0243, MOSD0252, MOSD0267, MOSD0277, MOSD0282, MOSD0352, SFANO09

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Quercus agrifolia</i>	100	87.3	38.4	1.0	98.6	X	X		X
	<i>Umbellularia californica</i>	57	5.3	1.7	0.2	15.0				X
	<i>Quercus lobata</i>	48	2.1	0.7	0.2	4.0				
	<i>Arbutus menziesii</i>	24	1.0	0.1	0.2	1.0				
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	76	40.7	1.3	0.2	11.1	X		X	X
	<i>Baccharis pilularis</i>	43	8.0	0.3	0.2	4.0				
	<i>Lonicera hispidula</i>	43	12.1	0.2	0.2	1.4				
	<i>Diplacus aurantiacus</i>	29	7.1	0.2	0.2	2.0				
	<i>Genista monspessulana</i>	24	6.2	0.0	0.2	0.2				
	<i>Heteromeles arbutifolia</i>	24	3.0	0.0	0.2	0.2				
<b>Herb</b>										
	<i>Briza maxima</i>	81	33.9	11.5	0.2	35.0	X		X	X
	<i>Avena spp.</i>	81	9.4	4.6	0.2	45.0	X			X
	<i>Bromus diandrus</i>	67	10.6	3.3	0.2	15.0				X
	<i>Carduus pycnocephalus</i>	67	2.1	0.5	0.2	3.0				X
	<i>Elymus glaucus</i>	62	8.9	1.6	0.2	18.2				X
	<i>Cynosurus echinatus</i>	43	0.9	0.3	0.2	2.2				
	<i>Galium spp.</i>	38	1.6	0.2	0.2	1.0				
	<i>Sanicula crassicaulis</i>	38	1.1	0.1	0.2	1.0				
	<i>Nassella pulchra</i>	33	1.0	0.4	0.2	3.0				
	<i>Bromus hordeaceus</i>	29	2.6	0.9	0.2	10.0				
	<i>Erodium botrys</i>	29	0.9	0.3	0.2	5.0				
	<i>Stachys ajugoides</i>	29	0.9	0.1	0.2	0.2				
	<i>Lolium perenne</i>	24	2.7	2.3	0.2	45.0				
	<i>Brachypodium distachyon</i>	24	3.2	1.0	0.2	15.0				
	<i>Iris macrosiphon</i>	24	0.4	0.2	0.2	1.0				
	<i>Hypochaeris glabra</i>	24	0.3	0.1	0.2	1.0				



***Quercus agrifolia* / *Toxicodendron diversilobum* Association**

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**Common Name:** Coast Live Oak / Poison-oak Woodland

**Alliance:** *Quercus agrifolia* Forest & Woodland Alliance

**Local Vegetation Description**

The Coast Live Oak / Poison-oak Association forms an open to continuous tree canopy with a sparse to continuous shrub understory. The dominant tree is *Quercus agrifolia*, and those that are characteristic or often present includes *Umbellularia californica*. Commonly associated shrubs include *Toxicodendron diversilobum*, *Lonicera hispidula*, and *Rubus ursinus*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	1.5	0 – 10	3.5	2 – 5
Hardwood	32.4	6 – 65	7.4	2 – 15
Regenerating or Shrubby Tree	0.1	0 – 1.2	3.5	2 – 5
Shrub	32.6	0.0 – 95.0	2.5	0.5 – 5
Herb	22.5	0 – 70	0.3	0 – 1

**Local Environmental Description**

**Elevation:** Mean 109 m, Range 13 – 461 m

**Aspect:** SW (7), SE (3), NE (2), NW (2)

**Slope:** Mean 24 degrees, Range 10 – 52 degrees

**Macro Topography:** Lower 1/3 of slope (4), Ridge top (2), Upper 1/3 of slope (2), Middle 1/3 of slope (1)

**Large Rock:** Mean 0.6%, Range 0 – 4%

**Small Rock:** Mean 4.3%, Range 0 – 12%

**Fines Cover:** Mean 9.2%, Range 0.2 – 40%

**Litter Cover:** Mean 73.9%, Range 5 – 99%

**Soil Texture (field assessed):** Moderately fine clay loam (3), Coarse, loamy sand (1), Medium to very fine, sandy loam (1), Moderately coarse, sandy loam (1), Moderately fine sandy clay loam (1), Not recorded (1), Unknown (1)

**Geology (field or map data):** Franciscan melange (10), Sandstone and other sedimentary (8), Alluvium (2), Volcanic flow rocks (1), Granitic (1), Granitic (generic) (1)

**Marin County Watersheds:** Bolinas (7), Lagunitas Creek (6), San Rafael (6), Inverness (2), Petaluma River (1), Walker Creek (1)

**Site Impacts**

This association has low non-native plant cover (average 9.3%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Cynosurus echinatus*, *Genista monspessulana*, *Holcus lanatus*, and *Torilis arvensis*.

**Classification Comments**

None.

**References:** AECOM 2013, Allen et al. 1989, Evens and Kentner 2006, Evens and San 2004, Evens and San 2005, Keeler-Wolf and Evens 2006, Keeler-Wolf et al. 2003a, Kittel et al. 2012, Klein and Evens 2005, Klein et al. 2015, Sproul et al. 2011

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** N

**Surveys Used for Description**

**Total: N=25; Marin County (n=25):** GGNRA388, HYPM063, MMWD0108A, MMWD0151, MMWD0375, MOSD0068, MOSD0190, PGA1170, PGA1324, PGA1543, PGA1625, PGA4793, PGA5489, PGA6780, PGA7074, PGA7630, PGA7832, PORE158, PORE175, SFANO01, SFANO02, SFANO08, SFANO10, SFANO11, WRBL023

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Quercus agrifolia</i>	100	87.4	49.9	8.0	100.0	X	X		X
	<i>Umbellularia californica</i>	72	9.1	4.3	0.2	11.8				X
	<i>Pseudotsuga menziesii</i>	24	1.7	0.9	1.0	10.0				
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	100	31.1	9.7	0.2	29.2	X		X	X
	<i>Rubus ursinus</i>	64	25.7	15.7	0.2	76.4				X
	<i>Lonicera hispidula</i>	52	4.8	1.0	0.2	8.3				X
	<i>Baccharis pilularis</i>	44	8.7	3.8	0.2	30.0				
	<i>Diplacus aurantiacus</i>	44	5.4	1.6	0.2	10.0				
	<i>Heteromeles arbutifolia</i>	40	7.0	4.1	0.1	64.6				
	<i>Corylus cornuta</i>	32	3.8	1.6	0.2	15.0				
	<i>Frangula californica</i>	32	2.3	1.5	0.2	17.4				
	<i>Genista monspessulana</i>	24	3.5	1.5	0.2	16.0				
<b>Herb</b>										
	<i>Holcus lanatus</i>	32	7.8	3.0	0.2	50.0				
	<i>Clinopodium douglasii</i>	32	4.6	1.3	0.2	14.0				
	<i>Polystichum munitum</i>	28	8.6	3.5	0.2	64.0				
	<i>Cynosurus echinatus</i>	28	4.4	1.1	0.2	10.0				
	<i>Stachys ajugoides</i>	28	2.3	0.8	0.2	8.2				
	<i>Pteridium aquilinum</i>	28	3.3	0.5	0.2	4.7				
	<i>Bromus carinatus</i>	28	2.5	0.4	0.2	5.3				
	<i>Torilis arvensis</i>	24	2.3	0.8	0.2	12.0				

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## ***Quercus chrysolepis* (tree) Forest & Woodland Alliance**

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**Common Name:** Canyon live oak forest and woodland

**NVC Alliance Code:** A3349. *Quercus chrysolepis* - *Quercus kelloggii* Forest & Woodland Alliance

### **Statewide Description**

*Quercus chrysolepis* is dominant or co-dominant in the tree canopy with *Abies concolor*, *Acer macrophyllum*, *Arbutus menziesii*, *Calocedrus decurrens*, *Notholithocarpus densiflorus*, *Pinus coulteri*, *Pinus lambertiana*, *Pinus monophylla*, *Pinus ponderosa*, *Pseudotsuga menziesii*, *Quercus garryana* var. *garryana*, *Quercus kelloggii*, *Quercus wislizeni*, and *Umbellularia californica*.

*Quercus chrysolepis* grows on the east side of the Sierra Nevada, in the Mojave Desert, and in most of cismontane California typically at middle and upper elevations (Griffin and Critchfield 1972). *Quercus chrysolepis* is present in many different alliances and it shares dominance with several other tree species in this alliance (Allen-Diaz et al. 2007). Most *Quercus chrysolepis* stands that are free of recent major disturbance have trees of all sizes and all ages (Tirmenstein 1989b, Thornburgh 1990b).

### **Local Vegetation Description**

The Canyon live oak forest and woodland Alliance forms an open to continuous tree canopy with a sparse to open shrub understory. The dominant tree is *Quercus chrysolepis*, and *Umbellularia californica*, *Arbutus menziesii*, and *Pseudotsuga menziesii* are characteristic or often present. Regenerating or shrubby trees that are dominant and characteristic include *Pseudotsuga menziesii* and those that are often present include *Notholithocarpus densiflorus*. Commonly associated shrubs include *Lonicera hispidula* and *Toxicodendron diversilobum*, and commonly associated herbs include *Iris douglasiana*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.4	0 – 2	10.0	5 – 15
Hardwood	48.2	28 – 71	7.7	2 – 15
Regenerating or Shrubby Tree	3.6	0 – 12.2	no data	
Shrub	7.5	0.0 – 24.0	no data	
Herb	6.5	0.75 – 17	0.3	0 – 0.5

### **Local Membership Rule**

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

### **Local Environmental Description**

**Elevation:** Mean 436 m, Range 174 – 746 m

**Aspect:** NE (4), Variable (3), SW (2), NW (2)

**Slope:** Mean 31 degrees, Range 3 – 63 degrees

**Macro Topography:** Middle 1/3 of slope (5), Upper 1/3 of slope (3), Lower 1/3 of slope (2), Bottom (1)

**Large Rock:** Mean 3.8%, Range 0.0 – 25.0%

**Small Rock:** Mean 9.1%, Range 0.0 – 32.0%

**Fines Cover:** Mean 10.5%, Range 1.0 – 32.0%

**Litter Cover:** Mean 69.4%, Range 31.0 – 99%

**Soil Texture (field assessed):** Medium to very fine, sandy loam (3), Moderately fine sandy clay loam (3), Moderately fine clay loam (3), Medium silt loam (1), Moderately coarse, sandy loam (1)

**Geology (field or map data):** Franciscan melange (11)

**Marin County Watersheds:** Lagunitas Creek (7), Bolinas (2), San Rafael (2)

### **Site Impacts**

This alliance has very low non-native plant cover (average 0.7%) relative to native cover. Non-native species with highest frequency and abundance include *Cynosurus echinatus* and *Carduus pycnocephalus*.

### **Associations in Marin County**

*Quercus chrysolepis* – *Arbutus menziesii* – *Notholithocarpus densiflorus* var. *densiflorus*

*Quercus chrysolepis* – *Umbellularia californica*

*Quercus chrysolepis* / *Quercus (wislizeni, parvula)*

### **Classification Comments**

None.

**References:** Campbell 1980, Evens and Kentner 2006, Keeler-Wolf et al. 2003b, Klein et al. 2007, Klein et al. 2015, Reyes et al. 2020a, NPS-SEKI 2009, VegCAMP 2015a

**Global Rarity Rank:** G5

**State Rarity Rank:** S5

### **Surveys Used for Description**

**Total: N=19; Marin County (n=12):** GGNRA387, HYPM094, MMWD0169, MMWD0173, MMWD0199A, MMWD0267A, MMWD0288, MMWD0292, MMWD0299A, MMWD0302A, MMWD0356, MMWD0368

## Alliance Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Quercus chrysolepis</i>	100	50.4	25.8	6.0	70.0	X	X		X
	<i>Umbellularia californica</i>	92	27.5	14.9	1.0	40.0	X			X
	<i>Arbutus menziesii</i>	58	5.6	2.2	1.0	8.2				X
	<i>Pseudotsuga menziesii</i>	50	4.2	2.0	0.2	12.0				X
	<i>Notholithocarpus densiflorus</i>	42	7.1	2.4	2.0	12.0				
	<i>Quercus wislizeni</i>	25	4.3	1.5	0.2	15.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Pseudotsuga menziesii</i> *	75	21.4	0.4	0.2	2.0	X			X
	<i>Notholithocarpus densiflorus</i> *	50	29.9	1.4	0.2	7.0				X
	<i>Umbellularia californica</i> *	33	11.0	0.7	0.2	8.0				
	<i>Quercus chrysolepis</i> *	25	2.8	0.1	0.2	0.2				
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	50	14.5	0.4	0.2	1.0				X
	<i>Lonicera hispidula</i>	50	5.4	0.2	0.2	1.0				X
	<i>Symphoricarpos mollis</i>	42	12.1	0.2	0.2	1.0				
	<i>Vaccinium ovatum</i>	33	7.9	0.9	0.2	8.0				
	<i>Heteromeles arbutifolia</i>	33	13.3	0.7	1.0	4.0				
	<i>Diplacus aurantiacus</i>	33	4.8	0.3	0.2	2.0				
<b>Herb</b>										
	<i>Iris douglasiana</i>	67	20.0	0.7	0.2	3.0				X
	<i>Pteridium aquilinum</i>	33	6.2	0.2	0.2	2.0				
	<i>Pentagramma triangularis</i>	33	3.2	0.1	0.2	1.0				
	<i>Carex globosa</i>	25	4.9	0.3	0.2	2.0				
	<i>Stachys ajugoides</i>	25	2.5	0.1	0.2	1.0				
	<i>Polystichum munitum</i>	25	2.8	0.1	0.2	1.0				
	<i>Melica californica</i>	25	1.9	0.1	0.2	0.2				
	<i>Melica torreyana</i>	25	1.5	0.1	0.2	0.2				
<b>Non-vascular</b>										
	Moss	25	25.0	0.3	0.2	3.0				

***Quercus chrysolepis* – *Arbutus menziesii* – *Notholithocarpus densiflorus* var. *densiflorus* Association**

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**Common Name:** Canyon Live Oak – Madrone – Tanoak Woodland

**Alliance:** *Quercus chrysolepis* (tree) Forest & Woodland Alliance

**Local Vegetation Description**

The Canyon Live Oak – Madrone – Tanoak Association forms an open to continuous tree canopy with a sparse to open shrub understory. The dominant tree is *Quercus chrysolepis*, and those that are characteristic or often present include *Arbutus menziesii*, *Notholithocarpus densiflorus*, *Pseudotsuga menziesii*, and *Umbellularia californica*. Regenerating or shrubby trees that are dominant and characteristic include *Pseudotsuga menziesii* and those that are often present include *Umbellularia californica*. Commonly associated shrubs include *Heteromeles arbutifolia* and *Lonicera hispidula*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	2.0	0 – 4	6.5	2 – 15
Hardwood	44.4	28 – 71	7.1	2 – 15
Regenerating or Shrubby Tree	5.0	0 – 8.2	3.0	1 – 5
Shrub	12.6	0.2 – 31	1.3	0.5 – 2
Herb	5.4	0.75 – 11	0.3	0 – 0.5

**Local Environmental Description**

**Elevation:** Mean 484 m, Range 231 – 794 m

**Aspect:** Variable (3), SW (2), NW (1)

**Slope:** Mean 30 degrees, Range 10 – 45 degrees

**Macro Topography:** Middle 1/3 of slope (3), Upper 1/3 of slope to Ridgetop (2), Lower to Middle 1/3 of slope (1)

**Large Rock:** Mean 2.5%, Range 0 – 17%

**Fines Cover:** Mean 15.8%, Range 0.2 – 60%

**Small Rock:** Mean 6.0%, Range 0.0 – 32%

**Litter Cover:** Mean 65.8%, Range 33 – 96%

**Soil Texture (field assessed):** Moderately fine sandy clay loam (2), Medium to very fine, sandy loam (1)

**Geology (field or map data):** Franciscan melange (4), Sandstone (3)

**Marin County Watersheds:** San Rafael (2), Lagunitas Creek (1)

**Other Watersheds, San Mateo Co.:** Pescadero Creek (1); **Sonoma Co.:** Gualala River (3)

**Site Impacts**

This association has low non-native plant cover (average 1.8%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Cynosurus echinatus* and *Torilis arvensis*.

**Classification Comments**

Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** Campbell 1980, Evens and Kentner 2006, Klein et al. 2015

**Global Rarity Rank:** G4

**State Rarity Rank:** S4?

**State Rare:** N

**Surveys Used for Description**

**Total: N=7; Marin County (n=3):** HYPM094, MMWD0267A, MMWD0292

San Mateo County (n=1): SMAT0256

Sonoma County (n=3): SONO0901, SONO0908, SONO0944

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Quercus chrysolepis</i>	100	59.7	28.0	6.0	60.0	X	X		X
	<i>Arbutus menziesii</i>	100	12.0	5.0	1.0	11.0	X			X
	<i>Pseudotsuga menziesii</i>	71	5.6	2.4	0.2	6.5				X
	<i>Umbellularia californica</i>	71	6.3	2.3	1.0	7.0				X
	<i>Notholithocarpus densiflorus</i>	57	10.1	3.4	2.0	12.0				X
	<i>Quercus wislizeni</i>	29	4.1	1.0	3.0	4.0				
	<i>Quercus kelloggii</i>	29	0.4	0.2	0.2	1.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Pseudotsuga menziesii</i> *	86	44.2	2.1	0.2	6.2	X		X	X
	<i>Umbellularia californica</i> *	71	18.1	1.3	0.2	8.0				X
	<i>Notholithocarpus densiflorus</i> *	29	14.0	1.1	0.4	7.0				
	<i>Quercus chrysolepis</i> *	29	4.7	0.2	0.4	1.2				
	<i>Arbutus menziesii</i> *	29	2.7	0.1	0.4	0.4				
<b>Shrub</b>										
	<i>Heteromeles arbutifolia</i>	57	7.4	1.3	0.2	4.0				X
	<i>Lonicera hispidula</i>	57	3.8	0.1	0.2	0.4				X
	<i>Diplacus aurantiacus</i>	43	7.2	0.3	0.2	2.0				
	<i>Toxicodendron diversilobum</i>	43	4.2	0.2	0.2	1.0				
	<i>Arctostaphylos manzanita</i>	29	10.6	3.7	0.2	26.0				
	<i>Vaccinium ovatum</i>	29	9.5	1.3	1.0	8.0				
	<i>Adenostoma fasciculatum</i>	29	10.8	1.0	1.0	6.0				
	<i>Frangula californica</i>	29	6.6	0.9	0.2	6.0				
	<i>Lotus scoparius</i>	29	7.1	0.9	0.2	6.0				
	<i>Baccharis pilularis</i>	29	4.8	0.1	0.2	0.2				
	<i>Symphoricarpos mollis</i>	29	3.1	0.1	0.2	0.2				
<b>Herb</b>										
	<i>Pteridium aquilinum</i>	43	11.1	0.5	0.2	2.0				
	<i>Iris</i> spp.	43	4.7	0.2	0.2	1.0				
	<i>Cynosurus echinatus</i>	29	12.2	0.7	1.0	4.0				
	<i>Iris douglasiana</i>	29	9.7	0.5	0.2	3.0				
	<i>Pentagramma triangularis</i>	29	6.1	0.3	1.0	1.0				
	<i>Chlorogalum pomeridianum</i>	29	1.1	0.1	0.2	0.2				
	<i>Melica californica</i>	29	2.6	0.1	0.2	0.2				
	<i>Polygala californica</i>	29	2.8	0.1	0.2	0.2				
	<i>Torilis arvensis</i>	29	1.0	0.1	0.2	0.2				
<b>Non-vascular</b>										
	Moss	43	42.7	2.2	0.2	15.0				
	Lichen	29	14.5	0.1	0.2	0.2				

*Quercus chrysolepis* – *Arbutus menziesii* – *Notholithocarpus densiflorus* var. *densiflorus* Association  
*Quercus chrysolepis* (tree) Forest & Woodland Alliance



## ***Quercus chrysolepis* – *Umbellularia californica* Association**

**Common Name:** Canyon Live Oak – California Bay Woodland

**Alliance:** *Quercus chrysolepis* (tree) Forest & Woodland Alliance

### **Local Vegetation Description**

The Canyon Live Oak – California Bay Association forms an intermittent to continuous tree canopy with a sparse to open shrub understory. The co-dominant trees are *Quercus chrysolepis* and *Umbellularia californica*, and those that are characteristic or often present *Pseudotsuga menziesii*. Regenerating or shrubby trees that are often present include *Notholithocarpus densiflorus*. Commonly associated shrubs include *Lonicera hispidula* and *Toxicodendron diversilobum*, and commonly associated herbs include *Iris douglasiana*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.6	0 – 2	10.0	5 – 15
Hardwood	53.5	40 – 71	8.8	5 – 15
Regenerating or Shrubby Tree	3.0	0 – 12.2	no data	
Shrub	4.5	0 – 15	no data	
Herb	8.1	2 – 17	0.3	0 – 0.5

### **Local Environmental Description**

**Elevation:** Mean 436 m, Range 174 – 746 m

**Aspect:** NE (3), SW (2), Variable (2), NW (1)

**Slope:** Mean 30 degrees, Range 3 – 63 degrees

**Macro Topography:** Middle 1/3 of slope (3), Upper 1/3 of slope (2), Lower 1/3 of slope (2), Bottom (1)

**Large Rock:** Mean 5.2%, Range 0.2 – 25%

**Small Rock:** Mean 9.5%, Range 2 – 20%

**Fines Cover:** Mean 9.1%, Range 2 – 22%

**Litter Cover:** Mean 73.1%, Range 31 – 99%

**Soil Texture (field assessed):** Moderately fine clay loam (3), Medium to very fine, sandy loam (2), Moderately coarse, sandy loam (1), Moderately fine sandy clay loam (1), Medium silt loam (1)

**Geology (field or map data):** Franciscan melange (7)

**Marin County Watersheds:** Lagunitas Creek (5), Bolinas (2)

### **Site Impacts**

This association has very low non-native plant cover (average 0.8%) relative to native cover.

### **Classification Comments**

None.

**References:** Evens and Kentner 2006, Keeler-Wolf et al. 2003b, Klein et al. 2007, NPS-SEKI 2009

**Global Rarity Rank:** G4?

**State Rarity Rank:** SNR

**State Rare:** N

### **Surveys Used for Description**

**Total: N=8; Marin County (n=8):** GGNRA387, MMWD0169, MMWD0173, MMWD0199A, MMWD0288, MMWD0299A, MMWD0302A, MMWD0368



### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Quercus chrysolepis</i>	100	47.9	28.4	9.0	70.0	X		X	X
	<i>Umbellularia californica</i>	100	38.8	21.7	6.2	40.0	X		X	X
	<i>Pseudotsuga menziesii</i>	50	4.2	2.2	1.0	12.0				X
	<i>Arbutus menziesii</i>	38	5.5	2.5	4.0	8.2				
	<i>Notholithocarpus densiflorus</i>	25	2.4	1.0	2.7	5.0				
	<i>Quercus agrifolia</i>	25	0.9	0.5	1.0	3.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Pseudotsuga menziesii</i> *	75	22.9	0.3	0.2	1.0	X			X
	<i>Notholithocarpus densiflorus</i> *	50	29.1	1.1	0.2	6.0				X
	<i>Quercus chrysolepis</i> *	38	4.2	0.1	0.2	0.2				
	<i>Umbellularia californica</i> *	25	4.0	0.1	0.2	0.4				
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	63	20.9	0.5	0.2	1.0				X
	<i>Lonicera hispidula</i>	50	7.6	0.2	0.2	1.0				X
	<i>Rosa californica</i>	38	13.5	0.3	0.2	2.0				
	<i>Diplacus aurantiacus</i>	38	5.4	0.2	0.2	1.0				
	<i>Symphoricarpos mollis</i>	38	15.1	0.1	0.2	0.2				
	<i>Heteromeles arbutifolia</i>	25	15.2	0.4	1.0	2.0				
<b>Herb</b>										
	<i>Iris douglasiana</i>	75	21.5	0.7	0.2	2.0	X			X
	<i>Carex globosa</i>	38	7.4	0.4	0.2	2.0				
	<i>Pentagramma triangularis</i>	38	2.6	0.1	0.2	0.2				
	<i>Cynoglossum grande</i>	25	8.4	1.5	0.2	12.0				
	<i>Whipplea modesta</i>	25	8.4	0.5	2.0	2.0				
	<i>Pteridium aquilinum</i>	25	6.9	0.3	0.2	2.0				
	<i>Arabis glabra</i>	25	3.0	0.1	0.2	0.4				
	<i>Adiantum jordanii</i>	25	0.9	0.1	0.2	0.2				
	<i>Elymus glaucus</i>	25	3.7	0.1	0.2	0.2				
	<i>Galium triflorum</i>	25	1.9	0.1	0.2	0.2				
	<i>Lathyrus vestitus</i>	25	4.2	0.1	0.2	0.2				
	<i>Melica torreyana</i>	25	1.6	0.1	0.2	0.2				
	<i>Polystichum munitum</i>	25	1.2	0.1	0.2	0.2				
	<i>Stachys ajugoides</i>	25	0.8	0.1	0.2	0.2				
<b>Non-vascular</b>										
	Moss	25	25.0	0.4	0.2	3.0				

***Quercus chrysolepis* / *Quercus (wislizeni, parvula)* Association**

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**Common Name:** Canyon Live Oak / Shrub Interior Live Oak Woodland

**Alliance:** *Quercus chrysolepis* (tree) Forest & Woodland Alliance

**Local Vegetation Description**

The Canyon Live Oak / Shrub Interior Live Oak Association forms an intermittent tree canopy with an open shrub understory. The dominant tree is *Quercus chrysolepis*, and those that are characteristic or often present include *Arbutus menziesii*, *Umbellularia californica* and *Quercus parvula* or *Q. wislizeni*. Regenerating or shrubby trees that are often present include *Notholithocarpus densiflorus*, *Pseudotsuga menziesii*, and *Quercus parvula* or *Q. wislizeni*. Commonly associated shrubs include *Cercocarpus betuloides*, *Corylus cornuta*, *Holodiscus discolor*, *Rubus ursinus*, *Symphoricarpos mollis* and *Vaccinium ovatum*, and commonly associated herbs include *Carduus pycnocephalus*, *Claytonia exigua*, *Cynosurus echinatus*, *Elymus californicus*, *Fragaria vesca*, *Melica torreyana*, *Polystichum munitum*, *Pteridium aquilinum* and *Stachys ajugoides*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0	0 – 0	no data	
Hardwood	48.5	47 – 50	7.5	5 – 10
Regenerating or Shrubby Tree	7.5	3 – 12	no data	
Shrub	12	5 – 19	3.5	2 – 5
Herb	3	2 – 4	0.3	0 – 0.5

**Local Environmental Description**

**Elevation:** Mean 727 m, Range 487 – 967 m

**Aspect:** NE (1)

**Slope:** 37 degrees

**Macro Topography:** Upper 1/3 of slope (1), Middle 1/3 of slope (1)

**Large Rock:** 4%

**Small Rock:** 1 %

**Fines Cover:** 15%

**Litter Cover:** 78%

**Soil Texture (field assessed):** Moderately fine sandy clay loam (1)

**Geology (field or map data):** Franciscan melange (1), Sandstone and other sedimentary (1)

**Marin County Watersheds:** Lagunitas Creek (1)

**Other Watersheds, Sonoma Co.:** Middle Russian River (1)

**Site Impacts**

This association has low non-native plant cover (average 1.0%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Carduus pycnocephalus* and *Cynosurus echinatus*.

### Classification Comments

Due to hybridization and morphological similarity between the species, plants identified as *Quercus wislizeni* may be *Quercus parvula*, which has been found to be the most widespread genotype in Marin County (Dodd and Afzul-Rafii 2004, Hauser et al. 2017). The name of the association has been updated to reflect the prevalence of *Q. parvula*. Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** Klein et al. 2007, Klein et al. 2015, Reyes et al. 2020a, VegCAMP 2015a

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** N

### Surveys Used for Description

**Total: N=2; Marin County (n=1):** MMWD0356

Sonoma County (n=1): SONO0045

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Quercus chrysolepis</i>	100	71.1	35.0	30.0	40.0	X	X		X
	<i>Umbellularia californica</i>	100	12.0	6.0	2.0	10.0	X			X
	<i>Arbutus menziesii</i>	100	1.2	0.6	0.2	1.0	X			X
	<i>Quercus wislizeni</i>	50	15.6	7.5	15.0	15.0				X
<b>Regenerating or Shrubby Trees</b>										
	<i>Quercus wislizeni</i> *	50	50.0	6.0	12.0	12.0				X
	<i>Pseudotsuga menziesii</i>	50	33.3	1.0	2.0	2.0				X
	<i>Notholithocarpus densiflorus</i>	50	16.7	0.5	1.0	1.0				X
<b>Shrub</b>										
	<i>Cercocarpus betuloides</i>	50	50.0	3.5	7.0	7.0				X
	<i>Corylus cornuta</i>	50	22.7	1.0	2.0	2.0				X
	<i>Rubus ursinus</i>	50	11.4	0.5	1.0	1.0				X
	<i>Symphoricarpos mollis</i>	50	11.4	0.5	1.0	1.0				X
	<i>Holodiscus discolor</i>	50	2.3	0.1	0.2	0.2				X
	<i>Vaccinium ovatum</i>	50	2.3	0.1	0.2	0.2				X
<b>Herb</b>										
	<i>Carduus pycnocephalus</i>	50	11.9	0.5	1.0	1.0				X
	<i>Polystichum munitum</i>	50	11.9	0.5	1.0	1.0				X
	<i>Stachys ajugoides</i>	50	11.9	0.5	1.0	1.0				X
	<i>Claytonia exigua</i>	50	2.4	0.1	0.2	0.2				X
	<i>Cynosurus echinatus</i>	50	2.4	0.1	0.2	0.2				X
	<i>Elymus californicus</i>	50	2.4	0.1	0.2	0.2				X
	<i>Fragaria vesca</i>	50	2.4	0.1	0.2	0.2				X
	<i>Melica torreyana</i>	50	2.4	0.1	0.2	0.2				X
	<i>Pteridium aquilinum</i>	50	2.4	0.1	0.2	0.2				X

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## ***Quercus douglasii* Forest & Woodland Alliance**

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**Common Name:** Blue oak woodland and forest

**NVC Alliance Code:** A3348. *Quercus douglasii* - *Pinus sabiniana* Woodland Alliance

### **Statewide Description**

*Quercus douglasii* is dominant or co-dominant in the tree canopy with *Aesculus californica*, *Juniperus californica*, *Pinus sabiniana*, *Quercus agrifolia*, *Quercus lobata*, and *Quercus wislizeni*.

The *Quercus douglasii* Alliance, in its varied forms, is one of the most extensive and conspicuous oak woodland vegetation types in the state. In some cases, oak savannas of *Quercus douglasii* trees are scattered across the landscape, and in other cases, trees of mixed composition form a closed tree canopy. Genetic variation is high in the species. Environmental factors controlling this variation include moisture availability, substrate, fire, and other disturbances (Allen-Diaz and Bartolome 1992, Allen-Diaz et al. 2007, Keeley 2002c). Named *Quercus douglasii* hybrids include those with *Q. john-tuckeri* (*Quercus xalvordiana*), *Q. garryana* (*Quercus xeplingii*), and *Q. lobata* (*Quercus xjolonensis*) (Griffin and Critchfield 1972).

### **Local Vegetation Description**

The Blue oak woodland and forest Alliance forms an open to intermittent tree canopy with a sparse to open shrub understory. The dominant tree is *Quercus xeplingii*, and *Quercus agrifolia*, *Quercus douglasii*, and *Umbellularia californica* are characteristic or often present. Commonly associated shrubs include *Arctostaphylos manzanita* and *Toxicodendron diversilobum*, and commonly associated herbs include *Briza maxima*, *Bromus diandrus*, *Avena* spp., *Brachypodium distachyon*, *Carduus pycnocephalus*, and *Chlorogalum pomeridianum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	36.3	25 – 60	11.3	5 – 15
Regenerating or Shrubby Tree	0.0	0 – 0	5.1	2 – 10
Shrub	8.2	0 – 20	4.0	0 – 10
Herb	57.5	35 – 90	0.3	0 – 0.5

### **Local Membership Rule**

*Quercus douglasii* or *Quercus xeplingii* (the hybrid between *Q. douglasii* and *Q. garryana*) dominates or co-dominates with *Quercus agrifolia* or *Arbutus menziesii* in the tree overstory. The understory herbaceous layer is often moderately dense to dense, with a mixture of native and non-native herbs.

### **Local Environmental Description**

**Elevation:** Mean 38 m, Range 10 – 69 m

**Aspect:** SE (4), NE (2), SW (1), Variable (1)

**Slope:** Mean 19 degrees, Range 10 – 30 degrees

**Macro Topography:** Upper 1/3 of slope (6), Lower 1/3 of slope (1), Middle 1/3 of slope (1)

**Large Rock:** Mean 0.0%, Range 0.0 – 0.2%

**Small Rock:** Mean 0.3%, Range 0.2 – 1.0%

**Fines Cover:** Mean 3.2%, Range 0.2 – 10.0%

**Litter Cover:** Mean 91.1%, Range 83.0 – 96%

**Soil Texture (field assessed):** Moderately fine sandy clay loam (3), Moderately fine clay loam (2), Unknown (1), Medium loam (1), Medium to very fine, sandy loam (1)

**Geology (field or map data):** Sandstone, shale, and conglomerate (4), Alluvium (3), Volcanic flow rocks (1)

**Marin County Watersheds:** Petaluma River (8)

### **Site Impacts**

This alliance has greater cover of exotics than natives, non-native plant cover average 57.0% relative to native cover. Non-native species with highest frequency and abundance include *Brachypodium distachyon*, *Briza maxima*, *Bromus diandrus*, *Bromus hordeaceus*, *Bromus madritensis*, *Carduus pycnocephalus*, *Cynosurus echinatus*, *Erodium botrys*, *Hypochaeris radicata*, and *Vicia benghalensis*.

### **Associations in Marin County**

*Quercus xeplingii* / Grass

*Quercus xeplingii* / Grass

### **Classification Comments**

None.

**References:** Allen et al. 1989, Allen et al. 1991, Buck and Evens 2010, Klein et al. 2015, O'Neil and Egan 2004

**Global Rarity Rank:** G4

**State Rarity Rank:** S4

### **Surveys Used for Description**

**Total: N=8; Marin County (n=8):** MOSD0297, MOSD0299, MOSD0300, MOSD0301, MOSD0303, MOSD0305, MOSD0306, MOSD0316

## Alliance Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Quercus xepplingii</i>	100	57.3	17.8	10.0	30.0	X	X		X
	<i>Quercus agrifolia</i>	88	17.5	6.4	0.2	15.0	X			X
	<b><i>Quercus douglasii</i></b>	<b>63</b>	<b>11.2</b>	<b>3.7</b>	<b>0.2</b>	<b>15.0</b>				<b>X</b>
	<i>Umbellularia californica</i>	50	4.5	1.4	0.2	7.0				X
	<i>Quercus kelloggii</i>	38	4.0	0.9	0.2	5.0				
	<i>Quercus garryana</i>	38	1.5	0.4	0.2	2.0				
	<i>Arbutus menziesii</i>	38	0.6	0.2	0.2	1.0				
<b>Shrub</b>										
	<i>Arctostaphylos manzanita</i>	75	59.0	7.0	0.2	15.0	X	X		X
	<i>Toxicodendron diversilobum</i>	63	8.6	0.7	0.2	2.0				X
	<i>Diplacus aurantiacus</i>	50	14.9	0.1	0.2	0.2				X
<b>Herb</b>										
	<i>Briza maxima</i>	100	51.9	32.8	2.0	60.0	X	X		X
	<i>Bromus diandrus</i>	88	4.5	1.9	0.2	10.0	X			X
	<i>Brachypodium distachyon</i>	75	13.7	7.8	0.2	25.0	X			X
	<i>Avena</i> spp.	75	9.0	5.4	3.0	10.0	X			X
	<i>Carduus pycnocephalus</i>	75	2.6	2.2	0.2	15.0	X			X
	<i>Chlorogalum pomeridianum</i>	63	1.2	0.6	0.2	2.0				X
	<i>Lolium perenne</i>	50	8.7	5.2	0.2	25.0				X
	<i>Bromus hordeaceus</i>	38	1.0	0.4	0.2	3.0				
	<i>Iris missouriensis</i>	38	0.1	0.1	0.2	0.2				
	<i>Dichelostemma capitatum</i>	38	0.1	0.1	0.2	0.2				
	<i>Achillea millefolium</i>	38	0.1	0.1	0.2	0.2				
	<i>Sisyrinchium bellum</i>	38	0.1	0.1	0.2	0.2				
	<i>Bromus madritensis</i>	25	3.7	3.1	10.0	15.0				
	<i>Vicia benghalensis</i>	25	1.0	0.8	1.0	5.0				
	<i>Erodium botrys</i>	25	0.2	0.2	0.2	1.0				
	<i>Elymus glaucus</i>	25	0.2	0.2	0.2	1.0				
	<i>Nassella pulchra</i>	25	0.1	0.1	0.2	0.2				
	<i>Galium</i> spp.	25	0.1	0.1	0.2	0.2				
	<i>Sanicula crassicaulis</i>	25	0.1	0.1	0.2	0.2				
	<i>Cynosurus echinatus</i>	25	0.1	0.1	0.2	0.2				
	<i>Ranunculus californicus</i>	25	0.1	0.1	0.2	0.2				
	<i>Hypochaeris radicata</i>	25	0.1	0.1	0.2	0.2				
	<i>Dichelostemma congestum</i>	25	0.1	0.1	0.2	0.2				

***Quercus xepplingii* / Grass Provisional Association**

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**Common Name:** Epling's Oak Woodland

**Alliance:** *Quercus douglasii* Forest & Woodland Alliance

**Classification Comments**

The association circumscription is the same as that of the alliance. See above for detailed description. This association is considered provisional since it is under-sampled in its expected range.

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

***Quercus douglasii* – *Quercus agrifolia* Association\***

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**Common Name:** Blue oak – Coast live oak Woodland

**Alliance:** *Quercus douglasii* Forest & Woodland Alliance

**Classification Comments**

The Blue oak – Coast live oak association was not adequately sampled in Marin County, but was observed occurring in drier areas of the county including around Novato and east of Highway 101. See Klein et al. 2015 for a description from Sonoma Co.

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** N



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## ***Quercus garryana* (tree) Forest & Woodland Alliance**

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**Common Name:** Oregon white oak woodland and forest

**NVC Alliance Code:** A3328. *Quercus garryana* - *Pseudotsuga menziesii* / *Toxicodendron diversilobum*  
Forest & Woodland Alliance

### **Statewide Description**

*Quercus garryana* var. *garryana* is dominant or co-dominant in the tree canopy with *Juniperus occidentalis*, *Pinus jeffreyi*, *Pinus ponderosa*, *Pinus sabiniana*, *Pseudotsuga menziesii*, *Quercus chrysolepis*, *Quercus kelloggii*, and *Umbellularia californica*.

Both forest and woodland *Quercus garryana* stands contain the tree form of the species (var. *garryana*). Trees grow on a wide variety of sites, and can be over-topped by conifers on productive sites. Stands typically occupy unproductive, exposed, dry, or temporarily wet locations (Griffin 1977, Howard 1992j, Stein 1980a). They occur primarily in northwestern California, which has higher rainfall than other locations with oaks in the state (Jimerson and). Both native and non-native grasses make up the understory on most sites (Sawyer 2006). The shrub form of *Quercus garryana* (var. *fruticosa*) is treated in a separate alliance.

### **Local Vegetation Description**

The Oregon white oak woodland and forest Alliance forms an open to intermittent tree canopy with a sparse to open shrub understory. The dominant tree is *Quercus garryana*, and *Quercus agrifolia*, *Aesculus californica*, and *Umbellularia californica* are characteristic or often present. Commonly associated shrubs include *Heteromeles arbutifolia*, *Lonicera hispidula*, and *Toxicodendron diversilobum*, and commonly associated herbs include *Briza maxima*.



Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	33.8	15 – 51	19.5	10 – 35
Regenerating or Shrubby Tree	0.6	0 – 3.8	1.8	0 – 5
Shrub	4.4	0.0 – 11.0	1.1	0.5 – 2
Herb	65.4	32.75 – 90	0.7	0 – 1

### **Local Membership Rule**

*Quercus garryana* dominates or co-dominates with other broadleaf trees or *Pseudotsuga menziesii*. Stands are of two types: 1) relatively dense woodlands without a significant understory herb component or 2) open woodlands over moderate to dense native and non-native herbs (e.g., *Cynosurus echinatus* and *Festuca californica*). *Pseudotsuga menziesii*, *Umbellularia californica*, *Quercus agrifolia*, and/or *Q. kelloggii* commonly intermix, typically as sub-dominants. If two or more other species of *Quercus* are present and, collectively, they are co-dominant with *Q. garryana*, key to the *Quercus (agrifolia, douglasii, garryana, kelloggii, lobata, wislizeni)* Alliance.

### **Local Environmental Description**

**Elevation:** Mean 157 m, Range 28 – 228 m

**Aspect:** NW (2), NE (2), SW (1), Variable (1)

**Slope:** Mean 23 degrees, Range 16 – 35 degrees

**Macro Topography:** Upper 1/3 of slope (4), Lower 1/3 of slope (1), Middle 1/3 of slope (1)

**Large Rock:** Mean 0.1%, Range 0.0 – 0.5%

**Small Rock:** Mean 1.6%, Range 0.2 – 6.0%

**Fines Cover:** Mean 10.3%, Range 0.2 – 61.0%

**Litter Cover:** Mean 62.8%, Range 2.0 – 97%

**Soil Texture (field assessed):** Medium loam (2), Medium to very fine, sandy loam (2), Moderately fine clay loam (2)

**Geology (field or map data):** Franciscan melange (4), Blueschist and semi-schist (1), Chert (1), Sandstone and other sedimentary (1), Volcanic flow rocks (1)

**Marin County Watersheds:** San Rafael (4), Petaluma River (2), Lagunitas Creek (1), Novato (1)

### **Site Impacts**

This alliance has moderate non-native plant cover (average 38.7%) relative to native cover. Non-native species with highest frequency and abundance include *Briza maxima*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Cynosurus echinatus*, and *Genista monspessulana*.

### **Associations in Marin County**

*Quercus garryana* – *Umbellularia californica* – *Quercus (agrifolia, kelloggii)*

*Quercus garryana* / (*Cynosurus echinatus* – *Festuca californica*)

### **Classification Comments**

None.

**References:** Klein et al. 2015

**Global Rarity Rank:** G4

**State Rarity Rank:** S3

### **Surveys Used for Description**

**Total: N=8; Marin County (n=8):** HYPM069, HYPM070, MARIN157, MARIN159, MARIN162, MMWD0001, MMWD0096A, MOSD0312

## Alliance Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Quercus garryana</i>	100	59.3	15.8	8.0	25.0	X	X		X
	<i>Quercus agrifolia</i>	75	9.8	3.2	0.3	9.0	X			X
	<i>Umbellularia californica</i>	63	23.6	10.7	0.2	38.5				X
	<i>Aesculus californica</i>	50	4.3	1.9	1.0	5.0				X
	<i>Arbutus menziesii</i>	25	0.9	0.2	0.2	1.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Umbellularia californica</i> *	25	6.9	0.1	0.2	0.2				
	<i>Quercus agrifolia</i> *	25	6.9	0.1	0.2	0.2				
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	63	25.1	2.3	0.2	10.0				X
	<i>Heteromeles arbutifolia</i>	50	14.5	0.6	0.2	3.0				X
	<i>Lonicera hispidula</i>	50	10.1	0.6	0.2	3.0				X
	<i>Diplacus aurantiacus</i>	25	10.5	0.6	1.0	4.0				
	<i>Genista monspessulana</i>	25	4.2	0.5	0.2	4.2				
	<i>Holodiscus discolor</i>	25	2.2	0.2	0.2	1.0				
	<i>Rosa gymnocarpa</i>	25	4.7	0.1	0.2	0.2				
<b>Herb</b>										
	<i>Briza maxima</i>	75	24.0	17.8	2.0	40.0	X			X
	<i>Festuca californica</i>	38	14.7	10.8	15.0	36.0				
	<i>Cynosurus echinatus</i>	38	6.5	4.6	9.0	18.0				
	<i>Galium porrigens</i>	38	0.2	0.2	0.2	1.0				
	<i>Avena</i> spp.	25	7.3	5.0	20.0	20.0				
	<i>Bromus diandrus</i>	25	5.3	4.4	5.0	30.0				
	<i>Carduus pycnocephalus</i>	25	1.1	0.9	0.2	7.0				
	<i>Lolium perenne</i>	25	1.1	0.8	1.0	5.0				
	<i>Bromus hordeaceus</i>	25	1.1	0.8	1.0	5.0				
	<i>Sanicula crassicaulis</i>	25	0.3	0.3	0.2	2.0				
	<i>Stachys ajugoides</i>	25	0.3	0.3	0.2	2.0				
	<i>Iris douglasiana</i>	25	0.2	0.2	0.2	1.0				
<b>Non-vascular</b>										
	Moss	38	29.2	0.2	0.2	1.0				
	Lichen	25	8.3	0.1	0.2	0.2				

## *Quercus garryana* – *Umbellularia californica* – *Quercus (agrifolia, kelloggii)* Association

**Common Name:** Oregon White Oak – California Bay – Coast Live Oak Woodland

**Alliance:** *Quercus garryana* (tree) Forest & Woodland Alliance

### Local Vegetation Description

The Oregon White Oak – California Bay – Coast Live Oak Association forms an open to continuous tree canopy with a sparse to intermittent shrub understory. The dominant tree is *Quercus garryana*, and those that are characteristic or often present include *Umbellularia californica*, *Aesculus californica*, *Quercus agrifolia* and *Quercus kelloggii*. Regenerating or shrubby trees that are often present include *Umbellularia californica*. Commonly associated shrubs include *Toxicodendron diversilobum* and commonly associated herbs include *Cynosurus echinatus*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	1.3	0 – 8	21.9	10 – 50
Hardwood	38.6	5 – 70	12.9	5 – 35
Regenerating or Shrubby Tree	3.3	0 – 21	2.7	0 – 10
Shrub	5.2	0.0 – 46	1.3	0– 5
Herb	23	1 – 81.75	0.4	0–2

### Local Environmental Description

**Elevation:** Mean 292 m, Range 43 – 600 m

**Aspect:** NW (12), NE (7), SE (3), Variable (2), SW (1)

**Slope:** Mean 18 degrees, Range 3 – 38 degrees

**Macro Topography:** Upper 1/3 of slope (7), Middle 1/3 of slope (6), Lower to Middle 1/3 of slope (5), Lower to Upper 1/3 of slope (3), Middle 1/3 of slope to Ridgetop (2), Middle to Upper 1/3 of slope (2), Bottom to Lower 1/3 of slope (1)

**Large Rock:** Mean 1.4%, Range 0 – 10.2%

**Small Rock:** Mean 5.5%, Range 0 – 23%

**Fines Cover:** Mean 8.7%, Range 0 – 39%

**Litter Cover:** Mean 73.7%, Range 17.5 – 97%

**Soil Texture (field assessed):** Moderately fine clay loam (5), Medium loam (3), Moderately coarse, sandy loam (2), Fine sandy clay (1), Fine clay (1), Moderately fine sandy clay loam (1), Medium to very fine, sandy loam (1)

**Geology (field or map data):** Franciscan melange (10), Volcanic flow rocks (10), General volcanic extrusives (5), Sandstone (4), Ultramafic rocks, mostly serpentine (2), Greenstone (2), Sandstone, shale, and conglomerate (1), Sandstone, shale, and gravel deposits (1), Chert (1)

**Marin County Watersheds:** San Rafael (4)

**Other Watersheds, Sonoma Co.:** Middle Russian River (15), Sonoma Creek (8), Lower Russian River (6), Gualala River (3)

### Site Impacts

This association has low non-native plant cover (average 9.2%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Briza maxima*, *Cynosurus echinatus* and *Torilis arvensis*.

**Classification Comments**

Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** Klein et al. 2015

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

**Total: N=36; Marin County (n=4):** HYPM069, HYPM070, MARIN157, MMWD0001

Sonoma County (n=32): HYPS001, HYPS004, HYPS016, HYPS034, HYPS144, HYPS163, HYPS402, HYPST01, SONO0016, SONO0060, SONO0117, SONO0118, SONO0123, SONO0145, SONO0157, SONO0197, SONO0207, SONO0284, SONO0320, SONO0365, SONO0372, SONO0582, SONO0633, SONO0656, SONO0660, SONO0684, SONO0701, SONO0710, SONO0716, SONO0943, SONO0964, SONO0996

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Quercus garryana</i>	100	61.1	26.1	6.8	57.2	X	X		X
	<i>Umbellularia californica</i>	83	17.5	8.4	0.2	40.0	X			X
	<i>Quercus agrifolia</i>	67	8.4	3.5	0.2	27.0				X
	<i>Quercus kelloggii</i>	58	6.0	2.0	0.2	14.0				X
	<i>Aesculus californica</i>	50	3.0	1.3	0.1	7.0				X
	<i>Pseudotsuga menziesii</i>	33	2.2	1.1	0.1	8.0				
	<i>Arbutus menziesii</i>	22	0.6	0.2	0.2	2.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Umbellularia californica</i> *	53	28.2	1.4	0.1	15.0				X
	<i>Pseudotsuga menziesii</i> *	42	21.8	1.1	0.2	8.2				
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	75	42.9	2.3	0.2	20.0	X		X	X
	<i>Lonicera hispidula</i>	33	8.7	0.6	0.2	5.0				
<b>Herb</b>										
	<i>Cynosurus echinatus</i>	61	20.9	2.9	0.2	18.0				X
	<i>Torilis arvensis</i>	39	4.1	0.3	0.2	4.0				
	<i>Elymus glaucus</i>	36	2.6	0.7	0.2	15.0				
	<i>Briza maxima</i>	31	7.1	1.7	0.2	22.0				
	<i>Festuca californica</i>	28	8.9	0.7	0.2	8.0				
	<i>Chlorogalum pomeridianum</i>	28	1.2	0.2	0.2	2.0				
	<i>Pentagramma triangularis</i>	28	1.4	0.1	0.2	3.0				
<b>Non-vascular</b>										
	Moss	44	43.0	1.2	0.2	10.0				

## ***Quercus garryana* / (*Cynosurus echinatus* – *Festuca californica*) Association**

**Common Name:** Oregon White Oak / (Dogtail Grass – California Fescue) Woodland

**Alliance:** *Quercus garryana* (tree) Forest & Woodland Alliance

### **Local Vegetation Description**

The Oregon White Oak / (Dogtail Grass – California Fescue) Association forms an open to intermittent tree canopy with a sparse to open shrub understory. The dominant tree is *Quercus garryana*, and those that are often present include *Quercus kelloggii*. Regenerating or shrubby trees that are often present include *Pseudotsuga menziesii* and *Umbellularia californica*. Commonly associated shrubs include *Toxicodendron diversilobum*, and commonly associated herbs include *Briza maxima*, *Cynosurus echinatus*, and *Festuca californica*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.3	0 – 3	14.2	10 – 20
Hardwood	27.6	10 – 46	10.3	2 – 35
Regenerating or Shrubby Tree	1.9	0 – 12.6	2.7	0 – 15
Shrub	3.7	0 – 19	2.1	0 – 5
Herb	44.9	15 – 90	0.6	0 – 2

### **Local Environmental Description**

**Elevation:** Mean 221 m, Range 67 – 494 m

**Aspect:** NE (11), NW (6), SW (5), SE (3), Variable (1)

**Slope:** Mean 19 degrees, Range 3 – 36 degrees

**Macro Topography:** Middle 1/3 of slope (8), Upper 1/3 of slope (7), Lower to Upper 1/3 of slope (3), Middle to Upper 1/3 of slope (2), Lower to Middle 1/3 of slope (2), Lower 1/3 of slope to Ridgetop (1), Lower 1/3 of slope (1), Middle 1/3 of slope to Ridgetop (1), Ridge top (1)

**Large Rock:** Mean 2.9%, Range 0 – 30%

**Fines Cover:** Mean 18%, Range 0.2 – 61%

**Small Rock:** Mean 4.6%, Range 0 – 20.2%

**Litter Cover:** Mean 64%, Range 0 – 97%

**Soil Texture (field assessed):** Moderately fine clay loam (6), Moderately fine sandy clay loam (2), Medium loam (1), Medium to very fine, sandy loam (1), Fine silty clay (1), Fine clay (1), Moderately fine silty clay loam (1), Moderately coarse, sandy loam (1)

**Geology (field or map data):** Volcanic flow rocks (7), Sandstone (5), Franciscan melange (5), Greenstone (2), Blue schist (2), General volcanic extrusives (1), Sandstone and other sedimentary (1), Sandstone, shale, and conglomerate (1), Serpentine (1), Ultramafic rocks, mostly serpentine (1), Basalt (1)

**Marin County Watersheds:** Lagunitas Creek (1), Novato (1), Petaluma River (1)

**Other Watersheds, Sonoma Co.:** Middle Russian River (14), Lower Russian River (4), Sonoma Creek (4), Gualala River (1), Petaluma River (1)

### **Site Impacts**

This association has moderate non-native plant cover (average 35.2%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Avena* spp., *Briza maxima*, *Cynosurus echinatus*, and *Torilis arvensis*.

### **Classification Comments**

Since the number of surveys of this association in Marin are low, data from nearby counties were included.

References: Klein et al. 2015

Global Rarity Rank: GNR

State Rarity Rank: SNR

State Rare: Y

**Surveys Used for Description**

Total: N=27; Marin County (n=3): MARIN159, MARIN162, MMWD0096A

Sonoma County (n=24): HYP605, SONO0066, SONO0070, SONO0089, SONO0113, SONO0114, SONO0116, SONO0210, SONO0218, SONO0286, SONO0312, SONO0317, SONO0330, SONO0384, SONO0611, SONO0620, SONO0621, SONO0634, SONO0805, SONO0824, SONO0827, SONO0858, SONO0949, SONO0991

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Quercus garryana</i>	100	79.7	23.3	8.0	42.2	X	X		X
	<i>Quercus kelloggii</i>	52	7.5	2.3	1.0	15.0				X
	<i>Umbellularia californica</i>	48	4.3	1.1	0.2	8.0				
	<i>Quercus agrifolia</i>	48	2.8	0.7	0.2	3.0				
	<i>Pseudotsuga menziesii</i>	33	1.3	0.3	0.2	3.0				
	<i>Arbutus menziesii</i>	26	1.0	0.3	0.2	4.0				
	<i>Aesculus californica</i>	22	0.8	0.2	0.2	3.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Pseudotsuga menziesii</i> *	59	24.8	0.5	0.2	8.2				X
	<i>Umbellularia californica</i> *	56	22.1	0.5	0.2	4.2				X
	<i>Quercus agrifolia</i> *	41	13.2	0.1	0.2	1.0				
	<i>Arbutus menziesii</i> *	26	11.9	0.4	0.2	4.2				
	<i>Quercus garryana</i> *	26	3.6	0.1	0.1	1.0				
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	85	41.2	1.5	0.2	11.3	X		X	X
	<i>Arctostaphylos manzanita</i>	48	26.4	1.8	0.2	18.0				
	<i>Lonicera hispidula</i>	41	6.2	0.4	0.2	5.0				
	<i>Heteromeles arbutifolia</i>	22	1.5	0.1	0.2	2.0				
<b>Herb</b>										
	<i>Briza maxima</i>	81	30.7	14.3	0.2	70.0	X		X	X
	<i>Cynosurus echinatus</i>	81	23.0	9.2	0.2	30.0	X			X
	<i>Festuca californica</i>	70	27.3	11.5	0.2	56.0				X
	<i>Chlorogalum pomeridianum</i>	44	1.0	0.6	0.2	6.0				
	<i>Elymus glaucus</i>	41	1.1	0.6	0.2	7.0				
	<i>Avena</i> spp.	37	5.0	1.9	0.2	20.0				
	<i>Torilis arvensis</i>	37	0.8	0.2	0.2	3.0				
	<i>Iris</i> spp.	22	0.6	0.1	0.2	3.0				
<b>Non-vascular</b>										
	Moss	78	66.4	2.0	0.2	23.0	X	X		X
	Lichen	33	11.3	0.3	0.2	2.0				



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## ***Quercus kelloggii* Forest & Woodland Alliance**

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**Common Name:** California black oak forest and woodland

**NVC Alliance Code:** A3349. *Quercus chrysolepis* - *Quercus kelloggii* Forest & Woodland Alliance

### **Statewide Description**

*Quercus kelloggii* is dominant or co-dominant in the tree canopy with *Abies concolor*, *Arbutus menziesii*, *Calocedrus decurrens*, *Pinus attenuata*, *Pinus ponderosa*, *Pseudotsuga menziesii*, *Quercus agrifolia*, *Quercus chrysolepis*, *Quercus garryana*, *Quercus lobata*, and *Umbellularia californica*.

The range of *Quercus kelloggii* is sufficiently wide that it mixes with many species in many alliances (Gaman and Casey 2002), though it tends to occur in higher elevations than most tree oaks other than *Q. chrysolepis*. The *Quercus kelloggii* Alliance occurs from the foothills to mid-montane elevations, from the Coast Ranges to the Klamath Mountains and the western Sierra Nevada (Barbour et al. 2007a). Conifers replace *Quercus kelloggii* on productive sites in the absence of fire. Conifer replacement is slower or lacking on unproductive sites (Howard 1992l). Stands commonly have *Pinus ponderosa*, *Pinus sabiniana*, and less commonly *Pinus jeffreyi*.

### **Local Vegetation Description**

The California black oak forest and woodland Alliance forms an open to continuous tree canopy with a sparse to intermittent shrub understory. The dominant tree is *Quercus kelloggii*, while *Arbutus menziesii*, *Quercus agrifolia*, and *Umbellularia californica* are characteristic or often present. Commonly associated shrubs include *Toxicodendron diversilobum*. Commonly associated herbs include *Briza maxima*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.8	0 – 7	15.0	10 – 20
Hardwood	40.9	10 – 75	12.0	5 – 20
Regenerating or Shrubby Tree	1.8	0 – 20.6	3.0	1 – 5
Shrub	5.4	0.0 – 40.0	3.4	0 – 10
Herb	40.2	0.2 – 95	0.4	0 – 1

### **Local Membership Rule**

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

### **Local Environmental Description**

**Elevation:** Mean 175 m, Range 50 – 408 m

**Aspect:** NW (6), NE (4), Variable (3), SE (1), SW (1)

**Slope:** Mean 23 degrees, Range 10 – 45 degrees

**Macro Topography:** Upper 1/3 of slope (7), Middle 1/3 of slope (6), Not recorded (1), Upper 1/3 of slope to Ridgetop (1)

**Large Rock:** Mean 0.0%, Range 0.0 – 0.2%

**Small Rock:** Mean 0.4%, Range 0.0 – 2.0%

**Fines Cover:** Mean 6.7%, Range 0.0 – 68.0%

**Litter Cover:** Mean 61.6%, Range 0.0 – 99%

**Soil Texture (field assessed):** Moderately coarse, sandy loam (5), Moderately fine clay loam (3), Moderately fine sandy clay loam (3), Medium to very fine, sandy loam (2), Medium loam (1), Coarse, loamy sand (1)

**Geology (field or map data):** Franciscan melange (12), Sandstone and other sedimentary (3), Blueschist and semi-schist (2), Alluvium (1)

**Marin County Watersheds:** Lagunitas Creek (6), San Rafael (5), Novato (4), Petaluma River (3)

### **Site Impacts**

This alliance has low non-native plant cover (average 19.8%) relative to native cover. Non-native species with highest frequency and abundance include *Briza maxima*, *Carduus pycnocephalus*, *Cynosurus echinatus*, *Torilis arvensis*, and *Vicia sativa*.

### **Associations in Marin County**

*Quercus kelloggii* – *Arbutus menziesii* – *Quercus agrifolia*

*Quercus kelloggii* – *Pseudotsuga menziesii* – *Umbellularia californica*

### **Classification Comments**

None.

**References:** Allen et al. 1991, Evens and Kentner 2006, Klein et al. 2007, Klein et al. 2015

**Global Rarity Rank:** G4

**State Rarity Rank:** S4

### **Surveys Used for Description**

**Total: N=18; Marin County (n=18):** HYPM022, HYPM048, HYPM067, MARIN003, MARIN005, MARIN029, MMWD0055, MMWD0103A, MMWD0113, MMWD0189A, MMWD0223, MMWD0275A, MMWD0411A, MMWD0412, MOSD0125, MOSD0160, MOSD0171, MOSD0317



## Alliance Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Quercus kelloggii</i>	89	44.5	21.0	8.0	46.3	X		X	X
	<i>Umbellularia californica</i>	83	16.3	7.6	0.2	30.0	X			X
	<i>Arbutus menziesii</i>	72	13.7	4.9	2.0	13.0				X
	<i>Quercus agrifolia</i>	72	8.3	3.8	0.5	25.0				X
	<i>Aesculus californica</i>	28	0.8	0.5	0.2	5.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Pseudotsuga menziesii</i>	33	19.5	1.3	0.2	19.0				
	<i>Umbellularia californica</i> *	28	9.4	0.1	0.2	0.4				
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	78	34.5	1.2	0.2	8.0	X		X	X
	<i>Lonicera hispidula</i>	44	7.7	0.3	0.2	3.2				
	<i>Diplacus aurantiacus</i>	28	5.6	0.3	0.2	2.2				
	<i>Heteromeles arbutifolia</i>	22	9.2	0.1	0.1	1.2				
<b>Herb</b>										
	<i>Briza maxima</i>	50	20.4	7.9	1.0	40.0				X
	<i>Cynosurus echinatus</i>	39	6.1	3.4	0.2	30.0				
	<i>Stachys ajugoides</i>	39	1.9	0.4	0.2	5.0				
	<i>Avena</i> spp.	33	6.4	2.3	0.2	22.0				
	<i>Melica torreyana</i>	33	7.2	1.8	0.2	20.0				
	<i>Iris douglasiana</i>	33	9.1	1.1	1.0	6.0				
	<i>Vicia sativa</i>	28	1.3	0.3	0.2	2.0				
	<i>Carduus pycnocephalus</i>	28	0.9	0.2	0.2	1.0				
	<i>Cynoglossum grande</i>	28	0.6	0.2	0.2	2.0				
	<i>Torilis arvensis</i>	22	0.8	0.2	0.2	2.0				
	<i>Elymus glaucus</i>	22	0.4	0.2	0.2	2.0				
	<i>Chlorogalum pomeridianum</i>	22	0.7	0.1	0.2	1.0				
	<i>Pteridium aquilinum</i>	22	3.0	0.0	0.2	0.2				

***Quercus kelloggii* – *Arbutus menziesii* – *Quercus agrifolia* Association**

**Common Name:** California Black Oak – Madrone – Coast Live Oak Woodland

**Alliance:** *Quercus kelloggii* Forest & Woodland Alliance

**Local Vegetation Description**

The California Black Oak – Madrone – Coast Live Oak Association forms an open to continuous tree canopy with a sparse to intermittent shrub understory. The dominant tree is *Quercus kelloggii*, and those that are characteristic or often present include *Arbutus menziesii*, *Quercus agrifolia* and *Umbellularia californica*. Commonly associated shrubs include *Toxicodendron diversilobum* and commonly associated herbs include *Avena* spp., *Briza maxima*, and *Carduus pycnocephalus*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.3	0 – 2	12.5	10 – 15
Hardwood	48.3	20 – 75	11.5	5 – 20
Regenerating or Shrubby Tree	0.1	0 – 0.4	3.5	2 – 5
Shrub	7.5	0.0 – 40	4.5	1 – 10
Herb	47	12 – 95	0.4	0 – 1

**Local Environmental Description**

**Elevation:** Mean 155 m, Range 50 – 257 m

**Aspect:** NW (5), Variable (1), SW (1), NE (1)

**Slope:** Mean 22 degrees, Range 12 – 32 degrees

**Macro Topography:** Middle 1/3 of slope (4), Upper 1/3 of slope (3), Not recorded (1)

**Large Rock:** Mean 0.1%, Range 0 – 0.2%

**Small Rock:** Mean 0.2%, Range 0 – 1%

**Fines Cover:** Mean 10.4%, Range 0 – 68%

**Litter Cover:** Mean 55.2%, Range 0– 94%

**Soil Texture (field assessed):** Moderately coarse, sandy loam (4), Moderately fine clay loam (2), Moderately fine sandy clay loam (1), Medium to very fine, sandy loam (1)

**Geology (field or map data):** Franciscan melange (6), Blueschist and semi-schist (2), Sandstone and other sedimentary (1)

**Marin County Watersheds:** Lagunitas Creek (3), Petaluma River (3), San Rafael (2), Novato (1)

**Site Impacts**

This association has moderate non-native plant cover (average 29.2%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Avena* spp., *Briza maxima*, *Bromus diandrus*, *Carduus pycnocephalus*, *Cynosurus echinatus*, *Torilis arvensis*, *Torilis nodosa*, and *Vicia sativa*.

**Classification Comments**

None.

**References:** Allen et al. 1991, Evens and Kentner 2006, Klein et al. 2015

**Global Rarity Rank:** G3

**State Rarity Rank:** S3

**State Rare:** Y

**Surveys Used for Description**

**Total: N=9; Marin County (n=9):** HYPM067, MARIN029, MMWD0055, MMWD0189A, MMWD0223, MMWD0411A, MMWD0412, MOSD0160, MOSD0317

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Quercus kelloggii</i>	100	52.6	22.4	8.0	40.0	X	X		X
	<i>Quercus agrifolia</i>	100	15.5	7.2	2.0	25.0	X			X
	<i>Arbutus menziesii</i>	89	15.9	5.2	2.0	12.0	X			X
	<i>Umbellularia californica</i>	78	12.4	6.7	0.8	30.0	X			X
<b>Regenerating or Shrubby Trees</b>										
	<i>Umbellularia californica*</i>	22	16.7	0.0	0.2	0.2				
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	89	38.8	0.9	0.2	3.0	X		X	X
	<i>Lonicera hispidula</i>	44	4.8	0.1	0.2	0.2				
	<i>Diplacus aurantiacus</i>	33	0.9	0.3	0.2	2.0				
	<i>Symphoricarpos mollis</i>	22	5.4	0.4	0.2	3.0				
<b>Herb</b>										
	<i>Briza maxima</i>	56	18.1	8.4	1.0	40.0				X
	<i>Avena</i> spp.	56	11.3	4.6	0.2	22.0				X
	<i>Carduus pycnocephalus</i>	56	1.9	0.5	0.2	1.0				X
	<i>Cynosurus echinatus</i>	44	9.9	6.2	0.2	30.0				
	<i>Melica torreyana</i>	44	4.7	1.4	0.2	10.0				
	<i>Vicia sativa</i>	44	1.1	0.5	0.2	2.0				
	<i>Stachys ajugoides</i>	33	2.1	0.7	0.2	5.0				
	<i>Elymus glaucus</i>	33	0.7	0.4	0.2	2.0				
	<i>Cynoglossum grande</i>	33	0.7	0.3	0.2	2.0				
	<i>Torilis nodosa</i>	33	1.1	0.2	0.2	1.0				
	<i>Iris douglasiana</i>	22	7.6	0.9	2.0	6.0				
	<i>Bromus diandrus</i>	22	2.9	0.8	2.0	5.0				
	<i>Galium triflorum</i>	22	1.7	0.7	1.0	5.0				
	<i>Torilis arvensis</i>	22	0.8	0.3	1.0	2.0				
	<i>Chlorogalum pomeridianum</i>	22	0.6	0.0	0.2	0.2				
	<i>Galium porrigens</i>	22	0.6	0.0	0.2	0.2				
	<i>Pteridium aquilinum</i>	22	0.1	0.0	0.2	0.2				
	<i>Sanicula crassicaulis</i>	22	0.1	0.0	0.2	0.2				

***Quercus kelloggii* – *Pseudotsuga menziesii* – *Umbellularia californica* Association**

**Common Name:** California Black Oak – Douglas-fir – California Bay Woodland

**Alliance:** *Quercus kelloggii* Forest & Woodland Alliance

**Local Vegetation Description**

The California Black Oak – Douglas-fir – California Bay Association forms an open to continuous tree canopy with a sparse to open shrub understory. The dominant tree is *Quercus kelloggii*, and those that are characteristic or often present include *Arbutus menziesii*, *Umbellularia californica*, *Aesculus californica*, *Pseudotsuga menziesii* and *Quercus agrifolia*. Regenerating or shrubby trees that are dominant and characteristic include *Pseudotsuga menziesii* and those that are often present include *Umbellularia californica*. Commonly associated shrubs include *Toxicodendron diversilobum* and *Lonicera hispidula*, and commonly associated herbs include *Briza maxima*, *Iris douglasiana*, *Lathyrus vestitus*, and *Stachys ajugoides*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	2.3	0 – 7	17.5	15 – 20
Hardwood	30	22 – 38	10.8	5 – 15
Regenerating or Shrubby Tree	5.3	0 – 20.6	2.5	1 – 5
Shrub	4.2	0 – 9	0.3	0 – 0.5
Herb	33.5	20 – 41.25	0.4	0 – 1

**Local Environmental Description**

**Elevation:** Mean 202 m, Range 85 – 273 m

**Aspect:** NE (2), Variable (2), SE (1)

**Slope:** Mean 26 degrees, Range 10 – 45 degrees

**Macro Topography:** Upper 1/3 of slope (3), Upper 1/3 of slope to Ridgetop (1), Middle 1/3 of slope (1)

**Large Rock:** Mean 0%, Range 0 – 0.2%

**Small Rock:** Mean 0.7%, Range 0 – 2.0%

**Fines Cover:** Mean 4%, Range 0.2 – 10%

**Litter Cover:** Mean 62.5%, Range 17 – 99%

**Soil Texture (field assessed):** Coarse, loamy sand (1), Medium loam (1), Medium to very fine, sandy loam (1), Moderately coarse, sandy loam (1), Moderately fine sandy clay loam (1)

**Geology (field or map data):** Franciscan melange (5), Sandstone and other sedimentary (1)

**Marin County Watersheds:** Lagunitas Creek (3), San Rafael (2), Novato (1)

**Site Impacts**

This association has low non-native plant cover (average 10.5%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Briza maxima*, *Cynosurus echinatus*, *Genista monspessulana*, and *Torilis arvensis*.

**Classification Comments**

None.

**References:** Klein et al. 2007, Klein et al. 2015

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

**Total: N=6; Marin County (n=6):** HYPM022, MARIN003, MARIN005, MMWD0103A, MMWD0113, MMWD0275A

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Umbellularia californica</i>	100	29.5	12.2	2.0	25.0	X			X
	<i>Quercus kelloggii</i>	83	35.4	17.4	9.0	42.5	X		X	X
	<i>Arbutus menziesii</i>	83	17.3	7.0	4.0	13.0	X			X
	<i>Pseudotsuga menziesii</i>	50	6.1	2.6	2.0	7.0				X
	<i>Aesculus californica</i>	50	1.2	0.5	0.2	2.0				X
	<i>Quercus agrifolia</i>	50	1.2	0.4	0.5	1.0				X
	<i>Notholithocarpus densiflorus</i>	33	2.0	0.8	1.0	4.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Pseudotsuga menziesii</i> *	83	50.1	3.9	0.4	19.0	X	X		X
	<i>Umbellularia californica</i> *	50	3.1	0.1	0.2	0.4				X
	<i>Notholithocarpus densiflorus</i> *	33	18.1	0.5	1.2	2.0				
	<i>Arbutus menziesii</i> *	33	1.7	0.2	0.2	1.2				
	<i>Quercus agrifolia</i> *	33	1.3	0.1	0.2	0.2				
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	83	38.2	1.7	0.2	8.0	X		X	X
	<i>Lonicera hispidula</i>	67	15.8	0.8	0.2	3.2				X
	<i>Diplacus aurantiacus</i>	33	15.2	0.5	1.0	2.2				
	<i>Genista monspessulana</i>	33	13.7	0.5	0.2	3.0				
	<i>Heteromeles arbutifolia</i>	33	10.2	0.2	0.2	1.2				
<b>Herb</b>										
	<i>Iris douglasiana</i>	67	15.8	2.0	1.0	5.0				X
	<i>Briza maxima</i>	50	20.7	6.2	2.0	30.0				X
	<i>Stachys ajugoides</i>	50	2.4	0.2	0.2	1.0				X
	<i>Lathyrus vestitus</i>	50	0.4	0.1	0.2	0.2				X
	<i>Melica torreyana</i>	33	14.6	3.4	0.2	20.0				
	<i>Cynosurus echinatus</i>	33	3.2	1.0	3.0	3.0				
	<i>Elymus californicus</i>	33	1.9	0.7	0.2	4.0				
	<i>Chlorogalum pomeridianum</i>	33	1.1	0.2	0.2	1.0				
	<i>Torilis arvensis</i>	33	1.1	0.2	0.2	1.0				
	<i>Bromus carinatus</i>	33	0.5	0.1	0.2	0.2				
	<i>Galium californicum</i>	33	0.2	0.1	0.2	0.2				
<b>Non-vascular</b>										
	Lichen	33	17.1	1.0	0.2	6.0				
	Moss	33	16.3	0.3	1.0	1.0				

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## **Quercus lobata Forest & Woodland Alliance**

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**Common Name:** Valley oak woodland and forest

**NVC Alliance Code:** A3347. *Quercus lobata* Woodland Alliance

### **Statewide Description**

*Quercus lobata* is dominant or co-dominant in the tree canopy with *Acer negundo*, *Alnus rhombifolia*, *Fraxinus latifolia*, *Juglans hindsii*, *Juglans hindsii xregia*, *Platanus racemosa*, *Populus fremontii*, *Quercus agrifolia*, *Quercus douglasii*, *Quercus kelloggii*, *Quercus wislizeni*, *Salix gooddingii*, and *Salix lasiolepis*. Shrubs and lianas may include *Aristolochia californica* or *Vitis californica*.

*Quercus lobata* is endemic to California, and stands vary from open savannas to closed-canopy forests (Allen-Diaz et al. 2007). Riparian and upland forests of *Quercus lobata* occur in the deep, rich soil typical of floodplains and valley floors. This alliance includes the upland forests. These forests are only remnants of what once existed in the Central Valley, other valleys, and foothill locations (Allen-Diaz et al. 2007).

### **Local Vegetation Description**

The Valley oak woodland and forest Alliance forms an open to continuous tree canopy with a sparse to open shrub understory. The dominant to co-dominant tree is *Quercus lobata*, with *Quercus agrifolia* and *Umbellularia californica* characteristic or often present. Commonly associated shrubs include *Toxicodendron diversilobum*, and commonly associated herbs include *Avena* spp., *Carduus pycnocephalus*, *Briza maxima*, *Bromus diandrus*, *Chlorogalum pomeridianum*, *Elymus glaucus*, and *Stachys ajugoides*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0.2	3.5	2 – 5
Hardwood	45.6	20 – 75	11.8	5 – 20
Regenerating or Shrubby Tree	0.9	0 – 7.0	2.7	0 – 10
Shrub	1.8	0.0 – 6.0	0.9	0 – 2
Herb	44.7	30 – 70	0.3	0 – 1

### **Local Membership Rule**

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

### **Local Environmental Description**

**Elevation:** Mean 110 m, Range 23 – 265 m

**Aspect:** NW (4), SW (4), Variable (2), NE (2), SE (2)

**Slope:** Mean 21 degrees, Range 11 – 32 degrees

**Macro Topography:** Middle 1/3 of slope (10), Lower 1/3 of slope (2), Middle to Upper 1/3 of slope (1), Upper 1/3 of slope (1)

**Large Rock:** Mean 0.7%, Range 0.0 – 5.0%

**Small Rock:** Mean 2.4%, Range 0.2 – 26.0%

**Fines Cover:** Mean 10.9%, Range 0.2 – 65.0%

**Litter Cover:** Mean 79.7%, Range 35.0 – 97%

**Soil Texture (field assessed):** Fine sandy clay (3), Moderately fine sandy clay loam (2), Medium silt (2), Medium to very fine, sandy loam (2), Moderately coarse, sandy loam (2), Moderately fine clay loam (2), Fine clay (1)

**Geology (field or map data):** Franciscan melange (6), Sandstone and other sedimentary (6), Large landslides (2), Blueschist and semi-schist (1)

**Marin County Watersheds:** Novato (12), San Rafael (3)

### **Site Impacts**

This alliance has moderate non-native plant cover (average 34.4%) relative to native cover. Non-native species with highest frequency and abundance include *Brachypodium distachyon*, *Briza maxima*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Cynosurus echinatus*, and *Vicia benghalensis*.

### **Associations in Marin County**

*Quercus lobata* – *Quercus agrifolia* / grass

*Quercus lobata* / grass

### **Classification Comments**

None.

**References:** Allen et al. 1989, Buck and Evens 2010, Buck-Diaz et al. 2012, Evens and Kentner 2006, Evens and San 2004, Evens et al. 2004, Keeler-Wolf and Evens 2006, Kittel et al. 2012, Klein et al. 2015, O’Neil and Egan 2004, Reyes et al. 2020

**Global Rarity Rank:** G3

**State Rarity Rank:** S3

### **Surveys Used for Description**

**Total: N=15; Marin County (n=15):** HYPM049, MARIN026, MMWD0068, MOSD0164, MOSD0165, MOSD0199, MOSD0228, MOSD0262, MOSD0268, MOSD0270, MOSD0373, MOSD0385, MOSD0390, MOSD0393, MOSD0394

## Alliance Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Quercus lobata</i>	100	54.8	24.1	8.0	60.0	X	X		X
	<i>Quercus agrifolia</i>	93	31.5	14.1	0.2	40.0	X		X	X
	<i>Umbellularia californica</i>	73	10.5	5.0	0.2	25.0				X
	<i>Aesculus californica</i>	27	2.9	1.0	0.2	9.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Quercus agrifolia</i> *	20	13.1	0.6	1.5	5.0				
	<i>Umbellularia californica</i> *	20	6.9	0.3	0.5	2.0				
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	67	49.5	2.1	0.2	10.0				X
	<i>Lonicera hispidula</i>	33	14.1	0.3	0.2	3.0				
	<i>Baccharis pilularis</i>	27	9.3	0.1	0.2	0.2				
<b>Herb</b>										
	<i>Avena</i> spp.	80	17.6	7.8	0.2	45.0	X			X
	<i>Carduus pycnocephalus</i>	80	7.0	2.8	0.2	25.0	X			X
	<i>Bromus diandrus</i>	73	16.2	8.5	1.0	35.0				X
	<i>Briza maxima</i>	73	20.3	8.1	1.0	35.0				X
	<i>Elymus glaucus</i>	67	5.4	2.1	0.2	20.0				X
	<i>Nassella pulchra</i>	53	1.9	1.0	0.2	5.0				X
	<i>Stachys ajugoides</i>	53	1.7	0.5	0.2	3.0				X
	<i>Chlorogalum pomeridianum</i>	53	1.3	0.3	0.2	2.0				X
	<i>Lolium perenne</i>	47	1.3	0.5	0.2	2.0				
	<i>Cynosurus echinatus</i>	47	0.9	0.5	0.2	5.0				
	<i>Brachypodium distachyon</i>	40	9.7	2.8	0.2	15.0				
	<i>Vicia benghalensis</i>	40	1.4	0.4	0.2	2.0				
	<i>Bromus hordeaceus</i>	27	1.2	0.5	0.2	5.0				
	<i>Daucus pusillus</i>	27	0.2	0.1	0.2	0.2				
	<i>Bromus carinatus</i>	20	0.5	0.2	0.2	3.0				
	<i>Pentagramma triangularis</i>	20	0.4	0.1	0.2	1.0				
	<i>Sanicula crassicaulis</i>	20	0.8	0.1	0.2	1.0				
	<i>Galium</i> spp.	20	0.2	0.0	0.2	0.2				



***Quercus lobata* – *Quercus agrifolia* / grass Association**

**Common Name:** Valley Oak – Coast Live Oak / Grass Woodland

**Alliance:** *Quercus lobata* Forest & Woodland Alliance

**Local Vegetation Description**

The Valley Oak – Coast Live Oak / Grass Association forms an open to continuous tree canopy with a sparse to open shrub understory. The co-dominant trees are *Quercus agrifolia* and *Quercus lobata*, and those that are characteristic or often present include *Umbellularia californica*. Commonly associated shrubs include *Toxicodendron diversilobum*, and commonly associated herbs include *Avena* spp., *Bromus diandrus*, *Carduus pycnocephalus*, *Briza maxima*, *Chlorogalum pomeridianum*, *Cynosurus echinatus*, *Elymus glaucus*, *Nassella pulchra*, *Stachys ajugoides*, and *Vicia benghalensis*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0	0 – 0.2	3.5	2 – 5
Hardwood	48.5	20 – 75	12.9	5 – 20
Regenerating or Shrubby Tree	0.9	0 – 7	3.4	0.5 – 10
Shrub	1.6	0 – 6	0.9	0 – 2
Herb	42.3	7 – 70	0.3	0 – 1

**Local Environmental Description**

**Elevation:** Mean 114 m, Range 47 – 265 m

**Aspect:** SW (4), NW (3), SE (3), NE (2), Variable (1)

**Slope:** Mean 21 degrees, Range 14 – 32 degrees

**Macro Topography:** Middle 1/3 of slope (10), Lower 1/3 of slope (2), Upper 1/3 of slope (1)

**Large Rock:** Mean 1.3%, Range 0.0 – 8%

**Small Rock:** Mean 3.3%, Range 0.2 – 26%

**Fines Cover:** Mean 7.6%, Range 0.2 – 35%

**Litter Cover:** Mean 80.6%, Range 40 – 96%

**Soil Texture (field assessed):** Medium silt (2), Moderately fine sandy clay loam (2), Moderately fine clay loam (2), Fine sandy clay (2), Moderately coarse, sandy loam (2), Medium to very fine, sandy loam (1), Fine clay (1), Moderately fine silty clay loam (1)

**Geology (field or map data):** Sandstone and other sedimentary (6), Franciscan melange (4), Blueschist and semi-schist (2), Large landslides (2)

**Marin County Watersheds:** Novato (11), San Rafael (2), Petaluma River (1)

**Site Impacts**

This association has moderate non-native plant cover (average 30.9%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Avena* spp., *Brachypodium distachyon*, *Briza maxima*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Cynosurus echinatus*, *Lolium perenne*, and *Vicia benghalensis*.

**Classification Comments**

None.

**References:** Allen et al. 1989, Buck and Evens 2010, Buck-Diaz et al. 2012, Keeler-Wolf and Evens 2006, Kittel et al. 2012, Klein et al. 2015, O’Neil and Egan 2004, Reyes et al. 2020

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

**Total: N=14; Marin County (n=14):** HYPM049, MOSD0164, MOSD0165, MOSD0199, MOSD0228, MOSD0262, MOSD0268, MOSD0270, MOSD0373, MOSD0385, MOSD0390, MOSD0393, MOSD0394

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Quercus lobata</i>	100	47.6	22.9	8.0	60.0	X		X	X
	<i>Quercus agrifolia</i>	100	36.1	16.4	2.0	40.0	X		X	X
	<i>Umbellularia californica</i>	79	12.8	6.3	0.2	25.0	X			X
	<i>Aesculus californica</i>	29	3.1	1.0	0.2	9.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Quercus agrifolia</i> *	21	14.0	0.6	1.5	5.0				
	<i>Umbellularia californica</i> *	21	7.4	0.3	0.5	2.0				
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	71	53.9	2.2	0.2	10.0				X
	<i>Lonicera hispidula</i>	43	16.3	0.3	0.2	3.0				
	<i>Baccharis pilularis</i>	21	2.8	0.0	0.2	0.2				
<b>Herb</b>										
	<i>Bromus diandrus</i>	79	17.3	8.9	0.2	35.0	X			X
	<i>Avena</i> spp.	79	15.5	5.2	0.2	20.0	X			X
	<i>Carduus pycnocephalus</i>	79	7.2	2.9	0.2	25.0	X			X
	<i>Briza maxima</i>	64	17.9	7.6	1.0	35.0				X
	<i>Elymus glaucus</i>	57	4.9	2.0	0.2	20.0				X
	<i>Stachys ajugoides</i>	57	2.5	0.6	0.2	3.0				X
	<i>Nassella pulchra</i>	50	1.8	1.0	0.2	5.0				X
	<i>Cynosurus echinatus</i>	50	0.9	0.5	0.2	5.0				X
	<i>Chlorogalum pomeridianum</i>	50	2.3	0.4	0.2	2.0				X
	<i>Vicia benghalensis</i>	50	1.7	0.4	0.2	2.0				X
	<i>Brachypodium distachyon</i>	43	10.4	3.0	0.2	15.0				
	<i>Lolium perenne</i>	43	1.3	0.5	0.2	2.0				
	<i>Bromus hordeaceus</i>	29	1.3	0.5	0.2	5.0				
	<i>Daucus pusillus</i>	29	0.2	0.1	0.2	0.2				
	<i>Galium</i> spp.	29	0.4	0.1	0.2	0.2				
	<i>Bromus carinatus</i>	21	0.6	0.2	0.2	3.0				
	<i>Melica torreyana</i>	21	1.4	0.2	0.2	2.0				
	<i>Pentagramma triangularis</i>	21	0.5	0.1	0.2	1.0				
	<i>Dichelostemma congestum</i>	21	0.3	0.0	0.2	0.2				

***Quercus lobata* / grass Association**

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**Common Name:** Valley Oak / Grass Woodland

**Alliance:** *Quercus lobata* Forest & Woodland Alliance

**Local Vegetation Description**

The Valley Oak / Grass Association forms an open to intermittent tree canopy with a sparse to open shrub understory. The dominant tree is *Quercus lobata*. Commonly associated herbs include *Avena* spp., *Bromus diandrus*, and *Carduus pycnocephalus*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0	0 – 0.2	7.5	5 – 10
Hardwood	26.1	5 – 45	10.3	5 – 20
Regenerating or Shrubby Tree	0.5	0 – 3	0.6	0 – 2
Shrub	0.8	0.0 – 5	0.8	0 – 2
Herb	42.9	14 – 82.5	0.3	0 – 1

**Local Environmental Description**

**Elevation:** Mean 200 m, Range 23 – 467 m

**Aspect:** NW (3), Variable (3), SE (2), Flat (1)

**Slope:** Mean 12 degrees, Range 0 – 30 degrees

**Macro Topography:** Middle 1/3 of slope (4), Upper 1/3 of slope (1), Bottom to Lower 1/3 of slope (1), Lower to Middle 1/3 of slope (1), Middle 1/3 of slope to Ridgetop (1), Middle to Upper 1/3 of slope (1)

**Large Rock:** Mean 1.8%, Range 0 – 7%

**Small Rock:** Mean 2.6%, Range 0 – 12%

**Fines Cover:** Mean 26%, Range 0 – 81%

**Litter Cover:** Mean 47.7%, Range 0.2 – 97%

**Soil Texture (field assessed):** Fine clay (2), Fine sandy clay (2), Medium to very fine, sandy loam (2), Unknown (1)

**Geology (field or map data):** Franciscan melange (3), Mixed metamorphic (2), Sandstone and other sedimentary (1), Volcanic flow rocks (1), Volcanic flow (1), Shale (1), Sandstone (1), Alluvium (1), Sandstone, shale, and gravel deposits (1)

**Marin County Watersheds:** Novato (1), San Rafael (1)

**Other Watersheds, San Mateo Co.:** San Mateo Bayside (2), Palo Alto (1); **Sonoma Co.:** Middle Russian River (5), Russian Gulch (1), Sonoma Creek (1)

**Site Impacts**

This association has moderate non-native plant cover (average 39.2%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Avena* spp., *Briza maxima*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Cynosurus echinatus*, *Geranium dissectum*, *Lolium perenne*, *Plantago lanceolata*, and *Vicia sativa*.

**Classification Comments**

Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** Allen et al. 1989, Evens and Kentner 2006, Keeler-Wolf and Evens 2006, Klein et al. 2015

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

Total: N=12; Marin County (n=2): MARIN026, MMWD0068

San Mateo County (n=3): SMAT0023, SMAT0062, SMAT0090

Sonoma County (n=7): HYP5051.2, HYP5409, MILO032, SONO0059, SONO0963, SONO0981, SONO2188

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Quercus lobata</i>	100	82.7	20.7	5.0	32.0	X	X		X
	<i>Quercus agrifolia</i>	42	2.8	0.7	0.2	5.0				
	<i>Umbellularia californica</i>	33	3.1	0.7	1.0	4.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Quercus lobata</i> *	25	13.5	0.1	0.2	0.2				
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	42	29.1	0.7	0.2	5.0				
	<i>Baccharis pilularis</i>	25	13.8	0.1	0.2	1.0				
<b>Herb</b>										
	<i>Bromus diandrus</i>	67	6.3	4.9	0.2	40.0				X
	<i>Avena</i> spp.	58	17.4	7.2	2.0	45.0				X
	<i>Carduus pycnocephalus</i>	50	5.1	3.1	0.2	19.0				X
	<i>Lolium perenne</i>	42	4.8	3.0	1.0	16.0				
	<i>Briza maxima</i>	42	10.1	2.2	2.0	12.0				
	<i>Vicia sativa</i>	42	0.7	0.4	0.2	3.0				
	<i>Cynosurus echinatus</i>	33	9.1	1.8	2.0	11.0				
	<i>Elymus glaucus</i>	33	5.4	1.5	0.2	15.0				
	<i>Geranium dissectum</i>	33	2.1	1.1	2.0	5.0				
	<i>Bromus hordeaceus</i>	33	2.8	0.7	1.0	3.0				
	<i>Plantago lanceolata</i>	33	1.5	0.4	1.0	2.0				
	<i>Sanicula crassicaulis</i>	33	0.2	0.1	0.2	0.2				
	<i>Nassella pulchra</i>	25	1.4	0.4	0.2	3.0				
	<i>Chlorogalum pomeridianum</i>	25	0.4	0.1	0.2	1.0				
<b>Non-vascular</b>										
	Moss	42	37.5	0.2	0.2	2.0				

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## **Quercus lobata Riparian Forest & Woodland Alliance**

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**Common Name:** Valley oak riparian forest and woodland

**NVC Alliance Code:** A0618. *Quercus lobata* Riparian Forest Alliance

### **Statewide Description**

*Quercus lobata* is dominant to co-dominant in the riparian tree canopy with *Acer negundo*, *Alnus rhombifolia*, *Fraxinus latifolia*, *Quercus agrifolia*, *Quercus wislizeni*, *Salix gooddingii*, *S. laevigata*, *S. lasiolepis*, and/or *Umbellularia californica*

*Quercus lobata* is endemic to California, and stands vary from open savannas to closed-canopy forests (Allen-Diaz et al. 2007). Riparian and upland forests of *Q. lobata* occur in the deep, rich soil typical of floodplains and valley floors. Riparian stands typically exist on higher portions of the floodplain than do stands of *Populus fremontii* and willows (Holstein 1984, Vaghti and Greco 2007). What remains of these forests are only remnants of what once existed in the Central Valley, other valleys, and foothill locations in California (Allen-Diaz et al. 2007).

This alliance has been split from the upland stands, which were previously combined in a single alliance in *A Manual of California Vegetation, Second Edition* (2009). This follows the revised National Vegetation Classification's recognition of riparian groups separately from upland groups (NatureServe 2020).

### **Local Vegetation Description**

The Valley oak riparian forest and woodland Alliance forms an open to intermittent tree canopy with an open shrub understory. The dominant tree is *Quercus lobata*, and *Umbellularia californica* and *Acer macrophyllum* are characteristic or often present. Commonly associated shrubs include *Toxicodendron diversilobum*, *Lonicera hispidula*, *Symphoricarpos albus*, and commonly associated herbs include

*Clinopodium douglasii*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	34.8	20 – 55	19.5	15 – 35
Regenerating or Shrubby Tree	2.5	0 – 9.0	6.3	1 – 15
Shrub	10.8	0.0 – 25.0	1.8	0.5 – 5
Herb	22.6	1 – 60	0.6	0 – 2

**Local Membership Rule**

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

**Local Environmental Description**

**Elevation:** Mean 68 m, Range 13 – 118 m

**Aspect:** NE (3), SE (1), SW (1)

**Slope:** Mean 10 degrees, Range 1 – 22 degrees

**Macro Topography:** Lower 1/3 of slope (3),  
Bottom to Lower 1/3 of slope (1), Middle 1/3 of slope (1)

**Large Rock:** Mean 2.2%, Range 0.0 – 8.0%

**Small Rock:** Mean 5.8%, Range 2.0 – 10.0%

**Fines Cover:** Mean 29.4%, Range 1.0 – 81.0%

**Litter Cover:** Mean 55.0%, Range 7.0 – 90%

**Soil Texture (field assessed):** Moderately fine silty clay loam (1), Moderately fine clay loam (1), Moderately coarse, sandy loam (1), Fine sandy clay (1), Fine silty clay (1)

**Geology (field or map data):** Franciscan melange (3), Alluvium (1), Blueschist and semi-schist (1)

**Marin County Watersheds:** Petaluma River (2), San Rafael (2), Lagunitas Creek (1)

**Site Impacts**

This alliance has low non-native plant cover (average 12.3%) relative to native cover. Non-native species with highest frequency and abundance include *Brachypodium distachyon*, *Briza maxima*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Mentha pulegium*, *Phalaris aquatica*, *Polypogon monspeliensis*, *Prunus domestica*, *Rumex pulcher*, and *Zantedeschia aethiopica*.

**Associations in Marin County**

*Quercus lobata* – *Fraxinus latifolia* / *Vitis californica*

*Quercus lobata* – *Salix lasiolepis*

*Quercus lobata* / *Rubus ursinus* – *Rosa californica*

**Classification Comments**

None.

**References:** Buck-Diaz et al. 2012, Klein et al. 2015

**Global Rarity Rank:** G3

**State Rarity Rank:** S3

**Surveys Used for Description**

**Total: N=5; Marin County (n=5):** MARIN041, MARIN155, MOSD0066, MOSD0254, MOSD0284

### Alliance Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Quercus lobata</i>	100	45.1	18.0	15.0	20.0	X		X	X
	<i>Umbellularia californica</i>	80	27.2	11.0	2.0	20.0	X			X
	<i>Quercus agrifolia</i>	60	24.6	12.8	6.0	40.0				X
	<i>Acer macrophyllum</i>	40	1.6	0.6	1.0	2.0				
	<i>Fraxinus latifolia</i>	20	0.5	0.2	1.0	1.0				
	<i>Populus fremontii</i>	20	0.8	0.2	1.0	1.0				
	<i>Arbutus menziesii</i>	20	0.1	0.0	0.2	0.2				
	<i>Prunus domestica</i>	20	0.2	0.0	0.2	0.2				
<b>Regenerating or Shrubby Trees</b>										
	<i>Quercus agrifolia</i> *	20	20.0	0.2	1.0	1.0				
	<i>Quercus lobata</i> *	20	5.0	0.0	0.2	0.2				
	<i>Umbellularia californica</i> *	20	5.0	0.0	0.2	0.2				
	<i>Acer macrophyllum</i> *	20	5.0	0.0	0.2	0.2				
	<i>Quercus kelloggii</i>	20	5.0	0.0	0.2	0.2				
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	100	70.7	7.2	1.0	23.0	X	X		X
	<i>Lonicera hispidula</i>	60	5.7	0.3	0.2	1.0				X
	<i>Baccharis pilularis</i>	40	6.5	1.0	0.2	5.0				
	<i>Rubus ursinus</i>	40	2.0	0.4	0.2	2.0				
	<i>Symphoricarpos albus</i>	40	1.8	0.1	0.2	0.2				
	<i>Rubus parviflorus</i>	20	7.1	1.2	6.0	6.0				
	<i>Salix lasiolepis</i>	20	3.0	0.2	1.0	1.0				
	<i>Sambucus nigra</i>	20	1.2	0.2	1.0	1.0				
	<i>Corylus cornuta</i>	20	0.7	0.2	1.0	1.0				
	<i>Cytisus scoparius</i>	20	0.6	0.0	0.2	0.2				
	<i>Aristolochia californica</i>	20	0.1	0.0	0.2	0.2				
	<i>Rosa californica</i>	20	0.1	0.0	0.2	0.2				
	<i>Frangula californica</i>	20	0.1	0.0	0.2	0.2				
	<i>Holodiscus discolor</i>	20	0.1	0.0	0.2	0.2				
	<i>Heteromeles arbutifolia</i>	20	0.1	0.0	0.2	0.2				
<b>Herb</b>										
	<i>Chlorogalum pomeridianum</i>	60	23.7	0.4	0.2	1.0				X
	<i>Avena</i> spp.	40	16.5	5.6	3.0	25.0				
	<i>Adiantum jordanii</i>	40	9.6	0.4	0.2	2.0				
	<i>Stachys ajugoides</i>	40	3.7	0.2	0.2	1.0				
	<i>Clinopodium douglasii</i>	40	15.2	0.2	0.2	1.0				
	<i>Bromus diandrus</i>	40	0.9	0.2	0.2	1.0				
	<i>Galium</i> spp.	40	1.5	0.1	0.2	0.2				
	<i>Carduus pycnocephalus</i>	40	0.6	0.1	0.2	0.2				
	<i>Zantedeschia aethiopica</i>	20	5.6	3.4	17.0	17.0				

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<i>Briza maxima</i>	20	2.0	1.2	6.0	6.0				
	<i>Mentha pulegium</i>	20	1.0	0.6	3.0	3.0				
	<i>Juncus patens</i>	20	0.7	0.4	2.0	2.0				
	<i>Juncus effusus</i>	20	0.3	0.2	1.0	1.0				
	<i>Brachypodium distachyon</i>	20	0.3	0.2	1.0	1.0				
	<i>Polypogon monspeliensis</i>	20	0.3	0.2	1.0	1.0				
	<i>Lolium perenne</i>	20	0.3	0.2	1.0	1.0				
	<i>Melica torreyana</i>	20	2.8	0.2	1.0	1.0				
	<i>Phalaris aquatica</i>	20	0.3	0.2	1.0	1.0				
	<i>Bromus hordeaceus</i>	20	0.3	0.2	1.0	1.0				
	<i>Maianthemum racemosum</i>	20	1.8	0.1	0.4	0.4				
	<i>Rumex pulcher</i>	20	0.1	0.0	0.2	0.2				
	<i>Lathyrus</i> spp.	20	0.9	0.0	0.2	0.2				
	<i>Galium aparine</i>	20	2.9	0.0	0.2	0.2				
	<i>Elymus</i> spp.	20	0.9	0.0	0.2	0.2				
	<i>Dichelostemma congestum</i>	20	0.6	0.0	0.2	0.2				
	<i>Cynoglossum grande</i>	20	0.9	0.0	0.2	0.2				
	<i>Sanicula crassicaulis</i>	20	0.9	0.0	0.2	0.2				
	<i>Osmorhiza berteroi</i>	20	0.9	0.0	0.2	0.2				
	<i>Vicia benghalensis</i>	20	0.6	0.0	0.2	0.2				
	<i>Pteridium aquilinum</i>	20	2.9	0.0	0.2	0.2				
	<i>Pentagramma triangularis</i>	20	0.9	0.0	0.2	0.2				
	<i>Cyperus eragrostis</i>	20	0.1	0.0	0.2	0.2				
<b>Non-vascular</b>										
	Moss	20	20.0	0.0	0.2	0.2				



## **Quercus lobata – Fraxinus latifolia / Vitis californica Association**

**Common Name:** Valley Oak – Oregon Ash / California Wild Grape Woodland

**Alliance:** *Quercus lobata* Riparian Forest & Woodland Alliance

### **Local Vegetation Description**

The Valley Oak – Oregon Ash / California Wild Grape Association forms an open to continuous tree canopy with an open to continuous shrub understory. The dominant tree is *Quercus lobata*, and *Fraxinus latifolia* is characteristic. Commonly associated shrubs include *Toxicodendron diversilobum*, *Rubus armeniacus*, *Rubus ursinus*, and *Symphoricarpos albus*, and commonly associated herbs include *Rumex crispus*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0	0 – 0	no data	
Hardwood	42.8	22 – 75	16.6	13 – 20
Regenerating or Shrubby Tree	4.5	1 – 9	3.5	2 – 5
Shrub	27.2	4 – 80	1.1	0.8 – 1.5
Herb	22.4	0.2 – 53	0.7	0 – 1

### **Local Environmental Description**

**Elevation:** Mean 52 m, Range 19 – 166 m

**Aspect:** Flat (3), NE (1), SE (1), Variable (1)

**Slope:** Mean 1 degrees, Range 0 – 3 degrees

**Macro Topography:** Lower 1/3 of slope (3), Bottom (2), Bottom to Lower 1/3 of slope (1)

**Large Rock:** Mean 0.2%, Range 0 – 1%

**Small Rock:** Mean 2.3%, Range 0 – 6%

**Fines Cover:** Mean 16.7%, Range 5 – 52%

**Litter Cover:** Mean 72.0%, Range 44 – 93%

**Soil Texture (field assessed):** Fine silty clay (2), Fine clay (1), Medium silt (1), Medium to very fine, sandy loam (1)

**Geology (field or map data):** Franciscan mélange (2), Sandstone (1), Alluvium (1), Clayey alluvium (1), Silty alluvium (1)

**Marin County Watersheds:** San Rafael (1)

**Other Watersheds, Sonoma Co.:** Lower Russian River (1), Middle Russian River (4)

### **Site Impacts**

This association has low non-native plant cover (average 18.8%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Bromus diandrus*, *Prunus cerasifera*, *Rubus armeniacus*, and *Rumex crispus*.

### **Classification Comments**

Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** Buck-Diaz et al. 2012, Hickson and Keeler-Wolf 2007, Klein et al. 2015

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

Total: N=6; Marin County (n=1): MARIN155

Sonoma County (n=5): SONO0200, SONO0223, SONO0229, SONO0263, SONO0323

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Quercus lobata</i>	100	61.4	26.2	16.0	40.0	X	X		X
	<i>Fraxinus latifolia</i>	100	19.6	11.5	1.0	30.0	X			X
	<i>Salix laevigata</i>	33	4.6	1.5	0.2	9.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Fraxinus latifolia</i> *	83	52.5	3.1	0.2	9.0	X	X		X
	<i>Quercus lobata</i> *	67	18.5	0.6	0.2	2.2				X
	<i>Prunus cerasifera</i>	33	6.9	0.4	0.2	2.2				
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	67	36.4	11.2	2.0	32.0	X			X
	<i>Rubus ursinus</i>	67	18.0	1.2	0.2	5.0				X
	<i>Rubus armeniacus</i>	50	21.2	13.2	1.0	70.0				X
	<i>Symphoricarpos albus</i>	50	5.4	0.2	0.2	1.0				X
	<i>Rosa californica</i>	33	12.6	0.5	0.2	3.0				
	<i>Aristolochia californica</i>	33	0.2	0.1	0.2	0.2				
<b>Herb</b>										
	<i>Rumex crispus</i>	50	5.0	0.7	1.0	2.0				X
	<i>Carex</i> spp.	33	25.6	11.7	25.0	45.0				
	<i>Bromus carinatus</i>	33	6.9	0.7	1.0	3.0				
	<i>Bromus diandrus</i>	33	0.9	0.2	0.2	1.0				
	<i>Chlorogalum pomeridianum</i>	33	0.4	0.2	0.2	1.0				
<b>Non-vascular</b>										
	Moss	67	55.6	0.4	0.2	1.0				X
	Lichen	33	11.1	0.1	0.2	0.2				

## ***Quercus lobata* – *Salix lasiolepis* Association**

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**Common Name:** Valley Oak – Arroyo Willow Woodland

**Alliance:** *Quercus lobata* Riparian Forest & Woodland Alliance

### **Local Vegetation Description**

The Valley Oak – Arroyo Willow Association forms an intermittent tree canopy with an open shrub understory in the single survey available. The dominant tree is *Quercus agrifolia* and *Quercus lobata* is co-dominant. Regenerating or shrubby trees that are dominant and characteristic include *Quercus agrifolia*. Commonly associated shrubs include *Toxicodendron diversilobum*, *Baccharis pilularis*, *Cytisus scoparius*, *Rubus ursinus*, *Salix lasiolepis*, and commonly associated herbs include *Chlorogalum pomeridianum*.

Lifeform	Cover (%)	Height (m)	
		Mean	Range
Conifer	0	0	no data
Hardwood	60	17.5	15 – 20
Regenerating or Shrubby Tree	1	12.5	10 – 15
Shrub	10	1.5	1 – 2
Herb	1	0.3	0 – 0.5

### **Local Environmental Description**

**Elevation:** 118 m

**Aspect:** SW (1)

**Slope:** 14 degrees

**Macro Topography:** Lower 1/3 of slope (1)

**Large Rock:** 1%

**Small Rock:** 5%

**Fines Cover:** 1%

**Litter Cover:** 90%

**Soil Texture (field assessed):** Fine sandy clay (1)

**Geology (field or map data):** Franciscan melange (1)

**Marin County Watersheds:** Lagunitas Creek (1)

### **Site Impacts**

This association has very low non-native plant cover (average 0.3%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Cytisus scoparius*.

### **Classification Comments**

This association was previously placed in the *Quercus lobata* Alliance which has recently been split into separate riparian and upland alliances.

**References:** Buck-Diaz et al. 2012, Evens and San 2004, Hickson and Keeler-Wolf 2007, Keeler-Wolf and Evens 2006

**Global Rarity Rank:** G2

**State Rarity Rank:** S2?

**State Rare:** Y

### **Surveys Used for Description**

**Total: N=1; Marin County (n=1):** MOSD0284

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Quercus agrifolia</i>	100	66.7	40.0	40.0	40.0	X	X		X
	<b><i>Quercus lobata</i></b>	<b>100</b>	<b>33.3</b>	<b>20.0</b>	<b>20.0</b>	<b>20.0</b>	<b>X</b>		<b>X</b>	<b>X</b>
<b>Regenerating or Shrubby Trees</b>										
	<i>Quercus agrifolia</i> *	100	100.0	1.0	1.0	1.0	X	X		X
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	100	75.8	5.0	5.0	5.0	X	X		X
	<b><i>Salix lasiolepis</i></b>	<b>100</b>	<b>15.2</b>	<b>1.0</b>	<b>1.0</b>	<b>1.0</b>	<b>X</b>			<b>X</b>
	<i>Baccharis pilularis</i>	100	3.0	0.2	0.2	0.2	X			X
	<i>Cytisus scoparius</i>	100	3.0	0.2	0.2	0.2	X			X
	<i>Rubus ursinus</i>	100	3.0	0.2	0.2	0.2	X			X
<b>Herb</b>										
	<i>Chlorogalum pomeridianum</i>	100	100.0	1.0	1.0	1.0	X	X		X

***Quercus lobata* / *Rubus ursinus* – *Rosa californica* Association**

**Common Name:** Valley Oak / California Blackberry – California Wild Rose Woodland

**Alliance:** *Quercus lobata* Riparian Forest & Woodland Alliance

**Local Vegetation Description**

The Valley Oak / California Blackberry – California Wild Rose Association forms an open to continuous tree canopy with an open to continuous shrub understory. The dominant tree is *Quercus lobata*, and those that are characteristic or often present include *Quercus kelloggii*. Commonly associated shrubs include *Toxicodendron diversilobum*, *Baccharis pilularis*, *Crataegus douglasii*, *Rubus armeniacus*, and *Sambucus nigra* while *Rubus ursinus* or *Rosa californica* can be other associates in these riparian stands, and commonly associated herbs include *Holcus lanatus* and *Pteridium aquilinum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0	0 – 0	no data	
Hardwood	37.3	25 – 60	17.5	15 – 20
Regenerating or Shrubby Tree	0.9	0 – 2.6	3.5	2 – 5
Shrub	36.7	17 – 63	1.9	0.5 – 5
Herb	45.0	21 – 70	0.6	0 – 1

**Local Environmental Description**

**Elevation:** Mean 29 m, Range 13 – 38 m

**Aspect:** SE (2), NE (1)

**Slope:** Mean 4 degrees, Range 1 – 8 degrees

**Macro Topography:** Lower 1/3 of slope (2), Bottom to Lower 1/3 of slope (1)

**Large Rock:** Mean 0.1%, Range 0 – 0.2%

**Small Rock:** Mean 5%, Range 0 – 10%

**Fines Cover:** Mean 44%, Range 7 – 81%

**Litter Cover:** Mean 48.5%, Range 7 – 90%

**Soil Texture (field assessed):** Medium to very fine, sandy loam (2), Moderately coarse, sandy loam (1)

**Geology (field or map data):** Sandstone (1), Sandstone and other sedimentary (1), Alluvium (1)

**Marin County Watersheds:** Petaluma River (1)

**Other Watersheds, Sonoma Co.:** Lower Russian River (1), Middle Russian River (1)

**Site Impacts**

This association has moderate non-native plant cover (average 45.5%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Avena* spp., *Brachypodium distachyon*, *Briza maxima*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Cirsium arvense*, *Cirsium vulgare*, *Holcus lanatus*, *Lolium perenne*, *Mentha pulegium*, *Phalaris aquatica*, *Polypogon monspeliensis*, *Prunus cerasifera*, *Prunus domestica*, *Rubus armeniacus*, *Rumex conglomeratus*, *Rumex crispus*, *Rumex pulcher*, and *Zantedeschia aethiopica*.

**Classification Comments**

Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** Buck-Diaz et al. 2012, Klein et al. 2015

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

Total: N=3; Marin County (n=1): MARIN041

Sonoma County (n=2): MILOB108, SONO0221

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Quercus lobata</i>	100	55.6	22.3	10.0	40.0	X	X		X
	<i>Quercus kelloggii</i>	67	32.3	14.0	12.0	30.0				X
	<i>Quercus agrifolia</i>	33	7.6	2.0	6.0	6.0				
	<i>Umbellularia californica</i>	33	2.5	0.7	2.0	2.0				
	<i>Populus fremontii</i>	33	1.3	0.3	1.0	1.0				
	<i>Prunus cerasifera</i>	33	0.5	0.3	1.0	1.0				
	<i>Prunus domestica</i>	33	0.3	0.1	0.2	0.2				
<b>Regenerating or Shrubby Trees</b>										
	<i>Quercus lobata</i> *	33	28.2	0.7	2.2	2.2				
	<i>Prunus cerasifera</i> *	33	2.6	0.1	0.2	0.2				
	<i>Quercus kelloggii</i> *	33	2.6	0.1	0.2	0.2				
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	100	10.4	2.1	0.2	5.0	X			X
	<i>Rubus armeniacus</i>	67	36.4	25.0	30.0	45.0				X
	<i>Baccharis pilularis</i>	67	9.9	1.7	0.2	5.0				X
	<i>Sambucus nigra</i>	67	2.5	0.7	1.0	1.0				X
	<i>Crataegus douglasii</i>	67	0.6	0.4	0.2	1.0				X
	<b><i>Rubus ursinus</i></b>	<b>33</b>	<b>15.7</b>	<b>10.0</b>	<b>30.0</b>	<b>30.0</b>				
	<i>Rhododendron occidentale</i>	33	11.5	8.3	25.0	25.0				
	<i>Rubus parviflorus</i>	33	11.8	2.0	6.0	6.0				
	<i>Frangula californica</i>	33	0.5	0.3	1.0	1.0				
	<b><i>Rosa californica</i></b>	<b>33</b>	<b>0.5</b>	<b>0.3</b>	<b>1.0</b>	<b>1.0</b>				
	<i>Lonicera hispidula</i>	33	0.1	0.1	0.2	0.2				
	<i>Rosa</i> spp.	33	0.1	0.1	0.2	0.2				
	<i>Rubus</i> spp.	33	0.1	0.1	0.2	0.2				
<b>Herb</b>										
	<i>Holcus lanatus</i>	67	48.1	8.3	10.0	15.0				X
	<i>Pteridium aquilinum</i>	67	2.1	0.4	0.2	1.0				X
	<i>Avena</i> spp.	33	13.7	8.3	25.0	25.0				
	<i>Zantedeschia aethiopica</i>	33	9.3	5.7	17.0	17.0				
	<i>Briza maxima</i>	33	3.3	2.0	6.0	6.0				
	<i>Chlorogalum pomeridianum</i>	33	5.0	1.0	3.0	3.0				
	<i>Juncus</i> spp.	33	6.9	1.0	3.0	3.0				
	<i>Mentha pulegium</i>	33	1.6	1.0	3.0	3.0				
	<i>Juncus patens</i>	33	1.1	0.7	2.0	2.0				
	<i>Brachypodium distachyon</i>	33	0.5	0.3	1.0	1.0				

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<i>Bromus diandrus</i>	33	0.5	0.3	1.0	1.0				
	<i>Bromus hordeaceus</i>	33	0.5	0.3	1.0	1.0				
	<i>Juncus effusus</i>	33	0.5	0.3	1.0	1.0				
	<i>Lolium perenne</i>	33	0.5	0.3	1.0	1.0				
	<i>Phalaris aquatica</i>	33	0.5	0.3	1.0	1.0				
	<i>Polypogon monspeliensis</i>	33	0.5	0.3	1.0	1.0				
	<i>Rumex crispus</i>	33	2.3	0.3	1.0	1.0				
	<i>Barbarea orthoceras</i>	33	0.3	0.1	0.2	0.2				
	<i>Carduus pycnocephalus</i>	33	0.1	0.1	0.2	0.2				
	<i>Carex leptopoda</i>	33	0.3	0.1	0.2	0.2				
	<i>Cirsium arvense</i>	33	0.3	0.1	0.2	0.2				
	<i>Cirsium vulgare</i>	33	0.3	0.1	0.2	0.2				
	<i>Cyperus eragrostis</i>	33	0.1	0.1	0.2	0.2				
	<i>Lilium pardalinum</i>	33	0.5	0.1	0.2	0.2				
	<i>Rumex conglomeratus</i>	33	0.3	0.1	0.2	0.2				
	<i>Rumex pulcher</i>	33	0.1	0.1	0.2	0.2				
	<i>Vicia hassei</i>	33	0.1	0.1	0.2	0.2				
	<i>Xanthium strumarium</i>	33	0.1	0.1	0.2	0.2				
<b>Non-vascular</b>										
	Lichen	33	16.7	0.1	0.2	0.2				
	Moss	33	16.7	0.1	0.2	0.2				

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## ***Quercus wislizeni* – *Quercus parvula* (tree) Forest & Woodland Alliance**

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**Common Name:** Interior live oak - Shreve oak woodland and forest

**NVC Alliance Code:** A3348. *Quercus douglasii* - *Pinus sabiniana* Woodland Alliance

### **Statewide Description**

*Quercus wislizeni* or *Quercus parvula* is dominant or co-dominant in the tree canopy with *Acer macrophyllum*, *Aesculus californica*, *Arbutus menziesii*, *Notholithocarpus densiflorus*, *Pinus sabiniana*, *Pseudotsuga menziesii*, *Quercus agrifolia*, *Quercus chrysolepis*, *Quercus douglasii*, *Quercus kelloggii*, *Sequoia sempervirens*, and *Umbellularia californica*.

*Quercus parvula* var. *shrevei* is a large tree of low elevation, coastal forests in central California. It has been confused with *Quercus wislizeni* for many years. Current taxonomic research individuates *Q. p.* var. *shrevei* from *Q. wislizeni* and also suggests a close relationship to *Q. agrifolia* (Nixon 1980, Kashani and Dodd 2002, Hauser et al. 2017). Most references to stands of *Q. wislizeni* in the mixed evergreen forests of the outer central Coast Ranges (e.g., Sawyer and Keeler-Wolf 1995, Thomas 1961) appear now to be *Q. p.* var. *shrevei* (Dodd et al. 2002, Hauser et al. 2017). However, oaks north of San Francisco in the North Coast and North Coast Ranges appear to be a hybrid swarm of *Q. parvula* and *Q. wislizeni*, with some mixing of *Q. agrifolia*, and a new subspecies of *Q. parvula* var. *tamalpaisensis* was noted as a narrow endemic from Mt. Tamalpais (Dodd and Afzal-Rafii 2004, Hauser et al. 2017). For this reason, we have combined the two species into a single alliance since the 2009 publication of *A Manual of California Vegetation, second edition*.

Unlike *Q. agrifolia* and *Q. wislizeni*, *Q. parvula* var. *shrevei* usually occurs as tall single-trunked trees within a matrix of conifers and broadleaf, evergreen trees. Stands are closely associated with but distinct from stands of *Sequoia sempervirens* or *Umbellularia californica* alliances. Stands are typically intermediate in moisture conditions between redwood and coast live oak alliances. Stands of *Q. parvula*



often form dense forests on slopes and on the margins of continuous *S. sempervirens* forest patches.

Stands of this extensive alliance vary from savannas to closed forests, but commonly they form woodlands (Allen-Diaz et al. 2007). The tree form of *Q. w.* var. *wislizeni* is also distinguished from the shrub form (var. *frutescens*), but form and height may be only the result of high fire frequencies (White and Sawyer 1995). The species also hybridizes with other oaks. The most commonly encountered hybrid is the deciduous *Q. xmorehus* (*Q. kelloggii* x *Q. wislizeni*).

### **Local Vegetation Description**

The Interior live oak - Shreve oak woodland and forest Alliance forms an open to intermittent tree canopy with a sparse to intermittent shrub understory. The dominant tree is *Quercus wislizeni* or *Q. parvula* var. *shrevei*, and *Arbutus menziesii* and *Umbellularia californica* are characteristic or often present.

Regenerating or shrubby trees that are often present include *Pseudotsuga menziesii*. Commonly associated shrubs include *Toxicodendron diversilobum*, *Diplacus aurantiacus*, *Heteromeles arbutifolia*, and *Lonicera hispidula*, and commonly associated herbs include *Iris douglasiana*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.9	0 – 6	10.8	5 – 15
Hardwood	30.8	20 – 40	11.2	2 – 35
Regenerating or Shrubby Tree	0.7	0 – 3.2	6.1	2 – 15
Shrub	18.9	0.2 – 60	3.0	0.5 – 10
Herb	10.5	0.2 – 42	0.3	0 – 0.5

### **Local Membership Rule**

The tree form of *Quercus parvula* and/or *Q. wislizeni* dominates or co-dominates in the tree canopy, often with *Arbutus menziesii*, *Pseudotsuga menziesii*, and/or *Umbellularia californica*. If the oaks have a shrubby habit or are regenerating and intermixing with a variety of other shrub species, key to the *Quercus wislizeni* – *Quercus chrysolepis* (shrub) Alliance.

### **Local Environmental Description**

**Elevation:** Mean 320 m, Range 140 – 574 m

**Aspect:** NE (4), Variable (2), SE (2), SW (1)

**Slope:** Mean 23 degrees, Range 4 – 39 degrees

**Macro Topography:** Middle 1/3 of slope (5), Ridge top (3), Upper 1/3 of slope (1)

**Large Rock:** Mean 1.1%, Range 0.0 – 3.0%

**Small Rock:** Mean 8.6%, Range 0.2 – 30.0%

**Fines Cover:** Mean 7.9%, Range 0.2 – 32.0%

**Litter Cover:** Mean 70.9%, Range 28.0 – 93%

**Soil Texture (field assessed):** Moderately coarse, sandy loam (4), Moderately fine clay loam (4), Moderately fine sandy clay loam (1)

**Geology (field or map data):** Franciscan melange (8), Ultramafic rocks, mostly serpentine (1)

**Marin County Watersheds:** Lagunitas Creek (4), San Rafael (4), Bolinas (1)

### **Site Impacts**

This alliance has low non-native plant cover (average 6.1%) relative to native cover. Non-native species with highest frequency and abundance include *Aira caryophyllea* and *Genista monspessulana*.

### **Associations in Marin County**

*Quercus (parvula, wislizeni)* – *Arbutus menziesii* / *Toxicodendron diversilobum*

### **Classification Comments**

None.

References: Allen et al. 1991, Buck and Evens 2010, Klein et al. 2015

Global Rarity Rank: G4

State Rarity Rank: S4

**Surveys Used for Description**

Total: N=9; Marin County (n=9): MMWD0280, MMWD0291, MMWD0308, MMWD0322A, MOSD0036, MOSD0037, MOSD0118, MOSD0121, MOSD0132

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Quercus wislizeni</i>	100	61.9	21.0	7.0	30.0	X	X		X
	<i>Arbutus menziesii</i>	67	16.4	5.0	1.0	15.0				X
	<i>Umbellularia californica</i>	56	11.6	4.3	2.0	15.0				X
	<i>Notholithocarpus densiflorus</i>	33	5.2	2.0	5.0	8.0				
	<i>Pseudotsuga menziesii</i>	33	1.2	0.4	0.2	2.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Pseudotsuga menziesii</i> *	56	45.1	0.6	0.2	3.0				X
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	100	19.0	1.1	0.2	2.0	X			X
	<i>Heteromeles arbutifolia</i>	67	22.3	2.9	0.2	10.0				X
	<i>Diplacus aurantiacus</i>	67	8.5	0.6	0.2	2.0				X
	<i>Lonicera hispidula</i>	67	4.0	0.6	0.2	2.0				X
	<i>Adenostoma fasciculatum</i>	44	6.6	1.7	1.0	8.0				
	<i>Arctostaphylos glandulosa</i>	33	8.8	2.7	1.0	20.0				
	<i>Genista monspessulana</i>	22	9.8	4.5	0.2	40.0				
	<i>Corylus cornuta</i>	22	3.4	0.6	0.2	5.0				
	<i>Garrya elliptica</i>	22	3.8	0.2	0.2	2.0				
	<i>Baccharis pilularis</i>	22	0.1	0.0	0.2	0.2				
	<i>Symphoricarpos mollis</i>	22	1.1	0.0	0.2	0.2				
<b>Herb</b>										
	<i>Iris douglasiana</i>	67	19.1	1.5	0.2	9.0				X
	<i>Pentagramma triangularis</i>	44	4.3	0.2	0.2	1.0				
	<i>Stachys ajugoides</i>	33	5.7	0.3	0.2	2.0				
	<i>Brodiaea elegans</i>	33	2.4	0.2	0.2	1.0				
	<i>Pteridium aquilinum</i>	33	1.9	0.1	0.2	0.2				
	<i>Zigadenus fremontii</i>	33	12.3	0.1	0.2	0.2				
	<i>Polystichum munitum</i>	22	3.9	0.1	0.2	1.0				
	<i>Clinopodium douglasii</i>	22	3.8	0.1	0.2	1.0				
	<i>Polygala californica</i>	22	1.4	0.0	0.2	0.2				
	<i>Hypericum concinnum</i>	22	1.6	0.0	0.2	0.2				
	<i>Aira caryophyllea</i>	22	1.6	0.0	0.2	0.2				
	<i>Chlorogalum pomeridianum</i>	22	1.6	0.0	0.2	0.2				

***Quercus (parvula, wislizeni) – Arbutus menziesii / Toxicodendron diversilobum***  
**Association**

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**Common Name:** Interior Live Oak – Madrone / Poison-oak Woodland

**Alliance:** *Quercus wislizeni* – *Quercus parvula* (tree) Forest & Woodland Alliance

**Classification Comments**

The association circumscription is the same as that of the alliance. See above for detailed description. Due to hybridization and morphological similarity between the species, plants identified as *Quercus wislizeni* are likely *Quercus parvula*, which has been found to be the most widespread genotype in Marin County (Dodd and Afzul-Rafii 2004, Hauser et al. 2017).

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** N

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## ***Salix gooddingii* – *Salix laevigata* Forest & Woodland Alliance**

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**Common Name:** Goodding's willow – Red willow riparian woodland and forest

**NVC Alliance Code:** A3752. *Salix gooddingii* - *Salix laevigata* Riparian Forest Alliance

### **Statewide Description**

*Salix gooddingii* and/or *Salix laevigata* is dominant or co-dominant in the tree or shrub canopy with *Acer negundo*, *Aesculus californica*, *Alnus rhombifolia*, *Calocedrus decurrens*, *Fraxinus latifolia*, *Pinus sabiniana*, *Platanus racemosa*, *Populus fremontii*, *Quercus agrifolia*, *Quercus chrysolepis*, *Quercus lobata*, *Salix lucida* var. *lasiandra* or *Washingtonia filifera*. Shrubs include *Baccharis salicifolia*, *Cornus sericea*, *Rosa californica*, *Rubus armeniacus*, *Salix exigua*, *Salix lasiolepis* or *Sambucus nigra*.

*Salix gooddingii* and *Salix laevigata* were formerly described and treated as separate alliances, but the two types have been merged since they often occur together and/or share similar habitats.

*Salix laevigata* commonly grows with various willows and other riparian trees, but it also can solely dominate sites. Researchers have mainly recognized mixed associations that include *S. laevigata* or *S. gooddingii* in the *Alnus rhombifolia*, *Populus fremontii*, and *Quercus agrifolia* alliances, too. Various associations of *Salix laevigata*-*Salix lasiolepis* exist, where several studies done in coastal and southern California describe mainly associations characterized by two trees. We need more sampling and study to understand this complex.

*Salix gooddingii* is a common riparian tree or shrub in the West, and stands of the species occur in the southwestern United States and northern Mexico (NatureServe 2007a). Mixed and pure stands of *S. gooddingii* occur regularly in the Central Valley and southern California. When *S. gooddingii* or *S. laevigata* co-dominates with *Populus fremontii*, the alliance is determined as *Populus fremontii* - *Fraxinus velutina* - *Salix gooddingii* Alliance.

### Local Vegetation Description

The Goodding's willow – Red willow riparian woodland and forest Alliance forms an open to intermittent tree canopy with a sparse to continuous shrub understory. The dominant tree is *Salix laevigata*. Commonly associated shrubs include *Salix lasiolepis*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.6	0 – 3	10.0	5 – 15
Hardwood	27.0	3 – 57	10.4	2 – 35
Regenerating or Shrubby Tree	9.4	0 – 55.0	3.9	1 – 10
Shrub	21.6	0.2 – 95.0	2.1	0 – 5
Herb	19.3	1 – 61	0.6	0 – 2

### Local Membership Rule

In Marin County, *Salix laevigata* dominates along streams, rivers, ditches, floodplains, and lake edges. Associated trees and shrubs include *Alnus rhombifolia*, *Populus fremontii*, *Quercus agrifolia*, *Rubus*, *Salix*, and others.

### Local Environmental Description

**Elevation:** Mean 166 m, Range 7 – 463 m

**Aspect:** Flat (3), SE (3), SW (2), Variable (2), NW (1)

**Slope:** Mean 2 degrees, Range 0 – 5 degrees

**Macro Topography:** Bottom (2), Lower 1/3 of slope (1)

**Large Rock:** Mean 0.9%, Range 0.0 – 4.0%

**Small Rock:** Mean 18.7%, Range 0.0 – 80.0%

**Fines Cover:** Mean 36.5%, Range 15.0 – 88.0%

**Litter Cover:** Mean 41.9%, Range 5.0 – 80%

**Soil Texture (field assessed):** Medium to very fine, sandy loam (2), Moderately fine silty clay loam (2), Coarse, loamy sand (1), Fine sand (1), Fine silty clay (1), Medium silt (1)

**Geology (field or map data):** Franciscan melange (6), Sandstone (2), Alluvium (1), Granitic (1), Mixed alluvium (1), Silty alluvium (1)

**Marin County Watersheds:** Lagunitas Creek (3)

**Other Watersheds, San Mateo Co.:** San Mateo Bayside (2), Ano Nuevo (1), Half Moon Bay (1);

**Sonoma Co.:** Middle Russian River (3), Estero San Antonio (1), Lower Russian River (1)

### Site Impacts

This alliance has low non-native plant cover (average 7.6%) relative to native cover. Non-native species with highest frequency and abundance include *Brassica nigra* and *Rubus armeniacus*.

### Associations in Marin County

*Salix laevigata* / (*Cornus sericea* – *Ribes* spp.) / *Scirpus microcarpus* – *Carex* spp.

*Salix laevigata* / *Salix lasiolepis*

### Classification Comments

Since Marin County has fewer than five surveys of this alliance, data from nearby counties were included.

**References:** AECOM 2013, Buck-Diaz et al. 2012, Evens and Kentner 2006, Evens and San 2005, Keeler-Wolf and Evens 2006, Keeler-Wolf and Vaghti 2000, Klein and Evens 2005, Klein et al. 2007, Klein et al. 2015, Reyes et al. 2020a, Stillwater Sciences and URS 2007, VegCAMP 2015a

**Global Rarity Rank:** G4

**State Rarity Rank:** S3

**Surveys Used for Description**

**Total: N=12; Marin County (n=3):** MARIN054, MMWD0408, MMWD0410

San Mateo County (n=4): GGNRA341, GGNRA361, GGNRA365, SMAT0647

Sonoma County (n=5): SONO0332, SONO0588, SONO0600, SONO0675, SONO0961

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Salix laevigata</i>	83	66.1	19.7	6.0	57.0	X	X		X
<b>Regenerating or Shrubby Trees</b>										
	<i>Salix laevigata*</i>	42	32.6	6.6	5.0	40.0				
	<i>Alnus rhombifolia</i>	25	12.5	1.2	2.0	7.0				
<b>Shrub</b>										
	<i>Salix lasiolepis</i>	50	25.5	7.2	1.0	25.0				X
	<i>Rubus ursinus</i>	42	10.8	8.6	2.0	75.0				
	<i>Rubus armeniacus</i>	42	13.7	3.1	0.2	28.0				
	<i>Toxicodendron diversilobum</i>	42	4.5	3.0	0.2	30.0				
	<i>Cornus sericea</i>	25	14.3	6.3	3.0	50.0				
	<i>Baccharis pilularis</i>	25	4.0	1.0	0.2	11.0				
<b>Herb</b>										
	<i>Urtica dioica</i>	33	3.5	1.7	0.2	19.0				
	<i>Marah fabaceus</i>	33	2.5	1.4	1.0	12.0				
	<i>Polystichum munitum</i>	33	1.1	0.7	0.2	4.2				
	<i>Heracleum maximum</i>	33	2.4	0.5	0.2	3.0				
	<i>Scirpus microcarpus</i>	25	10.9	4.5	12.0	25.0				
	<i>Oenanthe sarmentosa</i>	25	2.5	2.3	1.0	25.0				
	<i>Dryopteris arguta</i>	25	1.0	1.0	0.2	10.2				
	<i>Artemisia douglasiana</i>	25	3.5	0.3	0.2	3.0				
	<i>Equisetum arvense</i>	25	0.4	0.3	0.2	2.2				
	<i>Athyrium filix-femina</i>	25	0.4	0.2	0.2	2.0				
	<i>Brassica nigra</i>	25	0.3	0.1	0.2	0.2				
<b>Non-vascular</b>										
	Moss	42	37.5	1.5	0.2	15.0				

***Salix laevigata* / (*Cornus sericea* – *Ribes* spp.) / *Scirpus microcarpus* – *Carex* spp.  
Association**

**Common Name:** Red Willow / (American Dogwood – Currant) / Small-fruited Bulrush – Sedge Woodland

**Alliance:** *Salix gooddingii* – *Salix laevigata* Forest & Woodland Alliance

**Local Vegetation Description**

The Red Willow / (American Dogwood – Currant) / Small-fruited Bulrush – Sedge Association forms an open to intermittent tree canopy with an open to continuous shrub understory. The dominant tree is *Salix laevigata* which is often regenerating. Commonly associated shrubs include *Cornus sericea*, *Rubus ursinus*, and *Toxicodendron diversilobum*, and commonly associated herbs include *Dryopteris arguta*, *Heracleum maximum*, *Marah fabaceus*, and *Polystichum munitum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	1.0	0 – 3	10.0	5 – 15
Hardwood	32.8	11 – 57	7.5	5 – 10
Regenerating or Shrubby Tree	7.6	0 – 27	no data	
Shrub	40.6	11 – 70	no data	
Herb	47.2	12 – 90	0.5	0 – 1

**Local Environmental Description**

**Elevation:** Mean 292 m, Range 163 – 463 m

**Aspect:** SE (3), Variable (1), Flat (1)

**Slope:** Mean 2 degrees, Range 0 – 3 degrees

**Macro Topography:** Lower 1/3 of slope (2), Bottom (2), Wash (channel bed) (1)

**Large Rock:** Mean 1.3%, Range 0.0 – 4.0%

**Small Rock:** Mean 7.6%, Range 0.0 – 20%

**Fines Cover:** Mean 23.0%, Range 23 – 23%

**Litter Cover:** Mean 64.5%, Range 45 – 75%

**Soil Texture (field assessed):** Medium to very fine, sandy loam (2), Medium silt (1), Moderately fine silty clay loam (1), Coarse, loamy sand (1)

**Geology (field or map data):** Franciscan melange (4), Granitic (1)

**Marin County Watersheds:** Lagunitas Creek (2)

**Other Watersheds, San Mateo Co.:** San Mateo Bayside (2), Half Moon Bay (1)

**Site Impacts**

This association has very low non-native plant cover (average 0.9%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Brassica nigra* and *Conium maculatum*.

**Classification Comments**

The name of this association has been updated from *Salix laevigata* / *Cornus sericea* / *Scirpus microcarpus* Association to broaden its definition. Since the number of surveys of this association in Marin County is low, data from nearby counties were included.

**References:** Evens and Kentner 2006

**Global Rarity Rank:** G3

**State Rarity Rank:** S3?

**State Rare:** Y



**Surveys Used for Description**

Total: N=5; Marin County (n=2): MMWD0408, MMWD0410

San Mateo County (n=3): GGNRA341, GGNRA361, GGNRA365

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Salix laevigata</i>	100	76.4	28.0	6.0	57.0	X	X		X
<b>Regenerating or Shrubby Trees</b>										
	<i>Salix laevigata*</i>	60	54.2	6.2	5.0	20.0				X
<b>Shrub</b>										
	<i>Cornus sericea</i>	60	34.2	15.0	3.0	50.0				X
	<i>Toxicodendron diversilobum</i>	60	9.0	7.0	0.2	30.0				X
	<i>Rubus ursinus</i>	60	8.0	5.2	3.2	15.0				X
	<i>Ribes sanguineum</i>	40	5.0	4.0	0.2	20.0				
	<i>Rubus parviflorus</i>	40	7.0	2.4	0.2	12.0				
	<i>Baccharis pilularis</i>	40	6.6	2.2	0.2	11.0				
	<i>Lonicera hispidula</i>	40	1.2	0.6	1.2	2.0				
	<i>Sambucus nigra</i>	40	0.6	0.4	0.2	2.0				
	<i>Vaccinium ovatum</i>	40	0.5	0.1	0.2	0.2				
<b>Herb</b>										
	<i>Polystichum munitum</i>	80	2.8	1.7	0.2	4.2	X			X
	<i>Marah fabaceus</i>	60	4.8	3.2	1.0	12.0				X
	<i>Dryopteris arguta</i>	60	2.4	2.3	0.2	10.2				X
	<i>Heracleum maximum</i>	60	5.5	1.2	1.0	3.0				X
	<i>Scirpus microcarpus</i>	40	20.2	8.4	17.0	25.0				
	<i>Carex nudata</i>	40	7.1	6.2	6.0	25.0				
	<i>Oenanthe sarmentosa</i>	40	5.5	5.4	2.0	25.0				
	<i>Urtica dioica</i>	40	8.0	3.9	0.4	19.0				
	<i>Stachys ajugoides</i>	40	3.9	3.0	5.0	10.0				
	<i>Carex spp.</i>	40	4.9	2.6	0.2	13.0				
	<i>Elymus californicus</i>	40	5.2	2.4	4.2	8.0				
	<i>Thalictrum fendleri</i>	40	4.5	0.7	0.2	3.2				
	<i>Equisetum arvense</i>	40	0.8	0.6	1.0	2.2				
	<i>Athyrium filix-femina</i>	40	0.8	0.4	0.2	2.0				
	<i>Conium maculatum</i>	40	0.7	0.3	0.2	1.2				
	<i>Scrophularia californica</i>	40	0.3	0.2	0.2	1.0				
	<i>Brassica nigra</i>	40	0.4	0.1	0.2	0.2				
	<i>Cardamine oligosperma</i>	40	0.4	0.1	0.2	0.2				
	<i>Claytonia perfoliata</i>	40	0.4	0.1	0.2	0.2				
<b>Non-vascular</b>										
	Moss	60	50.0	3.4	0.2	15.0				X

*Salix laevigata* / (*Cornus sericea* – *Ribes* spp.) / *Scirpus microcarpus* – *Carex* spp. Association  
*Salix gooddingii* – *Salix laevigata* Forest & Woodland Alliance



***Salix laevigata* / *Salix lasiolepis* Association**

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**Common Name:** Red Willow / Arroyo Willow Woodland

**Alliance:** *Salix gooddingii* – *Salix laevigata* Forest & Woodland Alliance

**Local Vegetation Description**

The Red Willow / Arroyo Willow Association forms a sparse to intermittent tree canopy with a sparse to continuous shrub understory. Trees that are characteristic or often present include *Salix laevigata*. Commonly associated shrubs include *Salix lasiolepis* and *Rubus armeniacus*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0	0 – 0	0	no data
Hardwood	22	3 – 35	11.2	2 – 35
Regenerating or Shrubby Tree	10.7	0 – 55	3.9	1 – 10
Shrub	24.6	0.2 – 95	2.1	0 – 5
Herb	8.6	0 – 40	0.7	0 – 2

**Local Environmental Description**

**Elevation:** Mean 76 m, Range 7 – 171 m

**Aspect:** Flat (2), SW (2), NW (1), Variable (1)

**Slope:** Mean 2 degrees, Range 0 – 5 degrees

**Macro Topography:** Bottom (7)

**Large Rock:** Mean 0.8%, Range 0 – 3%

**Small Rock:** Mean 25.1%, Range 0 – 80%

**Fines Cover:** Mean 38.4%, Range 15 – 88%

**Litter Cover:** Mean 29%, Range 5 – 80%

**Soil Texture (field assessed):** Moderately fine silty clay loam (1), Fine sand (1), Fine silty clay (1)

**Geology (field or map data):** Sandstone (2), Franciscan melange (2), Mixed alluvium (1), Silty alluvium (1), Alluvium (1)

**Marin County Watersheds:** Lagunitas Creek (1)

**Other Watersheds, San Mateo Co.:** Ano Nuevo (1); **Sonoma Co.:** Middle Russian River (3), Estero San Antonio (1), Lower Russian River (1)

**Site Impacts**

This association has low non-native plant cover (average 12.4%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Bromus diandrus*, *Carduus pycnocephalus*, and *Rubus armeniacus*.

**Classification Comments**

Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** AECOM 2013, Buck-Diaz et al. 2012, Evens and San 2005, Keeler-Wolf and Evens 2006, Keeler-Wolf and Vaghti 2000, Klein and Evens 2005, Klein et al. 2007, Klein et al. 2015, Reyes et al. 2020a, Stillwater Sciences and URS 2007, VegCAMP 2015a

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

**Total: N=7; Marin County (n=1):** MARIN054

San Mateo County (n=1): SMAT0647

Sonoma County (n=5): SONO0332, SONO0588, SONO0600, SONO0675, SONO0961

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Salix laevigata</i>	71	58.7	13.7	12.0	30.0				X
	<i>Alnus rhombifolia</i>	29	17.0	1.0	3.0	4.0				
	<i>Alnus rubra</i>	29	3.5	0.5	0.2	3.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Alnus rhombifolia</i> *	43	21.5	2.0	2.0	7.0				
	<i>Salix laevigata</i> *	29	17.1	6.9	8.0	40.0				
	<i>Fraxinus latifolia</i>	29	8.0	0.2	0.2	1.0				
<b>Shrub</b>										
	<i>Salix lasiolepis</i>	86	43.7	12.3	1.0	25.0	X		X	X
	<i>Rubus armeniacus</i>	71	23.4	5.3	0.2	28.0				X
	<i>Rubus ursinus</i>	29	12.8	11.0	2.0	75.0				
	<i>Salix exigua</i>	29	10.1	2.4	5.0	12.0				
	<i>Baccharis salicifolia</i>	29	1.4	0.2	0.2	1.0				
	<i>Toxicodendron diversilobum</i>	29	1.3	0.2	0.2	1.0				
<b>Herb</b>										
	<i>Heterotheca oregona</i>	29	13.8	0.9	3.0	3.0				
	<i>Artemisia douglasiana</i>	29	6.0	0.5	0.2	3.0				
	<i>Bromus diandrus</i>	29	2.6	0.1	0.2	0.2				
	<i>Carduus pycnocephalus</i>	29	2.6	0.1	0.2	0.2				
	<i>Equisetum</i> spp.	29	0.8	0.1	0.2	0.2				
	<i>Juncus effusus</i>	29	0.2	0.1	0.2	0.2				
	<i>Urtica dioica</i>	29	0.2	0.1	0.2	0.2				
<b>Non-vascular</b>										
	Moss	29	28.6	0.1	0.2	0.2				

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## ***Salix lucida* ssp. *lasiandra* Woodland Alliance**

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**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 swampy 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.

### **Local Vegetation Description**

The Shining willow groves Alliance forms an open to continuous tree canopy with an open to continuous shrub understory. The dominant tree is *Salix lasiandra*, and *Alnus rubra* are characteristic or often present. Commonly associated shrubs include *Rubus ursinus*, *Rubus armeniacus*, *Salix lasiolepis*, and *Toxicodendron diversilobum*, and commonly associated herbs include *Conium maculatum*, *Equisetum telmateia*, and *Urtica dioica*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	54.3	30 – 70	7.5	5 – 10
Regenerating or Shrubby Tree	0.7	0 – 3.2	no data	
Shrub	32.0	5 – 70	2.4	0 – 5
Herb	28.5	10 – 70	0.3	0 – 0.5

### **Local Membership Rule**

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

### **Local Environmental Description**

**Elevation:** Mean 36 m, Range 5 – 105 m

**Aspect:** NE (1), SW (1), Variable (1)

**Slope:** Mean 35 degrees, Range 10 – 68 degrees

**Macro Topography:** Terrace (former shoreline or floodplain) (2), Bottom (1)

**Large Rock:** Mean 0.3%, Range 0.0 – 1.0%

**Small Rock:** Mean 1.0%, Range 0.0 – 3.0%

**Fines Cover:** 55.0%

**Litter Cover:** Mean 39.7%, Range 20.0 – 60%

**Soil Texture (field assessed):** Medium silt (1), Fine silty clay (1), Medium sand (1)

**Geology (field or map data):** Franciscan melange (3), Sandstone and other sedimentary (2), Mixed alluvium (1)

**Marin County Watersheds:** Lagunitas Creek (4), Bolinas (1), Walker Creek (1)

### **Site Impacts**

This alliance has low non-native plant cover (average 13.6%) relative to native cover. Non-native species with highest frequency and abundance include *Cirsium vulgare*, *Conium maculatum*, *Rubus armeniacus*, *Rumex crispus*, and *Zantedeschia aethiopica*.

### **Associations in Marin County**

*Salix lucida* ssp. *lasiandra*

### **Classification Comments**

None.

**References:** Buck-Diaz et al. 2012, Keeler-Wolf et al. 2003a, Klein et al. 2015, Sproul et al. 2011

**Global Rarity Rank:** G4

**State Rarity Rank:** S3

### **Surveys Used for Description**

**Total: N=6; Marin County (n=6):** GGNRA384, MMWD0387, PGA1142, PGA1371, PGA6780-1, PORE068

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Salix lasiandra</i>	100	64.3	33.8	20.0	60.0	X	X		X
	<i>Alnus rubra</i>	67	19.4	11.7	2.0	40.0				X
	<i>Quercus agrifolia</i>	33	7.2	3.3	3.0	17.0				
	<i>Umbellularia californica</i>	33	5.1	2.8	7.0	10.0				
	<i>Acer negundo</i>	33	0.9	0.7	2.0	2.0				
<b>Shrub</b>										
	<i>Rubus ursinus</i>	100	45.5	16.0	0.2	40.0	X		X	X
	<i>Salix lasiolepis</i>	67	13.0	6.7	3.0	20.0				X
	<i>Rubus armeniacus</i>	50	13.1	8.4	0.2	40.0				X
	<i>Toxicodendron diversilobum</i>	50	7.9	0.9	0.4	3.0				X
	<i>Baccharis pilularis</i>	33	9.7	1.5	2.0	7.0				
<b>Herb</b>										
	<i>Urtica dioica</i>	50	9.0	3.9	0.2	18.0				X
	<i>Equisetum telmateia</i>	50	2.9	1.2	0.2	5.0				X
	<i>Conium maculatum</i>	50	3.8	0.7	1.0	2.0				X
	<i>Athyrium filix-femina</i>	33	14.2	5.2	15.0	16.0				
	<i>Carex</i> spp.	33	7.2	4.2	0.2	25.0				
	<i>Oenanthe sarmentosa</i>	33	2.9	1.5	1.0	8.0				
	<i>Marah fabaceus</i>	33	1.6	0.8	0.4	4.2				
	<i>Zantedeschia aethiopica</i>	33	0.9	0.5	0.2	3.0				
	<i>Cirsium vulgare</i>	33	2.9	0.4	0.2	2.0				
	<i>Sonchus</i> spp.	33	0.2	0.1	0.2	0.2				
	<i>Rumex crispus</i>	33	0.2	0.1	0.2	0.2				

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

**Common Name:** Shining willow Woodland

**Alliance:** *Salix lucida* ssp. *lasiandra* Forest & Woodland Alliance

**Classification Comments**

The association circumscription is the same as that of the alliance. See above for detailed description.

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y



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## ***Sequoia sempervirens* Forest & Woodland Alliance**

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**Common Name:** Redwood forest and woodland

**NVC Alliance Code:** A3403. *Sequoia sempervirens* Forest Alliance

### **Statewide Description**

*Sequoia sempervirens* is dominant or co-dominant in the tree canopy with *Abies grandis*, *Acer macrophyllum*, *Alnus rubra*, *Arbutus menziesii*, *Chrysolepis chrysophylla*, *Notholithocarpus densiflorus*, *Picea sitchensis*, *Pseudotsuga menziesii*, *Tsuga heterophylla*, and *Umbellularia californica*.

*Sequoia sempervirens* occurs in moist coastal areas with heavy summer fog. Stands generally occur below 600 meters in elevation, from southern Oregon to the Santa Lucia Mountains in central California. Scattered stands also occur along streams, springs, seeps, and sheltered moist locations up to about 975 meters in elevation, where they usually occur as mixed hardwood forests (Sawyer 2006, 2007). *Sequoia sempervirens* is probably limited in its northern extent by freezing temperatures and in its southern extent by low winter rainfall (Lanner 1999).

Ecologists differentiate forests on alluvial streamside terraces, where *S. sempervirens* is usually the dominant canopy tree, from those in upland settings, where *S. sempervirens* shares the canopy with other conifers and with hardwood trees (NatureServe 2007a). However, these differences are best understood when the associations are placed in three geographic regions (Sawyer et al. 2000b). *Tsuga heterophylla* plays an important role in the northern forest region, and it is absent from the other two regions, where *Notholithocarpus densiflorus* plays an important role. Additionally, redwood genetics in the southern forest region differs from that in the other regions (Sawyer et al. 2000a, b). Precipitation varies significantly between northern and southern regions with fog-drip playing an increasingly important role in the southern portion of the range (Olsen et al. 1990).

### Local Vegetation Description

The Redwood forest and woodland Alliance forms an open to continuous tree canopy with a sparse to intermittent shrub understory. The dominant tree is *Sequoia sempervirens*, and *Notholithocarpus densiflorus* and *Umbellularia californica* are characteristic or often present. Commonly associated shrubs include *Vaccinium ovatum*, and commonly associated herbs include *Polystichum munitum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	39.5	3 – 98	33.9	5 – 100
Hardwood	18.3	0 – 60	16.4	2 – 50
Regenerating or Shrubby Tree	2.1	0 – 26.4	7.8	2 – 20
Shrub	10.8	0.0 – 65.0	2.5	0 – 10
Herb	9.6	0 – 52	0.3	0 – 2

### Local Membership Rule

*Sequoia sempervirens* dominates, co-dominates, or characterizes (rarely with as little as 5% cover) stands near streams, along all slopes and aspects, or on ridges. Associated trees include *Acer macrophyllum*, *Notholithocarpus densiflorus*, *Pseudotsuga menziesii*, *Torreya californica*, and *Umbellularia californica*, which are typically sub- to co-dominant but may occasionally exceed *Sequoia* in cover. *Vaccinium ovatum*, *Oxalis oregana*, and *Woodwardia fimbriata* may intermix in the understory.

### Local Environmental Description

**Elevation:** Mean 264 m, Range 31 – 590 m

**Aspect:** NE (42), NW (15), Variable (15), SW (11), SE (9), Flat (4)

**Slope:** Mean 23 degrees, Range 0 – 70 degrees

**Macro Topography:** Middle 1/3 of slope (25), Upper 1/3 of slope (22), Bottom (11), Lower 1/3 of slope (8), Ridge top (7), Entire slope (2), Not recorded (1), Lower to Middle 1/3 of slope (1)

**Large Rock:** Mean 1.0%, Range 0.0 – 30.0%

**Small Rock:** Mean 4.5%, Range 0.0 – 78.0%

**Fines Cover:** Mean 7.9%, Range 0.0 – 50.0%

**Litter Cover:** Mean 76.2%, Range 0.2 – 100%

**Soil Texture (field assessed):** Moderately fine sandy clay loam (17), Medium loam (13), Moderately fine clay loam (13), Medium to very fine, sandy loam (8), Moderately coarse, sandy loam (7), Medium silt loam (5), Moderately fine silty clay loam (5), Fine sandy clay (2), Medium silt (1), Medium to very fine, loamy sand (1), Coarse, loamy sand (1), Coarse sand (1)

**Geology (field or map data):** Franciscan melange (82), Sandstone and other sedimentary (18), Volcanic and metavolcanic rocks (3), Alluvium (1), Sandstone (1), Sedimentary (type unknown) (1), Ultramafic rocks, mostly serpentine (1)

**Marin County Watersheds:** Lagunitas Creek (39), Bolinas (36), San Rafael (27), Novato (4)

### Site Impacts

This alliance has very low non-native plant cover (average 0.4%) relative to native cover. Non-native species with highest frequency and abundance include *Genista monspessulana* and *Hedera helix*.

### **Associations in Marin County**

*Sequoia sempervirens* – *Acer macrophyllum* – *Umbellularia californica*.  
*Sequoia sempervirens* – *Arbutus menziesii* / *Vaccinium ovatum*  
*Sequoia sempervirens* – *Chrysolepis chrysophylla* / *Arctostaphylos glandulosa*  
*Sequoia sempervirens* – *Notholithocarpus densiflorus* / *Vaccinium ovatum*  
*Sequoia sempervirens* – *Pseudotsuga menziesii* – *Notholithocarpus densiflorus*  
*Sequoia sempervirens* – *Pseudotsuga menziesii* – *Umbellularia californica*  
*Sequoia sempervirens* – *Umbellularia californica*  
*Sequoia sempervirens* / (*Pteridium aquilinum*) – *Woodwardia fimbriata*  
*Sequoia sempervirens* / *Polystichum munitum*

### **Classification Comments**

None.

**References:** Borchert et al. 1988, Buck and Evens 2010, Evens and Kentner 2006, Keeler-Wolf et al. 2003a, Klein et al. 2015, Lenihan 1990, Taylor 1982

**Global Rarity Rank:** G3

**State Rarity Rank:** S3

### **Surveys Used for Description**

**Total: N=119; Marin County (n=119):** GGNRA276, GGNRA278, GGNRA286, GGNRA289, GGNRA291, GGNRA294, GGNRA295, HYPM110, HYPM135, HYPM204.2, MARINSP02, MARINSP05, MARINSP15, MMWD0107, MMWD0132, MMWD0133A, MMWD0134A, MMWD0135, MMWD0148, MMWD0149A, MMWD0150A, MMWD0152A, MMWD0154, MMWD0155A, MMWD0158, MMWD0171, MMWD0172, MMWD0179, MMWD0180, MMWD0188, MMWD0204A, MMWD0205A, MMWD0209A, MMWD0215, MMWD0216, MMWD0225, MMWD0249, MMWD0251, MMWD0252, MMWD0255, MMWD0270A, MMWD0271, MMWD0285A, MMWD0286, MMWD0289, MMWD0298, MMWD0339, MMWD0389, MMWD0390, MMWD0391, MMWD0392, MMWD0398, MMWD0400A, MMWD0406, MMWD0415A, MMWD0416A, MMWD0417, MOSD0004, MOSD0006, MOSD0011, MOSD0020, MOSD0022, MOSD0023, MOSD0024, MOSD0039, MOSD0096, MOSD0098, MOSD0104, MOSD0105, MOSD0146, MOSD0152, MOSD0153, MOSD0363, MOSD0371, PGA1323, PGA1518, PGA1519, PGA1520, PGA1555, PGA1585, PGA1588, PGA1593, PGA1609, PGA1612, PGA1614, PGA1622, PGA1642, PGA1654, PGA1659, PGA1664, PGA1666, PGA1667, PGA7949, PGA8155, PORE001, PORE139, PORE141, PORE143, PORE145, PORE146, SFANR01, SFANR02, SFANR03, SFANR04, SFANR05, SFANR06, SFANR07, SFANR08, SFANR09, SFANR10, SFANR11, SFANR12, SFANR13, SFANR14, SFANR15, SFANR16, SFANR17, SFANR18, VASE0049



### Alliance Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Sequoia sempervirens</i>	100	63.1	45.9	3.0	100.0	X	X		X
	<i>Umbellularia californica</i>	66	13.5	9.7	0.2	80.6				X
	<i>Notholithocarpus densiflorus</i>	60	11.5	7.8	0.2	60.0				X
	<i>Pseudotsuga menziesii</i>	27	4.1	3.3	0.2	47.2				
	<i>Arbutus menziesii</i>	26	3.3	1.3	0.2	25.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Notholithocarpus densiflorus</i> *	34	22.1	1.2	0.2	26.2				
<b>Shrub</b>										
	<i>Vaccinium ovatum</i>	65	42.2	6.5	0.2	61.0				X
	<i>Toxicodendron diversilobum</i>	39	7.6	0.2	0.2	2.0				
	<i>Corylus cornuta</i>	33	11.8	1.1	0.2	18.0				
	<i>Lonicera hispidula</i>	33	5.8	0.2	0.2	7.0				
	<i>Rubus ursinus</i>	24	4.0	0.2	0.2	5.0				
<b>Herb</b>										
	<i>Polystichum munitum</i>	76	37.4	4.1	0.2	65.3	X		X	X
	<i>Pteridium aquilinum</i>	36	7.5	0.2	0.2	11.8				
	<i>Stachys ajugoides</i>	30	2.2	0.1	0.2	3.0				
	<i>Dryopteris arguta</i>	28	4.1	0.2	0.2	3.3				
	<i>Iris douglasiana</i>	26	4.3	0.3	0.2	10.0				
	<i>Galium triflorum</i>	23	2.3	0.1	0.2	2.9				
	<i>Trientalis borealis</i> ssp. <i>latifolia</i>	22	1.8	0.1	0.2	5.0				
<b>Non-vascular</b>										
	Moss	24	18.6	0.7	0.2	20.0				

## Sequoia sempervirens – Acer macrophyllum – Umbellularia californica Association

**Common Name:** Redwood – Bigleaf Maple – California Bay Woodland

**Alliance:** *Sequoia sempervirens* Forest & Woodland Alliance

### Local Vegetation Description

The Redwood – Bigleaf Maple – California Bay Association forms an open to continuous tree canopy with an open shrub understory. The dominant tree is *Sequoia sempervirens*, and those that are characteristic or often present include *Acer macrophyllum* and *Umbellularia californica*. Commonly associated shrubs include *Corylus cornuta*, and commonly associated herbs include *Polystichum munitum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	34.7	5 – 75	29	5 – 100
Hardwood	23	3 – 45	15.9	2 – 50
Regenerating or Shrubby Tree	1.4	0 – 8.2	7.5	5 – 10
Shrub	5.9	0 – 20	1.5	0.5 – 5
Herb	19.1	0.2 – 52	0.4	0 – 2

### Local Environmental Description

**Elevation:** Mean 132 m, Range 62 – 275 m

**Aspect:** Variable (8), Flat (2), NE (1)

**Slope:** Mean 29 degrees, Range 0 – 70 degrees

**Macro Topography:** Bottom (8), Lower 1/3 of slope (2), Ridge top (1)

**Large Rock:** Mean 4.6%, Range 0 – 30%

**Small Rock:** Mean 7.2%, Range 0.2 – 35%

**Fines Cover:** Mean 22.7%, Range 2 – 50%

**Litter Cover:** Mean 29.2%, Range 0.2 – 80%

**Soil Texture (field assessed):** Moderately fine sandy clay loam (5), Moderately fine silty clay loam (2), Coarse, loamy sand (1), Medium silt loam (1), Medium to very fine, sandy loam (1), Moderately fine clay loam (1)

**Geology (field or map data):** Franciscan melange (11), Sandstone and other sedimentary (1)

**Marin County Watersheds:** San Rafael (7), Lagunitas Creek (4), Bolinas (1)

### Site Impacts

This association has very low non-native plant cover (average 0.6%) relative to native cover. No non-native species were recorded by surveyors.

### Classification Comments

Surveys are primarily along riparian corridors, stream gulches, terraces, and bottomlands.

**References:** Borchert et al. 1988, Evens and Kentner 2006, Klein et al. 2015

**Global Rarity Rank:** G3

**State Rarity Rank:** S3

**State Rare:** Y

### Surveys Used for Description

**Total: N=15; Marin County (n=15):** MMWD0133A, MMWD0134A, MMWD0135, MMWD0148, MMWD0149A, MMWD0155A, MMWD0158, MMWD0188, MMWD0251, MOSD0004, MOSD0023, PGA1519, PGA1609, PGA1659, PGA1666

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Sequoia sempervirens</i>	100	51.2	28.6	5.0	75.0	X	X		X
	<i>Umbellularia californica</i>	93	29.9	15.9	2.0	60.0	X			X
	<i>Acer macrophyllum</i>	87	6.2	3.5	0.2	15.0	X			X
	<i>Notholithocarpus densiflorus</i>	47	3.4	1.9	1.0	15.0				
	<i>Alnus rhombifolia</i>	27	3.8	1.5	2.0	12.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Notholithocarpus densiflorus</i> *	40	32.6	1.2	0.2	8.0				
<b>Shrub</b>										
	<i>Corylus cornuta</i>	60	34.5	3.3	0.2	15.0				X
	<i>Toxicodendron diversilobum</i>	47	15.4	0.3	0.2	2.0				
	<i>Vaccinium ovatum</i>	40	10.4	0.9	0.2	5.0				
	<i>Lonicera hispidula</i>	33	8.9	0.3	0.2	3.0				
	<i>Rubus ursinus</i>	33	3.7	0.1	0.2	0.2				
<b>Herb</b>										
	<i>Polystichum munitum</i>	73	42.4	7.3	0.2	45.0				X
	<i>Whipplea modesta</i>	33	7.9	1.2	0.2	10.0				
	<i>Hierochloe occidentalis</i>	33	2.0	0.2	0.2	2.0				
	<i>Stachys ajugoides</i>	33	1.4	0.1	0.2	1.0				
	<i>Cardamine californica</i>	33	2.7	0.1	0.2	0.2				
	<i>Iris douglasiana</i>	27	5.3	0.2	0.2	2.0				

## **Sequoia sempervirens – Arbutus menziesii / Vaccinium ovatum Association**

**Common Name:** Redwood – Madrone / Black Huckleberry Woodland

**Alliance:** *Sequoia sempervirens* Forest & Woodland Alliance

### **Local Vegetation Description**

The Redwood – Madrone / Black Huckleberry Association forms an open to continuous tree canopy with an open shrub understory. The dominant tree is *Sequoia sempervirens*, while *Arbutus menziesii* is also characteristic, and those that are often present include *Notholithocarpus densiflorus* and *Umbellularia californica*. Commonly associated shrubs include *Vaccinium ovatum*, *Genista monspessulana*, *Heteromeles arbutifolia*, *Lonicera hispidula*, and commonly associated herbs include *Iris douglasiana*, *Polystichum munitum* and *Whipplea modesta*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	24.2	3 – 50	36.3	15 – 100
Hardwood	13	0 – 25	20.5	5 – 50
Regenerating or Shrubby Tree	0.8	0 – 3.4	7.1	2 – 20
Shrub	9	5 – 15	2.3	1 – 5
Herb	3.9	1 – 14	0.3	0 – 1

### **Local Environmental Description**

**Elevation:** Mean 195 m, Range 72 – 432 m

**Aspect:** NE (5), NW (2), Variable (1)

**Slope:** Mean 31 degrees, Range 20 – 47 degrees

**Macro Topography:** Middle 1/3 of slope (3), Upper 1/3 of slope (3)

**Large Rock:** Mean 0.1%, Range 0 – 0.2%

**Small Rock:** Mean 6.2%, Range 0.2 – 30%

**Fines Cover:** Mean 9.2%, Range 0.2 – 30%

**Litter Cover:** Mean 67.1%, Range 20 – 90%

**Soil Texture (field assessed):** Medium loam (4), Moderately fine sandy clay loam (2), Moderately fine clay loam (1)

**Geology (field or map data):** Franciscan melange (7), Sandstone and other sedimentary (1)

**Marin County Watersheds:** San Rafael (7), Bolinas (1)

### **Site Impacts**

This association has low non-native plant cover (average 2.0%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Cytisus scoparius* and *Genista monspessulana*.

### **Classification Comments**

None.

**References:** Evens and Kentner 2006

**Global Rarity Rank:** G3

**State Rarity Rank:** S3

**State Rare:** Y

### **Surveys Used for Description**

**Total: N=8; Marin County (n=8):** MMWD0132, MMWD0270A, MOSD0006, MOSD0020, MOSD0022, MOSD0024, MOSD0039, SFANR13

## Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Sequoia sempervirens</i>	100	62.2	31.6	3.0	100.0	X	X		X
	<i>Arbutus menziesii</i>	100	27.5	10.0	0.2	25.0	X			X
	<i>Notholithocarpus densiflorus</i>	75	5.7	2.1	0.2	10.0	X			X
	<i>Umbellularia californica</i>	50	0.5	0.1	0.2	0.2				X
	<i>Chrysolepis chrysophylla</i> var. <i>chrysophylla</i>	38	1.6	0.8	0.2	5.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Quercus wislizeni</i>	38	29.4	0.4	0.2	2.0				
	<i>Pseudotsuga menziesii</i>	25	7.7	0.1	0.2	0.4				
	<i>Quercus agrifolia</i>	25	18.8	0.1	0.2	0.2				
<b>Shrub</b>										
	<i>Vaccinium ovatum</i>	100	56.9	4.2	0.2	12.5	X	X		X
	<i>Lonicera hispidula</i>	63	9.3	1.0	0.2	7.0				X
	<i>Genista monspessulana</i>	50	14.4	0.9	0.2	5.0				X
	<i>Heteromeles arbutifolia</i>	50	3.5	0.2	0.2	0.6				X
	<i>Toxicodendron diversilobum</i>	38	1.0	0.1	0.2	0.2				
	<i>Arctostaphylos glandulosa</i>	25	8.5	1.0	3.0	5.2				
	<i>Corylus cornuta</i>	25	0.9	0.1	0.2	0.2				
	<i>Cytisus scoparius</i>	25	2.3	0.1	0.2	0.2				
<b>Herb</b>										
	<i>Iris douglasiana</i>	75	10.5	0.2	0.2	0.2	X			X
	<i>Polystichum munitum</i>	63	11.7	0.2	0.2	1.0				X
	<i>Whipplea modesta</i>	50	9.9	0.3	0.2	1.0				X
	<i>Polygala californica</i>	38	3.0	0.1	0.2	0.2				
	<i>Pteridium aquilinum</i>	25	5.3	0.2	0.2	1.0				
	<i>Scoliopus bigelovii</i>	25	3.2	0.2	0.2	1.0				
	<i>Pentagramma triangularis</i>	25	3.0	0.1	0.2	0.2				
	<i>Stachys ajugoides</i>	25	3.9	0.1	0.2	0.2				
	<i>Zigadenus fremontii</i>	25	2.8	0.1	0.2	0.2				

***Sequoia sempervirens* – *Chrysolepis chrysophylla* / *Arctostaphylos glandulosa*  
Association**

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**Common Name:** Redwood – Chinquapin / Eastwood Manzanita Woodland

**Alliance:** *Sequoia sempervirens* Forest & Woodland Alliance

**Local Vegetation Description**

The Redwood – Chinquapin / Eastwood Manzanita Association forms an open to intermittent tree canopy with an open to intermittent shrub understory. The dominant tree is *Sequoia sempervirens*, and those that are characteristic or often present include *Chrysolepis chrysophylla* var. *chrysophylla* and *Quercus wislizeni*. Commonly associated shrubs include *Arctostaphylos glandulosa* and *Vaccinium ovatum* and commonly associated herbs include *Pteridium aquilinum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	20.6	8 – 30	20	5 – 50
Hardwood	20	10 – 35	12.5	5 – 35
Regenerating or Shrubby Tree	1.5	0 – 7.7	7.5	5 – 10
Shrub	44	25 – 65	6.2	2 – 10
Herb	3	0.2 – 5	0.3	0 – 0.5

**Local Environmental Description**

**Elevation:** Mean 342 m, Range 236 – 489 m

**Aspect:** NE (3), SW (2)

**Slope:** Mean 14 degrees, Range 3 – 27 degrees

**Macro Topography:** Ridge top (2), Middle 1/3 of slope (2), Upper 1/3 of slope (1)

**Large Rock:** Mean 0.1%, Range 0 – 0.2%

**Small Rock:** Mean 1%, Range 0 – 2%

**Fines Cover:** Mean 1.2%, Range 0.2 – 2.1%

**Litter Cover:** Mean 77.2%, Range 9.9 – 97%

**Soil Texture (field assessed):** Moderately coarse, sandy loam (2), Medium loam (1), Moderately fine clay loam (1)

**Geology (field or map data):** Franciscan melange (4), Sandstone and other sedimentary (1), Sedimentary (type unknown) (1)

**Marin County Watersheds:** Bolinas (2), Lagunitas Creek (2), San Rafael (2)

**Site Impacts**

This association has very low non-native plant cover (average 0.0%) relative to native cover. No non-native species were recorded by surveyors.

**Classification Comments**

Due to hybridization and morphological similarity between the species, plants identified as *Quercus wislizeni* may be *Quercus parvula*, which has been found to be the most widespread genotype in Marin County (Dodd and Afzul-Rafii 2004, Hauser et al. 2017).

**References:** Evens and Kentner 2006

**Global Rarity Rank:** G2

**State Rarity Rank:** S2?

**State Rare:** Y

**Surveys Used for Description**

**Total: N=6; Marin County (n=6):** MMWD0215, MMWD0216, MMWD0417, MOSD0105, PGA1520, VASE0049

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Sequoia sempervirens</i>	100	48.7	18.6	13.4	33.0	X		X	X
	<i>Chrysolepis chrysophylla</i> var. <i>chrysophylla</i>	83	25.4	12.5	2.0	35.0	X			X
	<i>Quercus wislizeni</i>	50	5.8	1.5	1.0	5.0				X
	<i>Pseudotsuga menziesii</i>	33	9.6	3.6	8.0	13.6				
	<i>Arbutus menziesii</i>	33	3.3	1.5	1.0	8.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Chrysolepis chrysophylla</i> var. <i>minor</i>	33	22.2	1.3	0.2	7.7				
	<i>Pseudotsuga menziesii</i> *	33	13.9	0.1	0.2	0.2				
	<i>Quercus wislizeni</i> *	33	22.2	0.1	0.2	0.2				
<b>Shrub</b>										
	<i>Arctostaphylos glandulosa</i>	100	50.3	15.9	0.2	30.0	X	X		X
	<i>Vaccinium ovatum</i>	100	41.1	15.3	2.0	41.9	X		X	X
	<i>Arctostaphylos sensitiva</i>	33	2.4	2.3	0.2	13.4				
	<i>Heteromeles arbutifolia</i>	33	0.6	0.3	1.0	1.0				
	<i>Lonicera hispidula</i>	33	0.6	0.2	0.2	1.0				
	<i>Pickeringia montana</i>	33	0.2	0.1	0.2	0.3				
<b>Herb</b>										
	<i>Pteridium aquilinum</i>	100	60.8	2.6	0.2	11.8	X	X		X
	<i>Carex</i> spp.	33	7.5	0.1	0.2	0.2				
	<i>Iris macrosiphon</i>	33	6.7	0.1	0.2	0.2				
	<i>Polygala californica</i>	33	6.7	0.1	0.2	0.2				
<b>Non-vascular</b>										
	Lichen	33	33.2	5.9	0.2	35.0				

## **Sequoia sempervirens – Notholithocarpus densiflorus / Vaccinium ovatum Association**

**Common Name:** Redwood – Tanoak / Black Huckleberry Woodland

**Alliance:** *Sequoia sempervirens* Forest & Woodland Alliance

### **Local Vegetation Description**

The Redwood – Tanoak / Black Huckleberry Association forms an open to continuous tree canopy with an sparse to intermittent shrub understory. The dominant tree is *Sequoia sempervirens*, and those that are characteristic or often present include *Notholithocarpus densiflorus*. Commonly associated shrubs include *Vaccinium ovatum* and commonly associated herbs include *Polystichum munitum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	36.7	5 – 85	38.3	15 – 50
Hardwood	17.2	0 – 46	16.4	5 – 35
Regenerating or Shrubby Tree	3.5	0 – 18.6	10.8	5 – 15
Shrub	17.9	1 – 58	2	1 – 5
Herb	5	0 – 25	0.3	0 – 0.5

### **Local Environmental Description**

**Elevation:** Mean 355 m, Range 54 – 503 m

**Aspect:** NE (15), SE (4), NW (3), SW (3), Flat (1), Variable (1)

**Slope:** Mean 20 degrees, Range 2 – 43 degrees

**Macro Topography:** Middle 1/3 of slope (10), Upper 1/3 of slope (10), Ridge top (2), Lower 1/3 of slope (1), Lower to Middle 1/3 of slope (1), Not recorded (1)

**Large Rock:** Mean 0.1%, Range 0 – 2.5%

**Small Rock:** Mean 0.8%, Range 0 – 5%

**Fines Cover:** Mean 3.2%, Range 0 – 23%

**Litter Cover:** Mean 86.5%, Range 35 – 100%

**Soil Texture (field assessed):** Moderately fine clay loam (6), Moderately fine sandy clay loam (5), Medium to very fine, sandy loam (3), Moderately fine silty clay loam (2), Medium loam (2), Moderately coarse, sandy loam (2), Medium silt loam (2)

**Geology (field or map data):** Franciscan melange (22), Sandstone and other sedimentary (4), Sandstone (1), Volcanic and metavolcanic rocks (1)

**Marin County Watersheds:** Lagunitas Creek (18), Bolinas (7), San Rafael (2)

### **Site Impacts**

This association has very low non-native plant cover (average 0.1%) relative to native cover.

### **Classification Comments**

None.

**References:** Evens and Kentner 2006, Keeler-Wolf et al. 2003a, Klein et al. 2015

**Global Rarity Rank:** G3

**State Rarity Rank:** S3

**State Rare:** Y



**Surveys Used for Description**

**Total: N=33; Marin County (n=33):** GGNRA278, GGNRA289, GGNRA291, GGNRA294, GGNRA295, HYPM110, MARINSP15, MMWD0107, MMWD0180, MMWD0209A, MMWD0252, MMWD0285A, MMWD0390, MMWD0391, MMWD0392, MMWD0406, MMWD0415A, MMWD0416A, MOSD0096, MOSD0098, MOSD0104, PGA1518, PGA1555, PGA1588, PGA1593, PGA8155, PORE001, PORE139, PORE141, PORE145, PORE146, SFANR15, SFANR16

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Sequoia sempervirens</i>	100	67.2	47.4	5.0	99.0	X	X		X
	<i>Notholithocarpus densiflorus</i>	88	26.0	16.5	0.2	55.0	X			X
	<i>Umbellularia californica</i>	42	3.9	3.1	0.2	25.0				
	<i>Arbutus menziesii</i>	21	1.5	0.5	0.2	6.2				
<b>Regenerating or Shrubby Trees</b>										
	<i>Notholithocarpus densiflorus*</i>	48	25.2	1.8	0.2	12.0				
	<i>Sequoia sempervirens*</i>	45	21.3	1.4	0.2	13.2				
	<i>Umbellularia californica*</i>	30	7.3	0.1	0.2	0.4				
<b>Shrub</b>										
	<i>Vaccinium ovatum</i>	94	81.4	14.9	0.4	61.0	X	X		X
	<i>Corylus cornuta</i>	30	4.7	0.6	0.2	5.0				
	<i>Rubus ursinus</i>	21	2.7	0.1	0.2	3.0				
	<i>Toxicodendron diversilobum</i>	21	0.8	0.1	0.2	1.0				
	<i>Lonicera hispidula</i>	21	0.7	0.0	0.2	0.2				
<b>Herb</b>										
	<i>Polystichum munitum</i>	91	47.2	2.5	0.2	25.0	X		X	X
	<i>Pteridium aquilinum</i>	48	9.7	0.2	0.2	1.0				
	<i>Viola sempervirens</i>	27	3.0	0.1	0.2	0.2				
<b>Non-vascular</b>										
	Moss	24	21.9	1.8	0.2	20.0				

***Sequoia sempervirens* – *Pseudotsuga menziesii* – *Notholithocarpus densiflorus* Association**

**Common Name:** Redwood – Douglas-fir – Tanoak Woodland

**Alliance:** *Sequoia sempervirens* Forest & Woodland Alliance

**Local Vegetation Description**

The Redwood – Douglas-fir – Tanoak Association forms an intermittent to continuous tree canopy with a sparse to open shrub understory. The dominant tree is *Sequoia sempervirens*, and those that are characteristic or often present include *Notholithocarpus densiflorus*, *Pseudotsuga menziesii*, and *Umbellularia californica*. Commonly associated shrubs include *Lonicera hispidula* and *Vaccinium ovatum*, and commonly associated herbs include *Galium triflorum*, *Polystichum munitum*, *Trientalis borealis* ssp. *Latifolia*, and *Trillium ovatum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	50.0	25 – 75	42.5	35 – 50
Hardwood	25.0	25 – 25	7.5	5 – 10
Regenerating or Shrubby Tree	4.4	0 – 26.4	no data	
Shrub	5	0 – 12	0.3	0 – 0.5
Herb	14.9	6 – 28.75	0.3	0 – 0.5

**Local Environmental Description**

**Elevation:** Mean 137 m, Range 74 – 266 m

**Aspect:** NE (4), SW (1), NW (1)

**Slope:** Mean 30 degrees, Range 10 – 60 degrees

**Macro Topography:** Ridge top (1), Entire slope (1), Lower 1/3 of slope (1)

**Large Rock:** Mean 0.1%, Range 0.0 – 0.2%

**Small Rock:** Mean 1.9%, Range 0.2 – 5%

**Fines Cover:** Mean 4%, Range 0.7 – 10%

**Litter Cover:** Mean 89.1%, Range 72.5 – 100%

**Soil Texture (field assessed):** Medium to very fine, sandy loam (1), Fine sandy clay (1), Medium loam (1)

**Geology (field or map data):** Franciscan melange (7), Volcanic and metavolcanic rocks (1)

**Marin County Watersheds:** Bolinas (5), Lagunitas Creek (3)

**Site Impacts**

This association has very low non-native plant cover (average 0.05%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Hedera helix*.

**Classification Comments**

None.

**References:** Klein et al. 2015

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

**Total: N=8; Marin County (n=8):** HYPM204.2, MARINSP02, MARINSP05, MMWD0255, PGA1667, SFANR08, SFANR10, SFANR12

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Sequoia sempervirens</i>	100	52.5	53.6	18.0	75.0	X	X		X
	<i>Notholithocarpus densiflorus</i>	100	23.2	21.3	2.1	60.0	X			X
	<i>Pseudotsuga menziesii</i>	88	15.9	17.6	2.5	47.2	X			X
	<i>Umbellularia californica</i>	63	7.7	6.8	0.2	28.0				X
<b>Regenerating or Shrubby Trees</b>										
	<i>Notholithocarpus densiflorus</i> *	25	16.2	3.4	1.2	26.2				
	<i>Umbellularia californica</i> *	25	0.7	0.1	0.2	0.2				
<b>Shrub</b>										
	<i>Vaccinium ovatum</i>	50	30.8	5.1	1.0	35.0				X
	<i>Lonicera hispidula</i>	50	6.2	0.2	0.2	1.0				X
	<i>Corylus cornuta</i>	38	18.9	2.8	2.0	18.0				
	<i>Toxicodendron diversilobum</i>	38	1.9	0.3	0.2	2.0				
	<i>Hedera helix</i>	25	13.1	0.1	0.2	0.2				
	<i>Rosa gymnocarpa</i>	25	1.4	0.1	0.2	0.2				
<b>Herb</b>										
	<i>Polystichum munitum</i>	63	41.4	4.7	2.0	18.0				X
	<i>Trillium ovatum</i>	63	1.8	0.1	0.2	0.2				X
	<i>Galium triflorum</i>	50	6.7	0.5	0.2	2.9				X
	<i>Trientalis borealis</i> ssp. <i>latifolia</i>	50	3.2	0.3	0.2	1.0				X
	<i>Scoliopus bigelovii</i>	38	3.2	0.6	0.2	4.0				
	<i>Dryopteris arguta</i>	38	1.4	0.1	0.2	0.2				
	<i>Iris douglasiana</i>	38	1.1	0.1	0.2	0.2				
	<i>Stachys ajugoides</i>	38	1.5	0.1	0.2	0.2				
	<i>Oxalis oregana</i>	25	15.9	1.5	2.0	10.0				
	<i>Bromus laevipes</i>	25	0.5	0.1	0.2	0.2				
	<i>Prosartes</i> spp.	25	0.5	0.1	0.2	0.2				
	<i>Prosartes hookeri</i>	25	0.6	0.1	0.2	0.2				
	<i>Pteridium aquilinum</i>	25	1.2	0.1	0.2	0.2				
	<i>Whipplea modesta</i>	25	1.0	0.1	0.2	0.2				
<b>Non-vascular</b>										
	Lichen	25	24.0	2.3	8.0	10.7				

## Sequoia sempervirens – Pseudotsuga menziesii – Umbellularia californica Association

**Common Name:** Redwood – Douglas-fir – California Bay Woodland

**Alliance:** *Sequoia sempervirens* Forest & Woodland Alliance

### Local Vegetation Description

The Redwood – Douglas-fir – California Bay Association forms an open to continuous tree canopy with a sparse to open shrub understory. The dominant tree is *Sequoia sempervirens*, and those that are characteristic or often present include *Pseudotsuga menziesii*, *Umbellularia californica*, and *Notholithocarpus densiflorus*. Regenerating or shrubby trees that are often present include *Notholithocarpus densiflorus*. Commonly associated shrubs include *Toxicodendron diversilobum*, *Rubus ursinus*, and *Vaccinium ovatum*, and commonly associated herbs include *Polystichum munitum*, *Dryopteris arguta*, *Iris douglasiana*, and *Stachys ajugoides*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	42.4	30 – 70	38.8	20 – 50
Hardwood	20.8	5 – 60	18.1	5 – 35
Regenerating or Shrubby Tree	1.1	0 – 4.0	7.5	5 – 10
Shrub	3.0	0.2 – 8.0	2.5	1 – 5
Herb	10.5	1 – 20	0.5	0 – 2

### Local Environmental Description

**Elevation:** Mean 295 m, Range 105 – 497 m

**Aspect:** NW (3), SE (2), Flat (1), SW (1), Variable (1)

**Slope:** Mean 19 degrees, Range 2 – 31 degrees

**Macro Topography:** Middle 1/3 of slope (3), Entire slope (1), Ridge top (1), Bottom (1)

**Large Rock:** Mean 2.4%, Range 0 – 12%

**Small Rock:** Mean 13.4%, Range 0 – 78%

**Fines Cover:** Mean 2.1%, Range 0.2 – 5%

**Litter Cover:** Mean 89.7%, Range 78 – 99%

**Soil Texture (field assessed):** Medium loam (2), Moderately fine sandy clay loam (2), Medium to very fine, loamy sand (1), Medium to very fine, sandy loam (1)

**Geology (field or map data):** Franciscan melange (7), Ultramafic rocks, mostly serpentine (1)

**Marin County Watersheds:** Bolinas (4), Lagunitas Creek (3), San Rafael (1)

### Site Impacts

This association has very low non-native plant cover (average 0.1%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Hedera helix*.

### Classification Comments

None.

**References:** Evens and Kentner 2006, Keeler-Wolf et al. 2003a, Klein et al. 2015

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

### Surveys Used for Description

**Total: N=10; Marin County (n=10):** GGNRA286, MMWD0205A, MMWD0389, MMWD0398, MOSD0146, PGA1323, PGA1654, PORE143, SFANR17, SFANR18

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Sequoia sempervirens</i>	100	47.8	36.4	10.0	68.8	X		X	X
	<i>Umbellularia californica</i>	100	24.4	20.3	2.0	60.0	X			X
	<i>Pseudotsuga menziesii</i>	100	25.2	18.8	5.0	31.9	X			X
	<i>Notholithocarpus densiflorus</i>	50	1.0	1.0	0.2	7.6				X
<b>Regenerating or Shrubby Trees</b>										
	<i>Notholithocarpus densiflorus</i> *	50	27.6	0.6	0.2	4.0				X
	<i>Pseudotsuga menziesii</i> *	30	8.8	0.2	0.2	1.0				
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	80	16.3	0.6	0.2	2.0	X			X
	<i>Vaccinium ovatum</i>	60	39.6	2.8	0.2	10.2				X
	<i>Rubus ursinus</i>	50	9.6	0.2	0.2	1.0				X
	<i>Lonicera hispidula</i>	40	13.6	0.4	0.2	2.0				
	<i>Frangula californica</i>	30	10.1	0.9	0.2	8.3				
	<i>Hedera helix</i>	30	0.7	0.1	0.2	0.2				
<b>Herb</b>										
	<i>Polystichum munitum</i>	80	36.7	2.8	0.2	15.0	X		X	X
	<i>Iris douglasiana</i>	50	5.0	0.3	0.2	1.0				X
	<i>Dryopteris arguta</i>	50	3.7	0.1	0.2	0.4				X
	<i>Stachys ajugoides</i>	50	2.3	0.1	0.2	0.2				X
	<i>Carex globosa</i>	40	8.3	0.4	0.2	2.0				
	<i>Trientalis borealis</i> ssp. <i>latifolia</i>	30	7.0	0.6	0.2	5.0				
	<i>Clinopodium douglasii</i>	30	2.9	0.2	0.2	1.3				
	<i>Pteridium aquilinum</i>	30	3.5	0.1	0.2	0.9				
	<i>Galium</i> spp.	30	1.6	0.1	0.2	0.2				
	<i>Maianthemum stellatum</i>	30	2.6	0.1	0.2	0.2				
	<i>Trillium ovatum</i>	30	0.7	0.1	0.2	0.2				

## **Sequoia sempervirens – Umbellularia californica Association**

**Common Name:** Redwood – California Bay Woodland

**Alliance:** *Sequoia sempervirens* Forest & Woodland Alliance

### **Local Vegetation Description**

The Redwood – California Bay Association forms an open to continuous tree canopy with a sparse to open shrub understory. *Sequoia sempervirens* is dominant to co-dominant with *Umbellularia californica* in the tree layer. Commonly associated shrubs include *Toxicodendron diversilobum*, and commonly associated herbs include *Polystichum munitum* and *Stachys ajugoides*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	42.6	12 – 85	38.0	15 – 100
Hardwood	20.5	1 – 40	18.6	5 – 50
Regenerating or Shrubby Tree	1.2	0 – 9.4	6.2	2 – 10
Shrub	5.0	0.2 – 30.0	2.4	0.5 – 5
Herb	10.4	0.2 – 30	0.3	0 – 1

### **Local Environmental Description**

**Elevation:** Mean 252 m, Range 31 – 497 m

**Aspect:** NE (8), SW (4), NW (3), SE (2), Variable (2)

**Slope:** Mean 22 degrees, Range 4 – 40 degrees

**Macro Topography:** Middle 1/3 of slope (5), Upper 1/3 of slope (5), Bottom (1), Lower 1/3 of slope (1)

**Large Rock:** Mean 0.5%, Range 0 – 5%

**Small Rock:** Mean 8.7%, Range 0 – 75%

**Fines Cover:** Mean 9.9%, Range 0.2 – 44%

**Litter Cover:** Mean 77.2%, Range 44 – 100%

**Soil Texture (field assessed):** Medium loam (3), Moderately fine clay loam (2), Moderately fine sandy clay loam (2), Medium to very fine, sandy loam (2), Moderately coarse, sandy loam (1), Medium silt loam (1), Coarse sand (1)

**Geology (field or map data):** Franciscan melange (15), Sandstone and other sedimentary (7), Volcanic and metavolcanic rocks (1)

**Marin County Watersheds:** Bolinas (11), San Rafael (6), Lagunitas Creek (4), Novato (2)

### **Site Impacts**

This association has very low non-native plant cover (average 0.9%) relative to native cover.

### **Classification Comments**

None.

**References:** Evens and Kentner 2006, Klein et al. 2015

**Global Rarity Rank:** G3

**State Rarity Rank:** S3

**State Rare:** Y

### **Surveys Used for Description**

**Total: N=24; Marin County (n=24):** GGNRA276, HYPM135, MMWD0150A, MMWD0152A, MMWD0154, MMWD0171, MMWD0225, MMWD0249, MMWD0298, MMWD0339, MOSD0011, MOSD0363, MOSD0371, PGA1585, PGA1614, PGA1622, PGA7949, SFANR01, SFANR02, SFANR04, SFANR05, SFANR07, SFANR11, SFANR14

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Sequoia sempervirens</i>	100	64.5	53.5	12.0	95.0	X	X		X
	<i>Umbellularia californica</i>	100	29.0	22.4	0.2	80.6	X			X
	<i>Notholithocarpus densiflorus</i>	38	2.5	2.6	0.2	26.4				
	<i>Arbutus menziesii</i>	33	2.9	1.5	0.2	11.2				
<b>Regenerating or Shrubby Trees</b>										
	<i>Notholithocarpus densiflorus*</i>	29	26.0	0.7	1.0	5.0				
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	54	13.3	0.3	0.2	2.0				X
	<i>Vaccinium ovatum</i>	46	28.5	3.1	0.2	37.5				
	<i>Corylus cornuta</i>	38	15.4	1.1	0.2	13.2				
	<i>Lonicera hispidula</i>	29	4.9	0.1	0.2	0.2				
<b>Herb</b>										
	<i>Polystichum munitum</i>	75	35.4	6.4	0.2	65.3	X		X	X
	<i>Stachys ajugoides</i>	50	4.4	0.3	0.2	3.0				X
	<i>Dryopteris arguta</i>	46	6.8	0.3	0.2	3.3				
	<i>Iris douglasiana</i>	42	10.5	1.0	0.2	10.0				
	<i>Galium triflorum</i>	42	3.5	0.2	0.2	1.3				
	<i>Pteridium aquilinum</i>	29	2.4	0.1	0.2	1.0				
	<i>Trientalis borealis</i> ssp. <i>latifolia</i>	29	1.5	0.1	0.2	1.0				
<b>Non-vascular</b>										
	Moss	42	31.1	0.5	0.2	4.9				
	Lichen	25	10.6	0.3	0.2	4.7				

***Sequoia sempervirens* / (*Pteridium aquilinum*) – *Woodwardia fimbriata* Association**

**Common Name:** Redwood / Bracken – Chain Fern / Streamsides Woodland

**Alliance:** *Sequoia sempervirens* Forest & Woodland Alliance

**Local Vegetation Description**

The Redwood / Bracken – Chain Fern / Streamsides Association forms an intermittent to continuous tree canopy with a sparse to open shrub understory. The dominant tree is *Sequoia sempervirens*, and those that are characteristic or often present include *Notholithocarpus densiflorus* and *Umbellularia californica*. Commonly associated shrubs include *Lonicera hispidula* and *Toxicodendron diversilobum*, and commonly associated herbs include *Polystichum munitum*, *Woodwardia fimbriata*, and *Aralia californica*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	40.5	27 – 50	24.5	10 – 35
Hardwood	18.8	0 – 30	11.3	5 – 20
Regenerating or Shrubby Tree	2.5	0 – 15.2	no data	
Shrub	7.8	0.0 – 29.0	3.5	2 – 5
Herb	7.6	0.2 – 32	0.3	0 – 1

**Local Environmental Description**

**Elevation:** Mean 269 m, Range 132 – 590 m

**Aspect:** NW (3), Variable (2), NE (2)

**Slope:** Mean 26 degrees, Range 4 – 40 degrees

**Macro Topography:** Lower 1/3 of slope (3), Middle 1/3 of slope (2), Upper 1/3 of slope (1), Bottom (1)

**Large Rock:** Mean 1%, Range 0 – 4%

**Small Rock:** Mean 1.5%, Range 0.2 – 2%

**Fines Cover:** Mean 7.9%, Range 0.2 – 38%

**Litter Cover:** Mean 81.4%, Range 58 – 92%

**Soil Texture (field assessed):** Moderately coarse, sandy loam (2), Moderately fine sandy clay loam (1), Moderately fine clay loam (1), Fine sandy clay (1), Medium silt (1), Medium silt loam (1)

**Geology (field or map data):** Franciscan melange (8)

**Marin County Watersheds:** Lagunitas Creek (5), San Rafael (2), Bolinas (1)

**Site Impacts**

This association has very low non-native plant cover (average 0.1%) relative to native cover.

**Classification Comments**

Surveys are primarily along riparian corridors, drainages, terraces, and bottomlands.

**References:** Borchert et al. 1988, Evens and Kentner 2006, Klein et al. 2015

**Global Rarity Rank:** G3

**State Rarity Rank:** S3

**State Rare:** Y

**Surveys Used for Description**

**Total: N=8; Marin County (n=8):** MMWD0172, MMWD0179, MMWD0204A, MMWD0271, MMWD0286, MMWD0289, MMWD0400A, PGA1642



### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Sequoia sempervirens</i>	100	75.5	47.0	27.0	67.0	X	X		X
	<i>Notholithocarpus densiflorus</i>	75	19.6	12.4	1.0	30.0	X			X
	<i>Umbellularia californica</i>	50	2.1	1.5	0.2	10.0				X
<b>Regenerating or Shrubby Trees</b>										
	<i>Notholithocarpus densiflorus</i> *	38	24.3	2.3	0.2	15.0				
	<i>Umbellularia californica</i> *	38	4.0	0.1	0.2	0.4				
	<i>Sequoia sempervirens</i> *	25	9.2	0.2	0.4	1.0				
<b>Shrub</b>										
	<i>Lonicera hispidula</i>	50	19.2	0.1	0.2	0.2				X
	<i>Toxicodendron diversilobum</i>	50	15.3	0.1	0.2	0.2				X
	<i>Vaccinium ovatum</i>	38	16.5	0.3	0.2	1.0				
	<i>Corylus cornuta</i>	25	14.5	0.7	0.2	5.0				
	<i>Rubus ursinus</i>	25	11.4	0.7	0.2	5.0				
<b>Herb</b>										
	<i>Woodwardia fimbriata</i>	100	22.4	2.9	0.2	20.0	X			X
	<i>Polystichum munitum</i>	100	36.2	1.8	0.2	8.0	X		X	X
	<i>Aralia californica</i>	50	10.8	2.8	0.2	20.0				X
	<i>Equisetum telmateia</i>	38	1.9	0.4	0.2	3.0				
	<i>Pteridium aquilinum</i>	38	3.2	0.2	0.2	1.0				
	<i>Galium triflorum</i>	38	1.8	0.1	0.2	0.2				
	<i>Maianthemum racemosum</i>	38	1.6	0.1	0.2	0.2				
	<i>Trientalis borealis</i> ssp. <i>latifolia</i>	38	1.8	0.1	0.2	0.2				
	<i>Adiantum jordanii</i>	25	0.7	0.1	0.2	0.2				
	<i>Carex</i> spp.	25	1.0	0.1	0.2	0.2				
	<i>Dryopteris arguta</i>	25	4.7	0.1	0.2	0.2				
	<i>Galium porrigens</i>	25	1.1	0.1	0.2	0.2				
	<i>Hierochloe occidentalis</i>	25	1.3	0.1	0.2	0.2				
	<i>Scoliopus bigelovii</i>	25	1.0	0.1	0.2	0.2				
	<i>Stachys ajugoides</i>	25	0.5	0.1	0.2	0.2				
	<i>Trillium ovatum</i>	25	1.0	0.1	0.2	0.2				
	<i>Vancouveria planipetala</i>	25	1.3	0.1	0.2	0.2				
	<i>Whipplea modesta</i>	25	1.3	0.1	0.2	0.2				
<b>Non-vascular</b>										
	Moss	50	50.0	0.5	1.0	1.0				X

## *Sequoia sempervirens* / *Polystichum munitum* Association

**Common Name:** Redwood / Sword Fern Woodland

**Alliance:** *Sequoia sempervirens* Forest & Woodland Alliance

### Local Vegetation Description

The Redwood / Sword Fern Association forms an intermittent to continuous tree canopy with a sparse shrub understory. The dominant tree is *Sequoia sempervirens*, and those that are characteristic or often present include *Umbellularia californica*. Commonly associated herbs include *Polystichum munitum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	74.1	30 – 90	42.9	20 – 100
Hardwood	5.0	0 – 25	30.0	15 – 50
Regenerating or Shrubby Tree	0.2	0 – 0.8	3.5	2 – 5
Shrub	0.6	0.0 – 2.0	1.9	0 – 5
Herb	19.0	0.2 – 47	0.5	0 – 1

### Local Environmental Description

**Elevation:** Mean 224 m, Range 47 – 331 m

**Aspect:** NE (3), NW (1)

**Slope:** Mean 19 degrees, Range 4 – 36 degrees

**Macro Topography:** Upper 1/3 of slope (2), Upper 1/3 of slope to Ridgetop (1), Middle 1/3 of slope (1)

**Large Rock:** 0%

**Small Rock:** Mean 0.1%, Range 0.0 – 0.2%

**Fines Cover:** Mean 2.6%, Range 0.2 – 6%

**Litter Cover:** Mean 93.5%, Range 92 – 98%

**Soil Texture (field assessed):** Moderately fine clay loam (1), Moderately fine silty clay loam (1)

**Geology (field or map data):** Sandstone and other sedimentary (3), Shale and other sedimentary (2), Franciscan melange (1), Alluvium (1), Sandstone (1)

**Marin County Watersheds:** Bolinas (2), Novato (2)

**Other Watersheds, San Mateo Co.:** San Mateo Bayside (2); **Sonoma Co.:** Gualala River (1), Lower Russian River (1)

### Site Impacts

This association has very low non-native plant cover (average 0.0%) relative to native cover. No non-native species were recorded by surveyors.

### Classification Comments

Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** Buck and Evens 2010, Lenihan 1990, Taylor 1982

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

### Surveys Used for Description

**Total: N=8; Marin County (n=4):** MOSD0152, MOSD0153, PGA1612, SFANR06

San Mateo County (n=2): PGA1044, PGA1860

Sonoma County (n=2): SONO0254, SONO0988

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Sequoia sempervirens</i>	100	90.0	76.0	30.0	99.3	X	X		X
	<i>Umbellularia californica</i>	63	1.4	1.0	0.2	4.0				X
	<i>Pseudotsuga menziesii</i>	38	2.5	2.2	1.0	10.0				
	<i>Notholithocarpus densiflorus</i>	25	3.6	1.9	0.2	15.0				
	<i>Arbutus menziesii</i>	25	1.5	0.9	2.0	5.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Sequoia sempervirens</i> *	25	11.5	0.1	0.2	0.4				
<b>Shrub</b>										
	<i>Rubus ursinus</i>	25	21.9	0.4	1.0	2.1				
	<i>Toxicodendron diversilobum</i>	25	9.4	0.2	0.2	1.0				
	<i>Frangula californica</i>	25	18.8	0.1	0.2	0.2				
<b>Herb</b>										
	<i>Polystichum munitum</i>	100	73.3	16.5	0.2	30.0	X	X		X
	<i>Dryopteris arguta</i>	38	3.2	1.3	0.2	10.0				
	<i>Maianthemum racemosum</i>	25	4.4	0.1	0.2	0.2				
	<i>Viola glabella</i>	25	0.1	0.1	0.2	0.2				
<b>Non-vascular</b>										
	Moss	38	35.4	0.4	0.2	2.1				

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## ***Umbellularia californica* Forest & Woodland Alliance**

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**Common Name:** California bay forest and woodland

**NVC Alliance Code:** A3346 or A3750. *Quercus agrifolia* Woodland Alliance or *Platanus racemosa* - *Quercus agrifolia* - *Juglans californica* Riparian Woodland Alliance

### **Statewide Description**

*Umbellularia californica* is dominant or co-dominant in the tree or tall shrub canopy with *Acer macrophyllum*, *Aesculus californica*, *Alnus rhombifolia*, *Alnus rubra*, *Arbutus menziesii*, *Corylus cornuta*, *Juglans californica*, *Notholithocarpus densiflorus*, *Pinus sabiniana*, *Platanus racemosa*, *Pseudotsuga menziesii*, *Quercus agrifolia*, *Quercus chrysolepis*, *Quercus wislizeni*, and *Sequoia sempervirens*.

In many cases, *Umbellularia californica* is the only tree species in older stands with few shrubs and herbs present (McBride 1974). Stands occur near the coast and inland in both mesic and riparian settings, usually in a patchwork with stands of other evergreen forest or chaparral alliances. Coastal stands have characteristically wind-pruned trees or shrubs, and both coastal and inland stands typically have dense, clonally sprouted plants. The stands may be shrubby, as on ultramafic soils such as in the western Klamath Mountains, or they may be trees within a larger matrix of chaparral, as in central and southern California. Historically productive stands were cleared for agriculture and residential development (Stein 1990b).

### **Local Vegetation Description**

The California bay forest and woodland Alliance forms an open to continuous tree canopy with a sparse to continuous shrub understory. The dominant tree is *Umbellularia californica*, and *Quercus agrifolia* are characteristic or often present. Commonly associated shrubs include *Toxicodendron diversilobum*, and commonly associated herbs include *Polystichum munitum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	1.5	0 – 15	23.2	1 – 100
Hardwood	49.4	9 – 98	13.7	2 – 35
Regenerating or Shrubby Tree	2.4	0 – 44.2	6.2	1 – 35
Shrub	16.8	0.0 – 75.0	2.3	0 – 10
Herb	23.2	0 – 85	0.4	0 – 5

### **Local Membership Rule**

*Umbellularia californica* is either dominant or co-dominant with *Quercus agrifolia* in open to dense woodlands. Found in a variety of settings, such as streamsides, valley bottoms, coastal bluffs, inland ridges, steep north-facing slopes, rocky outcrops and post-fire landscapes. If *U. californica* is co-dominant with *Arbutus*, *Acer*, or *Pinus sabiniana* on serpentine, or *Pseudotsuga menziesii*, *Quercus chrysolepis*, *Q. garryana*, *Q. lobata*, *Q. kelloggii*, or *Sequoia*, key to one of these other hardwood or conifer alliances instead. Purely riparian stands of *U. californica* when it is dominant or co-dominant with *Acer macrophyllum* should be keyed to the *Acer macrophyllum* – *Alnus rubra* Alliance.

### **Local Environmental Description**

**Elevation:** Mean 176 m, Range 3 – 705 m

**Aspect:** SE (35), NW (28), NE (22), SW (10), Variable (9), Flat (2)

**Slope:** Mean 24 degrees, Range 0 – 60 degrees

**Macro Topography:** Middle 1/3 of slope (40), Upper 1/3 of slope (24), Lower 1/3 of slope (21), Bottom (9), Not recorded (2), Ridge top (2), Draw (1), Entire slope (1)

**Large Rock:** Mean 2.2%, Range 0.0 – 65.0%

**Small Rock:** Mean 7.4%, Range 0.0 – 75.0%

**Fines Cover:** Mean 13.0%, Range 0.2 – 78.0%

**Litter Cover:** Mean 67.6%, Range 2.0 – 100%

**Soil Texture (field assessed):** Moderately fine sandy clay loam (19), Moderately fine clay loam (15), Medium to very fine, sandy loam (14), Moderately fine silty clay loam (11), Moderately coarse, sandy loam (9), Medium loam (7), Coarse, loamy sand (6), Fine clay (6), Fine silty clay (3), Medium silt (2), Medium to very fine, loamy sand (2), Medium silt loam (2), Fine sandy clay (2), Unknown (1), Medium sand (1)

**Geology (field or map data):** Franciscan melange (77), Sandstone and other sedimentary (56), Granitic (13), Granitic (generic) (8), Alluvium (6), Volcanic and metavolcanic rocks (3), Shale (3), Blueschist and semi-schist (2), Sandstone, shale, and conglomerate (2), Volcanic flow rocks (1), Ultramafic rocks, mostly serpentine (1), Large landslides (1), Mixed sedimentary (1)

**Marin County Watersheds:** Lagunitas Creek (69), Bolinas (27), San Rafael (25), Novato (23), Inverness (16), Point Reyes (6), Walker Creek (5), Petaluma River (3)

### **Site Impacts**

This alliance has low non-native plant cover (average 4.7%) relative to native cover. Non-native species with highest frequency and abundance include *Avena* spp., *Briza maxima*, and *Genista monspessulana*.

### **Associations in Marin County**

*Umbellularia californica*

*Umbellularia californica* – *Notholithocarpus densiflorus*

*Umbellularia californica* – *Quercus agrifolia* / *Toxicodendron diversilobum*

*Umbellularia californica* – *Quercus wislizeni*

*Umbellularia californica* / *Polystichum munitum*

**Classification Comments**

None.

**References:** Buck and Evens 2010, Campbell 1980, Evens and Kentner 2006, Fiedler and Leidy 1987, Jimerson et al. 1996, Keeler-Wolf et al. 2003a, Klein et al. 2007, Klein et al. 2015

**Global Rarity Rank:** G4

**State Rarity Rank:** S3

**Surveys Used for Description**

**Total: N=189; Marin County (n=189):** GGNRA253, GGNRA279, GGNRA287, GGNRA290, GGNRA298, HYPM003, HYPM006, HYPM008, HYPM010, HYPM011, HYPM047, MARINSP01, MARINSP04, MARINSP07, MARINSP13, MMWD0069, MMWD0097, MMWD0102, MMWD0113A, MMWD0123A, MMWD0126, MMWD0137A, MMWD0158A, MMWD0170A, MMWD0173A, MMWD0174, MMWD0187, MMWD0189, MMWD0190A, MMWD0243, MMWD0257, MMWD0259, MMWD0261A, MMWD0274A, MMWD0313A, MMWD0333A, MMWD0334, MMWD0336A, MMWD0345A, MMWD0350, MMWD0361A, MMWD0363A, MMWD0371, MMWD0379, MMWD0380, MMWD0388, MMWD0419, MOSD0012, MOSD0014, MOSD0034, MOSD0059, MOSD0062, MOSD0099, MOSD0103, MOSD0120, MOSD0126, MOSD0139, MOSD0140, MOSD0141, MOSD0142, MOSD0147, MOSD0151, MOSD0157, MOSD0167, MOSD0169, MOSD0182, MOSD0183, MOSD0187, MOSD0188, MOSD0200, MOSD0203, MOSD0205, MOSD0213, MOSD0221, MOSD0222, MOSD0224, MOSD0225, MOSD0230, MOSD0232, MOSD0235, MOSD0255, MOSD0261, MOSD0296, MOSD0302, MOSD0319, MOSD0333, MOSD0351, MOSD0354, MOSD0356, MOSD0358, MOSD0372, PGA1062, PGA1065, PGA1122, PGA1143, PGA1148, PGA1149, PGA1154, PGA1159, PGA1164, PGA1171, PGA1172A, PGA1173, PGA1176, PGA1180, PGA1182, PGA1192, PGA1195, PGA1198, PGA1204, PGA1207, PGA1208, PGA1214, PGA1217, PGA1224, PGA1225, PGA1226, PGA1235, PGA1236, PGA1240, PGA1248, PGA1259, PGA1271, PGA1278, PGA1327, PGA1370A, PGA1373, PGA1381, PGA1464, PGA1494, PGA1552, PGA1567, PGA1571, PGA1575, PGA1580, PGA1601, PGA1606A, PGA1615, PGA1628, PGA1657, PGA1674, PGA2510-1, PGA2705, PGA3118, PGA3691, PGA3723, PGA3728, PGA3827, PGA4312, PGA4556, PGA4624, PGA5057, PGA5113, PGA5536, PGA5643, PGA6533, PGA6939, PGA7336, PGA7773, PGA7868, PGA8439, PGA8732, PGA8856, PGA9448, PGA9503, PGA9569, PGA9616, PORE033, PORE034, PORE062, PORE073, PORE081, PORE087, PORE096, PORE100, PORE121, PORE133, PORE144, PORE147, PORE162, PORE166, PORE174, PORE180, PORE187, PORE203, SFANO03, SFANO05, SFANO06, SFANO07

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Tree	<i>Umbellularia californica</i>	98	71.9	40.3	1.0	99.3	X	X		X
	<i>Quercus agrifolia</i>	54	14.4	7.9	0.1	56.9				X
	<i>Pseudotsuga menziesii</i>	32	2.8	1.3	0.2	25.0				
	<i>Aesculus californica</i>	23	2.3	1.3	0.2	38.0				
Shrub	<i>Toxicodendron diversilobum</i>	77	25.8	4.6	0.2	55.0	X			X
	<i>Rubus ursinus</i>	46	13.2	4.5	0.2	65.0				
	<i>Corylus cornuta</i>	41	13.5	3.6	0.2	50.0				
	<i>Lonicera hispidula</i>	37	5.7	0.5	0.2	12.5				
	<i>Diplacus aurantiacus</i>	22	4.5	0.5	0.2	20.0				
	<i>Frangula californica</i>	21	3.2	1.4	0.2	55.0				
	<i>Baccharis pilularis</i>	20	2.5	0.7	0.2	15.2				
Herb										

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Of
	<i>Polystichum munitum</i>	63	31.8	9.0	0.2	80.0				X
	<i>Stachys ajugoides</i>	47	3.4	0.6	0.2	10.0				
	<i>Pteridium aquilinum</i>	30	6.2	1.1	0.2	35.0				
	<i>Dryopteris arguta</i>	24	2.8	0.8	0.2	20.0				
	<i>Iris douglasiana</i>	22	3.3	0.3	0.2	10.0				
	<i>Galium</i> spp.	21	1.1	0.1	0.2	3.0				
	<i>Clinopodium douglasii</i>	20	2.0	0.5	0.2	12.0				

## ***Umbellularia californica* Association**

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**Common Name:** California Bay Woodland

**Alliance:** *Umbellularia californica* Forest & Woodland Alliance

### **Local Vegetation Description**

The California Bay Association forms an open to continuous tree canopy with a sparse to open shrub understory. The dominant tree is *Umbellularia californica*. Commonly associated shrubs include *Toxicodendron diversilobum* and *Lonicera hispidula*, and commonly associated herbs include *Pentagramma triangularis* and *Polystichum munitum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	1.1	0 – 12	29.4	1 – 100
Hardwood	50.9	20 – 90	18.1	5 – 35
Regenerating or Shrubby Tree	1.1	0 – 10	6.6	2 – 15
Shrub	3.7	0 – 20	1.7	0 – 5
Herb	16.4	1 – 65	0.4	0 – 1

### **Local Environmental Description**

**Elevation:** Mean 204 m, Range 36 – 483 m

**Aspect:** NE (7), NW (6), SE (6), Variable (2), Flat (1), SW (1)

**Slope:** Mean 24 degrees, Range 0 – 60 degrees

**Macro Topography:** Middle 1/3 of slope (12), Lower 1/3 of slope (5), Bottom (4), Upper 1/3 of slope (2)

**Large Rock:** Mean 3.6%, Range 0.0 – 40.0%

**Small Rock:** Mean 7.3%, Range 0.0 – 50.0%

**Fines Cover:** Mean 15.7%, Range 0.2 – 78.0%

**Litter Cover:** Mean 62.1%, Range 15.0 – 96%

**Soil Texture (field assessed):** Coarse, loamy sand (3), Moderately fine sandy clay loam (3), Medium to very fine, sandy loam (2), Moderately fine silty clay loam (2), Moderately fine clay loam (2), Fine clay (2), Unknown (1), Medium silt (1), Medium silt loam (1), Medium loam (1), Fine silty clay (1), Fine sandy clay (1), Medium sand (1), Moderately coarse, sandy loam (1)

**Geology (field or map data):** Franciscan melange (20), Sandstone and other sedimentary (6), Sandstone, shale, and conglomerate (1)

**Marin County Watersheds:** Lagunitas Creek (12), San Rafael (8), Novato (4), Bolinas (2), Petaluma River (1)

### **Site Impacts**

This association has low non-native plant cover (average 2.7%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Genista monspessulana*.

### **Classification Comments**

None.

**References:** Campbell 1980, Evens and Kentner 2006

**Global Rarity Rank:** G3

**State Rarity Rank:** S3

**State Rare:** Y



**Surveys Used for Description**

**Total: N=27; Marin County (n=27):** HYPM008, MMWD0137A, MMWD0158A, MMWD0170A, MMWD0187, MMWD0190A, MMWD0257, MMWD0259, MMWD0274A, MMWD0363A, MOSD0059, MOSD0062, MOSD0120, MOSD0126, MOSD0142, MOSD0187, MOSD0200, MOSD0205, MOSD0221, MOSD0302, MOSD0356, MOSD0358, MOSD0372, PGA1195, PGA1575, PGA1657, PORE187

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Umbellularia californica</i>	100	92.6	49.5	10.2	90.0	X	X		X
	<i>Pseudotsuga menziesii</i>	32	1.7	0.8	0.2	11.0				
	<i>Aesculus californica</i>	29	0.6	0.4	0.2	5.0				
	<i>Quercus agrifolia</i>	29	0.5	0.3	0.1	4.0				
	<i>Arbutus menziesii</i>	25	1.6	0.8	0.2	9.3				
<b>Regenerating or Shrubby Trees</b>										
	<i>Umbellularia californica</i> *	21	13.1	0.5	0.2	10.0				
	<i>Pseudotsuga menziesii</i> *	21	12.2	0.1	0.2	1.0				
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	82	34.4	1.0	0.2	8.0	X		X	X
	<i>Lonicera hispidula</i>	57	13.9	0.4	0.2	5.2				X
	<i>Rubus ursinus</i>	21	10.0	0.9	0.2	20.0				
	<i>Genista monspessulana</i>	21	10.4	0.7	0.2	15.0				
	<i>Corylus cornuta</i>	21	5.5	0.1	0.2	1.0				
<b>Herb</b>										
	<i>Pentagramma triangularis</i>	54	3.0	0.1	0.2	1.0				X
	<i>Polystichum munitum</i>	50	15.3	0.8	0.2	5.0				X
	<i>Stachys ajugoides</i>	46	6.8	0.4	0.2	3.0				
	<i>Sanicula crassicaulis</i>	43	3.7	0.4	0.2	7.0				
	<i>Iris douglasiana</i>	32	4.1	0.3	0.2	3.0				
	<i>Adiantum jordanii</i>	25	3.2	0.1	0.2	2.0				
	<i>Dryopteris arguta</i>	21	0.9	0.0	0.2	0.2				
	<i>Osmorhiza berteroi</i>	21	0.6	0.0	0.2	0.2				

***Umbellularia californica* – *Notholithocarpus densiflorus* Association**

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**Common Name:** California Bay – Tanoak Woodland

**Alliance:** *Umbellularia californica* Forest & Woodland Alliance

**Local Vegetation Description**

The California Bay – Tanoak Association forms an open to continuous tree canopy with a sparse to continuous shrub understory. The dominant tree is *Umbellularia californica*, and the co-dominant tree is *Notholithocarpus densiflorus*. Commonly associated shrubs include *Rubus ursinus* and *Toxicodendron diversilobum*, and commonly associated herbs include *Polystichum munitum*, *Pteridium aquilinum*, and *Stachys ajugoides*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	2.3	0 – 5	20.0	5 – 35
Hardwood	37.4	12 – 80	14.5	5 – 20
Regenerating or Shrubby Tree	8.5	0 – 44.2	3.5	2 – 5
Shrub	20.5	2 – 75	1.8	0 – 5
Herb	22.1	0.5 – 70	0.4	0 – 1

**Local Environmental Description**

**Elevation:** Mean 189 m, Range 23 – 522 m

**Aspect:** NW (2), SE (2), SW (1), NE (1)

**Slope:** Mean 27 degrees, Range 13 – 37 degrees

**Macro Topography:** Middle 1/3 of slope (4), Upper 1/3 of slope (2), Lower 1/3 of slope (1)

**Large Rock:** Mean 0.2%, Range 0 – 1.0%

**Small Rock:** Mean 3.1%, Range 0 – 15%

**Fines Cover:** Mean 18.8%, Range 1 – 36%

**Litter Cover:** Mean 74.2%, Range 60 – 93%

**Soil Texture (field assessed):** Medium to very fine, sandy loam (2), Moderately coarse, sandy loam (2), Moderately fine silty clay loam (1), Medium loam (1), Moderately fine sandy clay loam (1)

**Geology (field or map data):** Franciscan melange (5), Granitic (2), Granitic (generic) (2), Sandstone and other sedimentary (2), Alluvium (1)

**Marin County Watersheds:** Lagunitas Creek (6), Inverness (5), Bolinas (1)

**Site Impacts**

This association has low non-native plant cover (average 1.1%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Myosotis latifolia*.

**Classification Comments**

None.

**References:** Evens and Kentner 2006, Fiedler and Leidy 1987, Jimerson et al. 1996, Klein et al. 2015

**Global Rarity Rank:** G3

**State Rarity Rank:** S3

**State Rare:** Y

**Surveys Used for Description**

**Total: N=12; Marin County (n=12):** MMWD0097, MMWD0371, MMWD0419, MOSD0099, MOSD0139, PGA1240, PGA1464, PGA3691, PGA3723, PGA6939, PORE081, PORE180

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Notholithocarpus densiflorus</i>	92	35.2	13.7	5.0	40.0	X		X	X
	<i>Umbellularia californica</i>	83	53.5	23.8	10.0	60.0	X	X		X
	<i>Pseudotsuga menziesii</i>	42	5.3	1.4	0.2	5.0				
	<i>Quercus agrifolia</i>	33	2.5	1.0	0.2	9.0				
	<i>Pinus muricata</i>	25	3.1	1.5	0.2	15.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Notholithocarpus densiflorus*</i>	33	20.9	2.5	3.2	15.2				
	<i>Umbellularia californica*</i>	25	17.2	5.2	5.2	37.0				
<b>Shrub</b>										
	<i>Rubus ursinus</i>	58	12.1	4.0	0.2	20.0				X
	<i>Toxicodendron diversilobum</i>	50	4.7	0.4	0.2	4.0				X
	<i>Corylus cornuta</i>	42	16.6	2.3	0.2	15.0				
	<i>Vaccinium ovatum</i>	42	13.9	2.1	0.2	18.2				
	<i>Lonicera hispidula</i>	33	4.7	0.2	0.2	1.2				
	<i>Ceanothus thyrsiflorus</i>	25	6.4	4.6	0.4	45.0				
	<i>Frangula californica</i>	25	6.1	4.0	0.4	30.0				
	<i>Heteromeles arbutifolia</i>	25	6.8	0.8	1.2	5.4				
	<i>Symphoricarpos mollis</i>	25	2.7	0.3	0.2	3.0				
	<i>Diplacus aurantiacus</i>	25	1.6	0.2	0.2	2.0				
	<i>Rubus parviflorus</i>	25	1.8	0.2	0.2	2.0				
<b>Herb</b>										
	<i>Polystichum munitum</i>	92	42.8	6.6	0.2	24.0	X		X	X
	<i>Pteridium aquilinum</i>	75	20.4	6.7	0.2	35.0	X			X
	<i>Stachys ajugoides</i>	58	2.3	0.6	0.2	4.0				X
	<i>Myosotis latifolia</i>	33	1.8	0.9	0.2	10.0				
	<i>Calystegia purpurata</i>	25	12.1	6.9	10.0	55.0				
	<i>Iris douglasiana</i>	25	1.8	0.1	0.2	0.2				

## *Umbellularia californica* – *Quercus agrifolia* / *Toxicodendron diversilobum* Association

**Common Name:** California Bay – Coast Live Oak / Poison Oak

**Alliance:** *Umbellularia californica* Forest & Woodland Alliance

### Local Vegetation Description

The California Bay – Coast Live Oak / Poison Oak Association forms an open to continuous tree canopy with a sparse to continuous shrub understory. The dominant tree is *Umbellularia californica*, with *Quercus agrifolia* co-dominant. *Aesculus californica* and *Pseudotsuga menziesii* may also be present. Commonly associated shrubs include *Toxicodendron diversilobum*, and commonly associated herbs include *Polystichum munitum* and *Stachys ajugoides*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	1.1	0 – 15	22.8	2 – 50
Hardwood	50.3	12 – 85	12.8	2 – 35
Regenerating or Shrubby Tree	0.8	0 – 16.2	5.0	1 – 10
Shrub	17.3	0 – 70	2.5	0 – 10
Herb	26.1	0 – 85	0.5	0 – 2

### Local Environmental Description

**Elevation:** Mean 148 m, Range 7 – 621 m

**Aspect:** SE (20), NW (11), NE (7), SE (7), Variable (4)

**Slope:** Mean 23 degrees, Range 2 – 45 degrees

**Macro Topography:** Middle 1/3 of slope (14), Upper 1/3 of slope (12), Lower 1/3 of slope (11), Bottom (4)

**Large Rock:** Mean 1.2%, Range 0 – 15%

**Small Rock:** Mean 7.5%, Range 0 – 75%

**Fines Cover:** Mean 11.3%, Range 0.2 – 54%

**Litter Cover:** Mean 69.8%, Range 2 – 100%

**Soil Texture (field assessed):** Moderately fine sandy clay loam (9), Medium to very fine, sandy loam (8), Moderately fine silty clay loam (7), Fine clay (3), Moderately fine clay loam (7), Medium loam (2), Coarse, loamy sand (2), Fine silty clay (2), Medium silt (1), Moderately coarse, sandy loam (1)

**Geology (field or map data):** Franciscan melange (30), Sandstone and other sedimentary (30), Alluvium (5), Granitic (3), Blueschist and semi-schist (2), Shale (2), Volcanic and metavolcanic rocks (2), Large landslides (1), Mixed sedimentary (1), Sandstone, shale, and conglomerate (1), Volcanic flow rocks (1)

**Marin County Watersheds:** Lagunitas Creek (26), Novato (17), San Rafael (15), Bolinas (12), Walker Creek (4), Inverness (2), Petaluma River (2)

### Site Impacts

This association has low non-native plant cover (average 7.8%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Briza maxima* and *Carduus pycnocephalus*.

### Classification Comments

This association newly merges the pre-existing associations of *Umbellularia californica* – *Quercus agrifolia* / *Toxicodendron diversilobum* (*Corylus cornuta*) (Keeler-Wolf et al. 2003a) and *Umbellularia californica* – *Quercus agrifolia* (Evens and Kentner 2006).

References: Evens and Kentner 2006, Keeler-Wolf et al. 2003a, Klein et al. 2015

Global Rarity Rank: GNR

State Rarity Rank: SNR

State Rare: Y

**Surveys Used for Description**

**Total: N=87; Marin County (n=87):** GGNRA287, GGNRA290, GGNRA298, HYPM003, HYPM006, HYPM010, HYPM011, HYPM047, MMWD0069, MMWD0102, MMWD0113A, MMWD0123A, MMWD0126, MMWD0174, MMWD0189, MMWD0333A, MMWD0334, MMWD0336A, MMWD0350, MMWD0379, MMWD0380, MMWD0388, MOSD0012, MOSD0014, MOSD0157, MOSD0167, MOSD0169,k MOSD0183, MOSD0188, MOSD0203, MOSD0213, MOSD0222, MOSD0224, MOSD0225, MOSD0230, MOSD0232, MOSD0235, MOSD0255, MOSD0261, MOSD0296, MOSD0319, MOSD0333, MOSD0354, PGA1143, PGA1149, PGA1154, PGA1159, PGA1164, PGA1171, PGA1172A, PGA1176, PGA1180, PGA1192, PGA1204, PGA1207, PGA1208, PGA1214, PGA1217, PGA1224, PGA1259, PGA1327, PGA1567, PGA1571, PGA3118, PGA3827, PGA4312, PGA5113, PGA5643, PGA7773, PGA7868, PGA8439, PGA8732, PGA8856, PGA9448, PGA9503, PGA9616, PORE033, PORE034, PORE100, PORE133, PORE147, PORE174, PORE203, SFANO03, SFANO05, SFANO06, SFANO07

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Umbellularia californica</i>	100	61.0	36.0	5.0	99.3	X	X		X
	<i>Quercus agrifolia</i>	92	30.4	16.8	0.2	56.9	X		X	X
	<i>Aesculus californica</i>	30	3.4	1.5	0.2	20.0				
	<i>Pseudotsuga menziesii</i>	24	1.4	0.9	0.2	10.0				
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	82	23.4	5.1	0.2	55.0	X			X
	<i>Corylus cornuta</i>	45	17.6	6.2	0.2	50.0				
	<i>Rubus ursinus</i>	44	11.4	5.2	0.2	37.5				
	<i>Lonicera hispidula</i>	40	5.5	0.8	0.2	12.5				
	<i>Diplacus aurantiacus</i>	25	4.9	0.5	0.2	10.0				
	<i>Baccharis pilularis</i>	23	3.7	1.0	0.2	13.2				
	<i>Frangula californica</i>	21	2.5	1.0	0.2	20.0				
<b>Herb</b>										
	<i>Polystichum munitum</i>	48	23.4	6.5	0.2	80.0				
	<i>Stachys ajugoides</i>	48	3.6	0.5	0.2	10.0				
	<i>Carduus pycnocephalus</i>	25	2.0	0.2	0.2	3.0				
	<i>Clinopodium douglasii</i>	24	3.6	0.9	0.2	12.0				
	<i>Iris douglasiana</i>	24	3.8	0.4	0.2	10.0				
	<i>Dryopteris arguta</i>	23	2.7	0.7	0.2	8.0				
	<i>Galium spp.</i>	22	1.4	0.1	0.2	1.0				
	<i>Elymus glaucus</i>	21	1.2	0.2	0.2	4.0				

## ***Umbellularia californica* – *Quercus wislizeni* Association**

**Common Name:** California Bay – Interior Live Oak Woodland

**Alliance:** *Umbellularia californica* Forest & Woodland Alliance

### **Local Vegetation Description**

The California Bay – Interior Live Oak Association forms an open to continuous tree canopy with a sparse to intermittent shrub understory. The dominant tree is *Umbellularia californica*, and those that are characteristic or often present include *Pseudotsuga menziesii* and *Quercus wislizeni*. Regenerating or shrubby trees that are often present include *Quercus wislizeni*. Commonly associated shrubs include *Toxicodendron diversilobum*, *Diplacus aurantiacus* and *Heteromeles arbutifolia*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	1.5	0 – 6	no	no data
Hardwood	44.3	9 – 78	10.5	2 – 20
Regenerating or Shrubby Tree	9.0	0 – 30.0	5.5	2 – 10
Shrub	15.1	0.0 – 35.0	2.5	1 – 5
Herb	12.0	0 – 65	0.5	0 – 1

### **Local Environmental Description**

**Elevation:** Mean 407 m, Range 196 – 705 m

**Aspect:** SE (4), NE (2), NW (1)

**Slope:** Mean 25 degrees, Range 3 – 40 degrees

**Macro Topography:** Middle 1/3 of slope (3), Upper 1/3 of slope (2), Ridge top (1)

**Large Rock:** Mean 11.0%, Range 0.0 – 65.0%

**Small Rock:** Mean 20.0%, Range 0.2 – 65.0%

**Fines Cover:** Mean 6.7%, Range 0.2 – 35.0%

**Litter Cover:** Mean 52.9%, Range 8.0 – 98%

**Soil Texture (field assessed):** Moderately fine clay loam (3), Moderately fine sandy clay loam (2), Coarse, loamy sand (1)

**Geology (field or map data):** Franciscan melange (6), Sandstone and other sedimentary (3), Ultramafic rocks, mostly serpentine (1)

**Marin County Watersheds:** Bolinas (4), Lagunitas Creek (4), San Rafael (2)

### **Site Impacts**

This association has sparse non-native plant cover (average 0.1%) relative to native cover.

### **Classification Comments**

Due to hybridization and morphological similarity between the species, plants identified as *Quercus wislizeni* are likely *Quercus parvula*, which has been found to be the most widespread genotype in Marin County (Dodd and Afzul-Rafii 2004, Hauser et al. 2017).

**References:** Buck and Evens 2010, Klein et al. 2007

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

### **Surveys Used for Description**

**Total: N=11; Marin County (n=11):** GGNRA253, MMWD0173A, MMWD0313A, MMWD0345A, MMWD0361A, MOSD0034, MOSD0147, PGA1552, PGA1580, PGA1601, PGA1606A

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Umbellularia californica</i>	100	67.3	25.7	6.2	70.0	X	X		X
	<i>Quercus wislizeni</i>	64	20.5	7.7	2.0	27.0				X
	<i>Pseudotsuga menziesii</i>	64	6.4	1.8	0.2	10.0				X
	<i>Arbutus menziesii</i>	27	2.3	0.7	0.2	5.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Quercus wislizeni</i> *	64	45.1	8.1	0.2	30.0				X
	<i>Pseudotsuga menziesii</i> *	45	23.8	0.5	0.2	2.0				
	<i>Umbellularia californica</i> *	27	5.6	0.1	0.2	0.2				
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	91	26.3	3.2	0.2	18.0	X			X
	<i>Diplacus aurantiacus</i>	64	19.3	3.7	0.2	20.0				X
	<i>Heteromeles arbutifolia</i>	55	8.6	2.1	0.2	20.0				X
	<i>Adenostoma fasciculatum</i>	36	4.9	1.3	0.2	10.0				
	<i>Frangula californica</i>	36	7.4	1.3	1.0	5.0				
	<i>Lonicera hispidula</i>	36	5.9	0.1	0.2	0.2				
	<i>Arctostaphylos glandulosa</i>	27	7.3	1.7	0.4	15.0				
	<i>Baccharis pilularis</i>	27	0.4	0.1	0.2	0.2				
	<i>Lepechinia calycina</i>	27	1.3	0.1	0.2	0.2				
<b>Herb</b>										
	<i>Pteridium aquilinum</i>	36	16.8	1.0	0.2	10.0				
	<i>Polystichum munitum</i>	36	5.7	0.2	0.2	2.0				
	<i>Zigadenus fremontii</i>	27	3.2	0.1	0.2	1.0				
	<i>Pentagramma triangularis</i>	27	3.0	0.1	0.2	0.2				

## ***Umbellularia californica* / *Polystichum munitum* Association**

**Common Name:** California Laurel / Western Swordfern Forest Woodland

**Alliance:** *Umbellularia californica* Forest & Woodland Alliance

### **Local Vegetation Description**

The California Laurel / Western Swordfern Forest Association forms an open to continuous tree canopy with an open to intermittent shrub understory. The dominant tree is *Umbellularia californica*. Commonly associated shrubs include *Corylus cornuta*, *Rubus ursinus*, and *Toxicodendron diversilobum*, and commonly associated herbs include *Polystichum munitum* and *Stachys ajugoides*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	2.2	0 – 15	22.8	2 – 50
Hardwood	53.2	12 – 95	12.3	2 – 35
Regenerating or Shrubby Tree	2.1	0 – 35.0	10.7	2 – 35
Shrub	20.4	1.0 – 65.0	2.3	0 – 5
Herb	28.4	1 – 75	0.3	0 – 1

### **Local Environmental Description**

**Elevation:** Mean 167 m, Range 16 – 421 m

**Aspect:** NW (8), NE (5), SE (2), Variable (2), SW (1), Flat (1)

**Slope:** Mean 24 degrees, Range 0 – 45 degrees

**Macro Topography:** Middle 1/3 of slope (6), Upper 1/3 of slope (6), Lower 1/3 of slope (3), Entire slope (1), Draw (1), Bottom (1), Ridge top (1)

**Large Rock:** Mean 0.1%, Range 0 – 0.4%

**Small Rock:** Mean 4.5%, Range 0 – 26%

**Fines Cover:** Mean 13.1%, Range 1 – 31%

**Litter Cover:** Mean 73.2%, Range 20 – 95%

**Soil Texture (field assessed):** Moderately coarse, sandy loam (5), Moderately fine clay loam (3), Medium loam (3), Moderately fine sandy clay loam (3), Medium to very fine, sandy loam (2), Medium silt loam (1), Fine sandy clay (1), Fine clay (1)

**Geology (field or map data):** Franciscan melange (14), Sandstone and other sedimentary (12), Granitic (6), Granitic (generic) (4), Shale (1), Volcanic and metavolcanic rocks (1)

**Marin County Watersheds:** Lagunitas Creek (21), Inverness (7), Bolinas (5), Point Reyes (3), Novato (1), Walker Creek (1)

### **Site Impacts**

This association has low non-native plant cover (average 1.8%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Erechtites minimus*.

### **Classification Comments**

None.

**References:** Buck and Evens 2010, Evens and Kentner 2006, Keeler-Wolf et al. 2003a, Klein et al. 2015

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y



**Surveys Used for Description**

**Total: N=40; Marin County (n=40):** GGNRA279, MARINSP01, MARINSP04, MARINSP07, MARINSP13, MMWD0243, MMWD0261A, MOSD0103, MOSD0140, MOSD0141, MOSD0151, MOSD0351, PGA1065, PGA1122, PGA1148, PGA1173, PGA1182, PGA1225, PGA1226, PGA1235, PGA1248, PGA1271, PGA1278, PGA1373, PGA1615, PGA1674, PGA2510-1, PGA2705, PGA3728, PGA5057, PGA5536, PGA7336, PGA9569, PORE062, PORE087, PORE096, PORE121, PORE144, PORE162, PORE166

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Umbellularia californica</i>	100	88.7	53.7	2.0	95.0	X	X		X
	<i>Pseudotsuga menziesii</i>	35	4.8	2.6	0.2	25.0				
	<i>Notholithocarpus densiflorus</i>	28	2.1	1.4	1.0	25.0				
	<i>Quercus agrifolia</i>	23	0.8	0.5	0.2	5.0				
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	73	35.5	6.8	0.2	40.4				X
	<i>Rubus ursinus</i>	70	21.5	4.8	0.2	25.0				X
	<i>Corylus cornuta</i>	53	14.3	2.3	0.2	20.0				X
	<i>Rubus parviflorus</i>	30	3.9	1.3	0.2	25.0				
	<i>Sambucus racemosa</i>	23	6.8	1.9	0.2	35.0				
	<i>Lonicera hispidula</i>	23	2.0	0.1	0.2	1.0				
<b>Herb</b>										
	<i>Polystichum munitum</i>	100	66.4	25.2	2.0	80.0	X	X		X
	<i>Stachys ajugoides</i>	50	2.2	1.2	0.2	10.0				X
	<i>Pteridium aquilinum</i>	43	3.4	1.0	0.2	10.0				
	<i>Dryopteris arguta</i>	40	5.9	2.2	0.2	20.0				
	<i>Galium</i> spp.	33	0.4	0.1	0.2	1.0				
	<i>Erechtites minimus</i>	28	0.6	0.6	0.2	20.0				
	<i>Marah fabaceus</i>	25	1.5	0.6	0.2	10.4				

## SHRUB-OVERSTORY VEGETATION

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### *Acacia* spp. – *Grevillea* spp. – *Leptospermum laevigatum* Shrubland Provisional Semi-Natural Alliance

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**Common Name:** Australian wattle – Grevillea – Tea tree ruderal patches

**NVC Alliance Code:** N/A

#### **Statewide Description**

*Acacia* species are in the family Fabaceae and known for their yellow flowers and dissected leaves. Various shrubs are non-natives from Australia that thrive in coastal ranges and transverse ranges of California. Flowers of *Acacia* spp. can be pollinated by beetles, bees and wasps. Its seeds, spread by ants, birds, wind, water, or waste, can be long-lived and germinate after fire or other disturbance.

*Leptospermum laevigatum* belongs to the family Myrtaceae and is native to southeastern Australia. This small tree has white flowers and narrow leaves and grows in sand dunes in the San Francisco Bay and central and south coast ranges of California. Its seeds are spread via wind, vehicles, soil movement, water and dumped garden waste (CAL-IPC 2017).

*Grevillea* species are evergreen trees and shrubs distributed in central and southern coastal California (Calflora 2017). They are native to Australia and naturalized in California along with tropical and subtropical regions of the world (CAL-IPC 2017). They are prolific seeders with light weight seeds dispersed by wind. They can also spread via root suckers.

Stands of *Acacia* spp., *Albizia lophantha*, *Leptospermum laevigatum*, *Grevillea* spp. or related shrubs to small trees occur sporadically in California, particularly along the coast and in the Coast Ranges. They are often near development or from horticultural plantings, where these plants have escaped and are sometimes naturally reproducing in the wild along coastal hills.

### Local Vegetation Description

The Australian wattle - Grevillea - Tea tree ruderal Alliance forms a continuous shrub to small tree layer. The emergent tree layer is typically sparse, and the herbaceous layer is sparse to open. Dominant and characteristic tall shrubs or low trees include *Albizia lophantha*, *Acacia dealbata*, *Acacia longifolia*, *Acacia retinoides*, or other *Acacia* spp., and/or *Leptospermum laevigatum*. Commonly associated emergent trees at sparse cover include *Hesperocyparis macrocarpa*, *Notholithocarpus densiflorus*, and *Pinus radiata*. Herbs that are often present include *Marah fabaceus*, and herbs that are sometimes present include *Achillea millefolium*, *Anagallis arvensis*, *Cardamine oligosperma*, *Carduus pycnocephalus*, *Carpobrotus edulis*, *Claytonia perfoliata*, *Conium maculatum*, *Daucus pusillus*, *Dipsacus* spp., *Fragaria chiloensis*, *Galium aparine*, *Hirschfeldia incana*, *Melilotus* spp., *Myosotis latifolia*, *Pseudognaphalium* spp., *Pteridium aquilinum*, *Sanicula crassicaulis*, *Sonchus asper*, *Stellaria media*, and *Torilis arvensis*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.6	0.2 – 1	27.5	20 – 35
Hardwood	0.1	0 – 0.2	12.5	10 – 15
Regenerating or Shrubby Tree	0.1	0 – 0.2	2.1	0.5 – 5
Shrub	83	80 – 89	2.6	0.5– 5
Herb	0.5	0.2 – 1	0.3	0 –0.5

### Local Membership Rule

A non-native *Acacia* spp., *Albizia lophantha*, *Grevillea* spp., and/or *Leptospermum laevigatum* dominates or co-dominates together in the shrub or low tree canopy. If *Acacia melanoxylon* is dominant, key to the *Eucalyptus* spp. – *Ailanthus altissima* – *Robinia pseudoacacia* Woodland Semi-Natural Alliance.

### Local Environmental Description

**Elevation:** Mean 197 m, Range 59 – 470 m

**Aspect:** Flat (1), SW (1), Variable (1)

**Slope:** Mean 12 degrees, Range 0 – 30 degrees

**Macro Topography:** Lower 1/3 of slope (1),  
Ridge top (1), Upper 1/3 of slope (1)

**Large Rock:** Mean 0.0%, Range 0.0 – 0.0%

**Small Rock:** Mean 0.1%, Range 0.0 – 0.2%

**Fines Cover:** Mean 27.7%, Range 0.0 – 68%

**Litter Cover:** Mean 69.0%, Range 30 – 95%

**Soil Texture (field assessed):** Coarse, loamy sand (1), Medium sand (1), Sand, (class unknown) (1)

**Geology (field or map data):** Sand dunes (1), Sandstone (1), Shale and other sedimentary (1)

**Marin County Watersheds:** none

**Other Watersheds, San Mateo Co.:** San Francisco Coastal (2), Half Moon Bay (1)

### Site Impacts

This alliance has greater cover of exotics than natives, with very high non-native plant cover (averages 97.5%) relative to native cover. Non-native species with highest frequency and abundance include *Albizia lophantha*, *Anagallis arvensis*, *Carduus pycnocephalus*, *Carpobrotus edulis*, *Conium maculatum*, *Hirschfeldia incana*, *Ilex aquifolium*, *Leptospermum laevigatum*, *Myosotis latifolia*, *Sonchus asper*, *Stellaria media*, and *Torilis arvensis*.

### Associations in Marin County

*Acacia (cyclops, dealbata)\**

### Classification Comments

Though no samples were surveyed in Marin County, this alliance is known from nearby counties and has been mapped here. This alliance is newly described here.

**References:** none

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

### Surveys Used for Description

*Acacia* spp. – *Grevillea* spp. – *Leptospermum laevigatum* Shrubland Provisional Semi-Natural Alliance

**Total: N=3; Marin County (n=0):**

San Mateo County (n=2): SMAT0053, SMAT0218 San Francisco County (n=1): SMAT0229

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Pinus radiata</i>	33	30.3	0.7	2.0	2.0				
	<i>Hesperocyparis macrocarpa</i>	33	33.3	0.3	1.0	1.0				
	<i>Notholithocarpus densiflorus</i>	33	3.0	0.1	0.2	0.2				
<b>Regenerating or Shrubby Trees</b>										
	<i>Hesperocyparis macrocarpa</i> *	33	33.3	0.1	0.2	0.2				
<b>Shrub</b>										
	<b>Acacia spp.</b>	<b>67</b>	<b>37.3</b>	<b>32.7</b>	<b>10.0</b>	<b>88.2</b>				<b>X</b>
	<i>Albizia lophantha</i>	67	33.3	26.7	0.2	80.0				<b>X</b>
	<b>Leptospermum laevigatum</b>	<b>33</b>	<b>29.0</b>	<b>23.3</b>	<b>70.0</b>	<b>70.0</b>				
	<i>Toxicodendron diversilobum</i>	33	0.1	0.1	0.2	0.2				
	<i>Sambucus racemosa</i>	33	0.1	0.1	0.2	0.2				
	<i>Rubus ursinus</i>	33	0.1	0.1	0.2	0.2				
	<i>Ilex aquifolium</i>	33	0.1	0.1	0.2	0.2				
	<i>Baccharis pilularis</i>	33	0.1	0.1	0.2	0.2				
<b>Herb</b>										
	<i>Marah fabaceus</i>	67	6.4	0.1	0.2	0.2				<b>X</b>
	<i>Fragaria chiloensis</i>	33	3.3	0.1	0.2	0.2				
	<i>Anagallis arvensis</i>	33	3.3	0.1	0.2	0.2				
	<i>Achillea millefolium</i>	33	3.3	0.1	0.2	0.2				
	<i>Carpobrotus edulis</i>	33	16.7	0.1	0.2	0.2				
	<i>Claytonia perfoliata</i>	33	3.0	0.1	0.2	0.2				
	<i>Carduus pycnocephalus</i>	33	3.0	0.1	0.2	0.2				
	<i>Galium aparine</i>	33	3.0	0.1	0.2	0.2				
	<i>Conium maculatum</i>	33	3.0	0.1	0.2	0.2				
	<i>Daucus pusillus</i>	33	3.3	0.1	0.2	0.2				
	<i>Dipsacus</i> spp.	33	3.0	0.1	0.2	0.2				
	<i>Stellaria media</i>	33	3.0	0.1	0.2	0.2				
	<i>Melilotus</i> spp.	33	3.3	0.1	0.2	0.2				
	<i>Hirschfeldia incana</i>	33	3.3	0.1	0.2	0.2				
	<i>Torilis arvensis</i>	33	3.3	0.1	0.2	0.2				
	<i>Sonchus asper</i>	33	3.3	0.1	0.2	0.2				
	<i>Sanicula crassicaulis</i>	33	3.0	0.1	0.2	0.2				
	<i>Pteridium aquilinum</i>	33	3.3	0.1	0.2	0.2				
	<i>Pseudognaphalium</i> spp.	33	16.7	0.1	0.2	0.2				
	unknown Poaceae	33	3.0	0.1	0.2	0.2				
	<i>Myosotis latifolia</i>	33	3.0	0.1	0.2	0.2				
	<i>Cardamine oligosperma</i>	33	3.0	0.1	0.2	0.2				

## ***Acacia (cyclops, dealbata) Provisional Semi-natural Association***

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**Common Name:** Acacia Ruderal Shrubland

**Alliance:** *Acacia* spp. – *Grevillea* spp. – *Leptospermum laevigatum* Provisional Semi-Natural Alliance

### **Local Vegetation Description**

The Acacia Ruderal Shrubland Association forms a continuous shrub layer in the single sample available. The emergent tree layer is typically sparse to open, and the herbaceous layer is sparse. Dominant and characteristic shrubs include *Acacia dealbata*, and those that are present include *Ilex aquifolium* and *Rubus ursinus*. Herbs that present include *Cardamine oligosperma*, *Carduus pycnocephalus*, *Claytonia perfoliata*, *Conium maculatum*, *Dipsacus* sp., *Galium aparine*, *Marah fabaceus*, *Myosotis latifolia*, *Sanicula crassicaulis*, and *Stellaria media*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	2.0	NA	27.5	20 – 35
Hardwood	0.2	NA	12.5	10 – 15
Regenerating or Shrubby Tree	0.0	NA	no data	
Shrub	88.0	NA	0.8	0.5 – 1
Herb	1.0	NA	0.3	0 – 0.5

### **Local Environmental Description**

**Elevation:** 470 m

**Aspect:** Flat (1)

**Slope:** 0 degrees

**Macro Topography:** Ridge top (1)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** 0.0%

**Litter Cover:** 95%

**Soil Texture (field assessed):** Coarse, loamy sand (1)

**Geology (field or map data):** Shale and other sedimentary (1)

**Marin County Watersheds:** none

**Other Watersheds, San Mateo Co.:** Half Moon Bay (1)

### **Site Impacts**

This association has greater cover of exotics (average 96.1%) than natives. Non-native species that occur with highest frequency and abundance include *Acacia dealbata*, *Carduus pycnocephalus*, *Conium maculatum*, *Dipsacus* sp., *Ilex aquifolium*, *Myosotis latifolia*, *Pinus radiata*, and *Stellaria media*.

### **Classification Comments**

Though no samples were surveyed in Marin County, this association is known from nearby counties and appears to occur here based on observations. This association is considered provisional since it is under-sampled in its expected range.

**References:** Buck-Diaz and Evens 2015, Verdone and Evens, 2010

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

**State Rare:** N

### Surveys Used for Description

Total: N=1; Marin County (n=0):

San Mateo County (n=1): SMAT0053

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Pinus radiata</i>	100	90.9	2.0	2.0	2.0	X	X		X
	<i>Notholithocarpus densiflorus</i>	100	9.1	0.2	0.2	0.2	X			X
<b>Shrub</b>										
	<b>Acacia spp.</b>	<b>100</b>	<b>99.5</b>	<b>88.2</b>	<b>88.2</b>	<b>88.2</b>	X	X		X
	<i>Ilex aquifolium</i>	100	0.2	0.2	0.2	0.2	X			X
	<i>Rubus ursinus</i>	100	0.2	0.2	0.2	0.2	X			X
<b>Herb</b>										
	<i>Cardamine oligosperma</i>	100	9.1	0.2	0.2	0.2	X			X
	<i>Carduus pycnocephalus</i>	100	9.1	0.2	0.2	0.2	X			X
	<i>Claytonia perfoliata</i>	100	9.1	0.2	0.2	0.2	X			X
	<i>Conium maculatum</i>	100	9.1	0.2	0.2	0.2	X			X
	<i>Dipsacus</i> spp.	100	9.1	0.2	0.2	0.2	X			X
	<i>Galium aparine</i>	100	9.1	0.2	0.2	0.2	X			X
	<i>Marah fabaceus</i>	100	9.1	0.2	0.2	0.2	X			X
	<i>Myosotis latifolia</i>	100	9.1	0.2	0.2	0.2	X			X
	<i>Sanicula crassicaulis</i>	100	9.1	0.2	0.2	0.2	X			X
	<i>Stellaria media</i>	100	9.1	0.2	0.2	0.2	X			X
	unknown Poaceae	100	9.1	0.2	0.2	0.2	X			X



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## ***Adenostoma fasciculatum* Shrubland Alliance**

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**Common Name:** Chamise chaparral

**NVC Alliance Code:** A3868. *Adenostoma fasciculatum* Chaparral Alliance

### **Statewide Description**

*Adenostoma fasciculatum* is dominant in the shrub canopy with *Adenostoma sparsifolium*, *Arctostaphylos glandulosa*, *Arctostaphylos manzanita*, *Arctostaphylos viscida*, *Ceanothus* spp., *Diplacus aurantiacus*, *Eriodictyon californicum*, *Eriogonum fasciculatum*, *Hesperoyucca whipplei*, *Heteromeles arbutifolia*, *Quercus berberidifolia*, *Quercus wislizeni*, *Salvia apiana*, *Salvia leucophylla*, *Salvia mellifera*, and *Toxicodendron diversilobum*. Emergent trees may be present at low cover.

This alliance occurs across cismontane California in a variety of topographic settings from coastal bluffs to steep, lower montane slopes. In stands older than 60 years of age, little new growth is produced as dead stem biomass increases. In earlier treatments, several chaparral series were assigned to mixed alliances other than *Adenostoma fasciculatum* when other shrubs were co-dominant (Sawyer and Keeler-Wolf 1995). Following extensive review and the analysis of many more plots, most mixed stands where another indicator species is either strongly dominant or co-dominant with *A. fasciculatum* were treated as part of other alliances, such as the *Quercus durata* Alliance, with the exception of the *Adenostoma fasciculatum* – *Salvia* spp. Alliance.

### **Local Vegetation Description**

The Chamise chaparral Alliance forms an open to continuous shrub layer. The emergent tree layer is typically sparse to 12.0, and the herbaceous layer is sparse to intermittent. Dominant and characteristic shrubs include *Adenostoma fasciculatum*, and those that are often present include *Diplacus aurantiacus* and *Heteromeles arbutifolia*. Commonly associated emergent trees at sparse cover include *Quercus*

*agrifolia*. The herbs that are sometimes present include *Aira caryophyllea*, *Chlorogalum pomeridianum*, and *Pentagramma triangularis*. Commonly associated non-vascular plants include Lichen.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.7	0 – 9	12.5	5 – 20
Hardwood	1.9	0 – 10	6.9	2 – 20
Regenerating or Shrubby Tree	0.9	0 – 15.0	3.2	1 – 5
Shrub	68.4	12.0 – 97.0	1.6	0 – 5
Herb	6.4	0 – 40	0.3	0 – 1

### **Local Membership Rule**

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

### **Local Environmental Description**

**Elevation:** Mean 305 m, Range 99 – 651 m

Lower 1/3 of slope (3), Middle to Upper 1/3 of slope (1)

**Aspect:** SE (24), SW (11), Variable (3), Flat (1), NE (1)

**Slope:** Mean 26 degrees, Range 0 – 48 degrees

**Large Rock:** Mean 2.2%, Range 0.0 – 12.0%

**Small Rock:** Mean 24.0%, Range 0.2 – 98%

**Fines Cover:** Mean 35.9%, Range 4.0 – 86%

**Litter Cover:** Mean 37.9%, Range 1.0 – 90%

**Macro Topography:** Upper 1/3 of slope (21), Middle 1/3 of slope (10), Ridge top (4),

**Soil Texture (field assessed):** Moderately fine clay loam (10), Medium to very fine, sandy loam (7), Moderately fine sandy clay loam (6), Moderately coarse, sandy loam (5), Coarse, loamy sand (4), Medium to very fine, loamy sand (4), Moderately fine silty clay loam (1), Unknown (1), Medium silt loam (1), Medium loam (1)

**Geology (field or map data):** Franciscan melange (22), Sandstone and other sedimentary (11), Serpentine (3), Volcanic and metavolcanic rocks (3), Blueschist and semi-schist (2), Sandstone (1), Shale (1)

**Marin County Watersheds:** San Rafael (17), Bolinas (9), Novato (9), Lagunitas Creek (7)

### **Site Impacts**

This alliance has low non-native plant cover (average 4.3%) relative to native cover. Non-native species with highest frequency and abundance include *Aira caryophyllea*.

### **Associations in Marin County**

*Adenostoma fasciculatum*

*Adenostoma fasciculatum* – (*Arctostaphylos glandulosa* – *Ceanothus jepsonii*)

*Adenostoma fasciculatum* – *Diplacus aurantiacus*

### **Classification Comments**

None.

**References:** AECOM 2013, Borchert et al. 2004, Buck-Diaz and Evens 2011b, Buck-Diaz et al. 2012, Evens and Kentner 2006, Evens and San 2004, Evens and San 2005, Evens et al. 2004, Evens et al. 2006, Keeler-Wolf and Evens 2006, Keeler-Wolf et al. 2003a, Keeler-Wolf et al. 2003b, Kittel et al. 2012, Klein and Evens 2005, Klein et al. 2007, Klein et al. 2015, Reyes et al. 2020

**Global Rarity Rank:** G5

**State Rarity Rank:** S5



**Surveys Used for Description**

**Total: N=47; Marin County (n=47):** GGNRA255, GGNRA267, MARIN092, MARIN118, MARINSP16, MMWD0002, MMWD0110, MMWD0166, MMWD0193, MMWD0221, MMWD0227, MMWD0269, MMWD0276, MMWD0330, MMWD0331, MMWD0346, MMWD0348, MOSD0008, MOSD0010, MOSD0030, MOSD0042, MOSD0043, MOSD0073, MOSD0074, MOSD0077, MOSD0079, MOSD0087, MOSD0094, MOSD0117, MOSD0177, MOSD0180, MOSD0184, MOSD0219, MOSD0227, MOSD0229, MOSD0234, MOSD0244, MOSD0249, PGA1339, PGA1352, PGA1353, PGA1358, PGA1643, PGA651, PGA652, PORE130, PORE186

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Quercus agrifolia</i>	23	15.2	0.4	0.2	4.0				
<b>Shrub</b>										
	<i>Adenostoma fasciculatum</i>	100	77.4	55.2	8.0	100.0	X	X		X
	<i>Diplacus aurantiacus</i>	74	6.4	3.8	0.2	20.0				X
	<i>Heteromeles arbutifolia</i>	51	1.3	0.8	0.2	8.2				X
	<i>Baccharis pilularis</i>	45	2.9	1.9	0.2	20.0				
	<i>Toxicodendron diversilobum</i>	43	1.2	0.7	0.2	7.0				
	<i>Ceanothus cuneatus</i>	40	2.4	1.8	0.2	25.0				
	<i>Lonicera hispidula</i>	28	0.4	0.2	0.2	6.0				
	<i>Arctostaphylos glandulosa</i>	23	0.8	0.5	0.2	5.0				
	<i>Artemisia californica</i>	21	2.0	1.1	0.2	15.0				
<b>Herb</b>										
	<i>Chlorogalum pomeridianum</i>	34	6.4	0.2	0.2	3.0				
	<i>Aira caryophyllea</i>	23	4.0	0.2	0.2	5.0				
	<i>Pentagramma triangularis</i>	21	1.8	0.0	0.2	0.2				
<b>Non-vascular</b>										
	Lichen	21	15.0	1.0	0.2	20.0				

## **Adenostoma fasciculatum Association**

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**Common Name:** Chamise Shrubland

**Alliance:** *Adenostoma fasciculatum* Shrubland Alliance

### **Local Vegetation Description**

The Chamise Association forms an intermittent to continuous shrub layer. The emergent tree layer is typically sparse to open, and the herbaceous layer is sparse to intermittent. Dominant and characteristic shrubs include *Adenostoma fasciculatum*, and those that are often present include *Diplacus aurantiacus*. The herbaceous layer sometimes includes *Aira caryophyllea*, *Anagallis arvensis*, *Chlorogalum pomeridianum*, and *Pentagramma triangularis*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.4	0 – 5	17.5	15 – 20
Hardwood	2.6	0 – 15	5.8	2 – 15
Regenerating or Shrubby Tree	1.2	0 – 15.0	1.5	1 – 2
Shrub	77.8	55 – 97	1.3	0.5 – 2
Herb	4.2	0.2 – 40	0.3	0 – 0.5

### **Local Environmental Description**

**Elevation:** Mean 311 m, Range 136 – 495 m

**Aspect:** SE (7), SW (3), Variable (2)

**Slope:** Mean 27 degrees, Range 8 – 48 degrees

**Macro Topography:** Upper 1/3 of slope (7), Ridge top (2), Middle 1/3 of slope (2), Lower 1/3 of slope (1)

**Large Rock:** Mean 1.3%, Range 0.0 – 5.0%

**Small Rock:** Mean 26.9%, Range 7.0 – 72.0%

**Fines Cover:** Mean 39.9%, Range 5.0 – 86.0%

**Litter Cover:** Mean 25.9%, Range 1.0 – 70%

**Soil Texture (field assessed):** Medium to very fine, loamy sand (3), Moderately fine clay loam (2), Medium to very fine, sandy loam (2), Coarse, loamy sand (2), Moderately coarse, sandy loam (1), Unknown (1), Medium loam (1)

**Geology (field or map data):** Franciscan melange (7), Sandstone and other sedimentary (3), Volcanic and metavolcanic rocks (2), Shale (1), Blueschist and semi-schist (1)

**Marin County Watersheds:** San Rafael (6), Bolinas (4), Lagunitas Creek (2), Novato (2)

### **Site Impacts**

This association has low non-native plant cover (average 4.2%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea* and *Anagallis arvensis*.

### **Classification Comments**

Due to hybridization and morphological similarity between the species, plants identified as *Quercus wislizeni* may be *Quercus parvula*, which has been found to be the most widespread genotype in Marin County (Dodd and Afzul-Rafii 2004, Hauser et al. 2017).

**References:** AECOM 2013, Borchert et al. 2004, Buck-Diaz and Evens 2011b, Buck-Diaz et al. 2012, Evens and San 2004, Evens and San 2005, Evens et al. 2004, Evens et al. 2006, Keeler-Wolf and Evens 2006, Keeler-Wolf et al. 2003b, Kittel et al. 2012, Klein and Evens 2005, Klein et al. 2007, Klein et al. 2015, Reyes et al. 2020

Global Rarity Rank: G5

State Rarity Rank: S5

State Rare: N

**Surveys Used for Description**

**Total: N=15; Marin County (n=15):** MARIN118, MMWD0002, MMWD0346, MMWD0348, MOSD0010, MOSD0030, MOSD0042, MOSD0074, MOSD0087, MOSD0180, MOSD0229, PGA1339, PGA1643, PGA652, PORE186

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Regenerating or Shrubby Trees</b>										
	<i>Quercus wislizeni</i>	27	26.7	1.1	0.2	15.0				
<b>Shrub</b>										
	<b><i>Adenostoma fasciculatum</i></b>	<b>100</b>	<b>93.8</b>	<b>71.3</b>	<b>35.0</b>	<b>95.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Diplacus aurantiacus</i>	73	1.1	0.9	0.2	3.0				<b>X</b>
	<i>Ceanothus cuneatus</i>	40	1.4	1.0	0.2	5.0				
	<i>Baccharis pilularis</i>	33	0.6	0.5	0.2	5.0				
	<i>Arctostaphylos glandulosa</i>	27	0.6	0.5	0.2	3.0				
	<i>Toxicodendron diversilobum</i>	27	0.3	0.3	0.2	2.0				
<b>Herb</b>										
	<i>Chlorogalum pomeridianum</i>	33	8.1	0.2	0.2	2.0				
	<i>Aira caryophyllea</i>	27	6.0	0.2	0.2	2.0				
	<i>Anagallis arvensis</i>	27	3.2	0.1	0.2	0.2				
	<i>Pentagramma triangularis</i>	27	2.1	0.1	0.2	0.2				
<b>Non-vasc</b>										
	Lichen	27	25.3	0.7	0.2	8.0				

## *Adenostoma fasciculatum* – *Diplacus aurantiacus* Association

**Common Name:** Chamise – Bush Monkeyflower Shrubland

**Alliance:** *Adenostoma fasciculatum* Shrubland Alliance

### Local Vegetation Description

The Chamise – Bush Monkeyflower Association forms an open to continuous shrub layer. The emergent tree layer is typically sparse to open, and the herbaceous layer is open to intermittent. Dominant and characteristic shrubs include *Adenostoma fasciculatum* and *Diplacus aurantiacus*, and those that are often present include *Baccharis pilularis*, *Heteromeles arbutifolia*, and *Toxicodendron diversilobum*. Commonly associated emergent trees at sparse cover include *Quercus agrifolia* and *Umbellularia californica*. The herbaceous layer sometimes includes *Avena* spp., *Brachypodium distachyon*, *Bromus diandrus*, *Chlorogalum pomeridianum*, *Galium porrigens*, *Lotus* spp., *Melica torreyana*, *Pentagramma triangularis*, and *Zigadenus fremontii*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.6	0 – 7	7.5	5 – 10
Hardwood	1.7	0 – 7	7.7	2 – 20
Regenerating or Shrubby Tree	0.8	0 – 5.0	3.5	2 – 5
Shrub	61.8	12 – 90	1.8	0 – 5
Herb	8.3	0.2 – 35	0.3	0 – 1

### Local Environmental Description

**Elevation:** Mean 264 m, Range 99 – 533 m

**Aspect:** SE (12), SW (7), Variable (1)

**Slope:** Mean 29 degrees, Range 15 – 45 degrees

**Macro Topography:** Upper 1/3 of slope (11), Middle 1/3 of slope (6), Lower 1/3 of slope (2)

**Large Rock:** Mean 1.8%, Range 0.0 – 12.0%

**Small Rock:** Mean 14.9%, Range 0.2 – 92.0%

**Fines Cover:** Mean 34.3%, Range 5.0 – 86.0%

**Litter Cover:** Mean 50.0%, Range 2.0 – 90%

**Soil Texture (field assessed):** Moderately fine clay loam (6), Moderately fine sandy clay loam (5), Moderately coarse, sandy loam (4), Medium to very fine, sandy loam (3), Medium to very fine, loamy sand (1), Coarse, loamy sand (1)

**Geology (field or map data):** Franciscan melange (11), Sandstone and other sedimentary (7), Blueschist and semi-schist (1), Sandstone (1), Volcanic and metavolcanic rocks (1)

**Marin County Watersheds:** San Rafael (9), Novato (7), Bolinas (2), Lagunitas Creek (2)

### Site Impacts

This association has low non-native plant cover (average 5.7%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Avena* spp., *Brachypodium distachyon*, and *Bromus diandrus*.

### Classification Comments

None.

**References:** Evens and Kentner 2006, Keeler-Wolf and Evens 2006, Keeler-Wolf et al. 2003a, Klein and Evens 2005, Klein et al. 2015

**Global Rarity Rank:** G4

**State Rarity Rank:** S4

**State Rare:** N

**Surveys Used for Description**

**Total: N=23; Marin County (n=23):** GGNRA267, MMWD0221, MMWD0227, MMWD0269, MMWD0276, MMWD0330, MMWD0331, MOSD0008, MOSD0043, MOSD0079, MOSD0094, MOSD0117, MOSD0177, MOSD0184, MOSD0219, MOSD0227, MOSD0234, MOSD0244, MOSD0249, PGA1352, PGA1358, PGA651, PORE130

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Quercus agrifolia</i>	39	26.4	0.7	0.2	4.0				
	<i>Umbellularia californica</i>	30	10.3	0.3	0.2	3.0				
<b>Shrub</b>										
	<b><i>Adenostoma fasciculatum</i></b>	<b>100</b>	<b>66.2</b>	<b>44.7</b>	<b>8.0</b>	<b>85.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<b><i>Diplacus aurantiacus</i></b>	<b>100</b>	<b>12.4</b>	<b>7.2</b>	<b>0.2</b>	<b>20.0</b>	<b>X</b>			<b>X</b>
	<i>Toxicodendron diversilobum</i>	70	2.1	1.2	0.2	7.0				<b>X</b>
	<i>Heteromeles arbutifolia</i>	65	1.1	0.7	0.2	4.0				<b>X</b>
	<i>Baccharis pilularis</i>	61	5.2	3.4	0.2	20.0				<b>X</b>
	<i>Lonicera hispidula</i>	48	0.9	0.5	0.2	6.0				
	<i>Artemisia californica</i>	39	4.1	2.2	0.2	15.0				
	<i>Ceanothus cuneatus</i>	35	1.8	1.2	0.2	10.0				
	<i>Arctostaphylos</i> spp.	26	1.1	0.8	0.2	10.0				
<b>Herb</b>										
	<i>Chlorogalum pomeridianum</i>	30	6.8	0.2	0.2	3.0				
	<i>Melica torreyana</i>	26	6.3	0.1	0.2	2.0				
	<i>Pentagramma triangularis</i>	26	2.4	0.1	0.2	0.2				
	<i>Brachypodium distachyon</i>	22	12.3	2.6	4.0	35.0				
	<i>Avena</i> spp.	22	4.0	0.5	0.2	5.0				
	<i>Bromus diandrus</i>	22	3.4	0.5	0.2	5.0				
	<i>Lotus</i> spp.	22	4.6	0.3	0.2	3.0				
	<i>Galium porrigens</i>	22	3.2	0.0	0.2	0.2				
	<i>Zigadenus fremontii</i>	22	2.6	0.0	0.2	0.2				
<b>Non-vasc</b>										
	Lichen	26	14.0	1.6	0.2	20.0				

***Adenostoma fasciculatum* – (*Arctostaphylos glandulosa* – *Ceanothus jepsonii*)  
Association**

**Common Name:** Chamise Serpentine Shrubland

**Alliance:** *Adenostoma fasciculatum* Shrubland Alliance

**Local Vegetation Description**

The Chamise Serpentine Association forms an intermittent to continuous shrub layer. The emergent tree layer is typically absent, and the herbaceous layer is sparse to open. Dominant and characteristic shrubs include *Adenostoma fasciculatum*, and those that are often present include *Arctostaphylos glandulosa*, *Arctostaphylos montana*, *Ceanothus cuneatus*, *Heteromeles arbutifolia*, and *Pickeringia montana*. The herbaceous layer often includes *Aira caryophyllea* and *Chlorogalum pomeridianum*, and herbs that are sometimes present include *Calamagrostis ophitidis*, *Iris douglasiana*, *Lotus wrangelianus*, *Madia exigua*, *Vulpia bromoides*, *Vulpia myuros*, and *Zigadenus fremontii*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	3.0	0 – 9	no data	
Hardwood	0.7	0 – 1	3.5	2 – 5
Regenerating or Shrubby Tree	0.6	0 – 2.2	no data	
Shrub	67.3	46 – 87	1.9	0.5 – 5
Herb	4.9	0.2 – 10.8	0.3	0 – 0.5

**Local Environmental Description**

**Elevation:** Mean 436 m, Range 160 – 651 m

**Aspect:** SE (4), SW (1), NE (1), Flat (1)

**Slope:** Mean 14 degrees, Range 0 – 24 degrees

**Macro Topography:** Upper 1/3 of slope (3), Ridge top (2), Middle 1/3 of slope (1), Middle to Upper 1/3 of slope (1)

**Large Rock:** Mean 4.7%, Range 1.0 – 12.0%

**Small Rock:** Mean 41.9%, Range 19.0 – 98.0%

**Fines Cover:** Mean 32.4%, Range 4.0 – 73.0%

**Litter Cover:** Mean 27.9%, Range 3.0 – 61%

**Soil Texture (field assessed):** Medium to very fine, sandy loam (2), Moderately fine clay loam (2), Moderately fine silty clay loam (1), Coarse, loamy sand (1), Moderately fine sandy clay loam (1)

**Geology (field or map data):** Franciscan melange (3), Serpentine (3), Sandstone and other sedimentary (1)

**Marin County Watersheds:** Bolinas (3), Lagunitas Creek (3), San Rafael (1)

**Site Impacts**

This association has low non-native plant cover (average 1.1%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*, *Vulpia bromoides*, and *Vulpia myuros*.

**Classification Comments**

This association was originally described as *Adenostoma fasciculatum* – *Arctostaphylos glandulosa* – *Ceanothus jepsonii* / *Calamagrostis ophitidis* in earlier Marin County classifications. Also, the association described as *Adenostoma fasciculatum* Serpentine in the inner Central Coast Ranges (Evens et al. 2006) and in Sonoma County (Klein et al. 2015) is lumped into this association concept.

**References:** Buck and Evens 2010, Evens and Kentner 2006, Evens et al. 2006, Keeler-Wolf et al. 2003a, Klein et al. 2015

**Global Rarity Rank:** G2

**State Rarity Rank:** S2?

**State Rare:** Y

**Surveys Used for Description**

**Total: N=8; Marin County (n=8):** GGNRA255, MARIN092, MARINSP16, MMWD0110, MMWD0166, MMWD0193, MOSD0073, PGA1353

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Adenostoma fasciculatum</i>	100	78.8	57.5	42.0	100.0	X	X		X
	<i>Ceanothus cuneatus</i>	63	6.2	4.9	1.0	25.0				X
	<i>Heteromeles arbutifolia</i>	63	1.9	1.5	0.2	8.2				X
	<i>Arctostaphylos glandulosa</i>	63	2.0	1.3	0.2	4.2				X
	<i>Arctostaphylos montana</i>	50	4.8	3.4	0.2	10.0				X
	<i>Pickeringia montana</i>	50	1.0	0.7	0.2	5.0				X
	<i>Ceanothus jepsonii</i>	38	1.8	1.4	2.0	6.0				
	<i>Quercus durata</i>	25	1.6	1.6	3.0	10.0				
	<i>Baccharis pilularis</i>	25	0.7	0.7	0.2	5.0				
	<i>Eriodictyon californicum</i>	25	0.8	0.7	0.2	5.0				
<b>Herb</b>										
	<i>Aira caryophyllea</i>	50	8.6	0.7	0.2	5.0				X
	<i>Chlorogalum pomeridianum</i>	50	3.3	0.2	0.2	1.0				X
	<i>Calamagrostis ophitidis</i>	38	16.4	0.4	0.2	3.0				
	<i>Madia exigua</i>	25	2.1	0.2	0.2	1.0				
	<i>Vulpia myuros</i>	25	1.7	0.2	0.2	1.0				
	<i>Zigadenus fremontii</i>	25	8.1	0.2	0.2	1.0				
	<i>Iris douglasiana</i>	25	0.5	0.1	0.2	0.2				
	<i>Lotus wrangelianus</i>	25	1.3	0.1	0.2	0.2				
	<i>Vulpia bromoides</i>	25	1.3	0.1	0.2	0.2				

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## ***Arctostaphylos (bakeri, montana)* Shrubland Alliance**

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**Common Name:** Baker and Mount Tamalpais manzanita chaparral

**NVC Alliance Code:** A3859. *Arctostaphylos nummularia* - *Arctostaphylos stanfordiana* - *Chrysolepis chrysophylla* var. *minor* North Coast Chaparral Alliance

### **Statewide Description**

*Arctostaphylos bakeri* or *A. montana* is dominant or co-dominant in the shrub canopy with *Adenostoma fasciculatum*, *Ceanothus cuneatus*, *Ceanothus jepsonii*, *Diplacus aurantiacus*, *Eriodictyon californicum*, *Frangula californica* ssp. *tomentella*, *Garrya elliptica*, *Heteromeles arbutifolia*, *Quercus durata*, and *Toxicodendron diversilobum*. Emergent trees may be present at low cover, including *Hesperocyparis sargentii*, *Pseudotsuga menziesii*, *Quercus wislizeni*, or *Umbellularia californica*.

*Arctostaphylos bakeri* and *A. montana* are serpentine endemics; they are listed as California rare plants with ranks of 1B. Both are restricted to serpentine outcrops in the lower North Coast Ranges. Stands of *Arctostaphylos bakeri* var. *laevis* and *A. bakeri* var. *bakeri* occur on serpentine outcrops in Sonoma County. Stands of *Arctostaphylos montana* ssp. *montana* and *A. montana* ssp. *ravenii* occur in Marin and San Francisco Counties, respectively, but are similar in setting and composition to *A. bakeri* stands.

### **Local Vegetation Description**

The Baker and Mount Tamalpais manzanita chaparral Alliance forms an open to continuous shrub layer. The emergent tree layer is typically sparse to open, and the herbaceous layer is sparse to intermittent. Dominant and characteristic shrubs include *Arctostaphylos montana*, *Adenostoma fasciculatum*, and those that are often present include *Heteromeles arbutifolia*. Commonly associated emergent trees at sparse cover include *Pseudotsuga menziesii* and *Umbellularia californica*. The herbs that are often present include *Calamagrostis ophitidis* and *Chlorogalum pomeridianum*, and herbs that are sometimes



present include *Aspidotis densa*, *Calochortus umbellatus*, *Elymus glaucus*, *Epilobium minutum*, *Erigeron reductus*, *Eriogonum luteolum*, *Galium porrigens*, *Iris douglasiana*, *Melica torreyana*, *Monardella purpurea*, *Navarretia* spp., *Sisyrinchium bellum*, *Vulpia microstachys* and *Zigadenus fremontii*. Commonly associated non-vascular plants include Lichen and Moss.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	1.7	0 – 8	7.0	2 – 15
Hardwood	1.7	0 – 8	5.0	1 – 10
Regenerating or Shrubby Tree	0.8	0 – 8.2	3.1	0.5 – 10
Shrub	48.5	15.0 – 90.0	1.2	0.5– 2
Herb	8.9	0.2 – 55	0.4	0 –1

### **Local Membership Rule**

*Arctostaphylos montana*, a serpentine endemic, dominates or co-dominates with *Adenostoma fasciculatum* and/or *Quercus durata* in the shrub overstory, often on upper slopes, flats and ridges. *Ceanothus jepsonii*, *Hesperocyparis sargentii*, *Heteromeles arbutifolia*, and *Calamagrostis ophitidis* are commonly present.

### **Local Environmental Description**

**Elevation:** Mean 407 m, Range 164 – 630 m

**Aspect:** SW (9), NW (7), SE (7), NE (5),  
Variable (1)

**Slope:** Mean 14 degrees, Range 2 – 31  
degrees

**Macro Topography:** Upper 1/3 of slope (12),  
Middle 1/3 of slope (10), Ridge top (3), Not  
recorded (2), Middle to Upper 1/3 of slope  
(1), Bottom (1)

**Large Rock:** Mean 8.1%, Range 0.0 – 31.0%

**Small Rock:** Mean 27.1%, Range 1.0 – 68%

**Fines Cover:** Mean 26.5%, Range 0.2 – 60%

**Litter Cover:** Mean 33.3%, Range 1.0 – 87%

**Soil Texture (field assessed):** Moderately fine sandy clay loam (6), Moderately fine clay loam (6),  
Moderately coarse, sandy loam (6), Moderately fine silty clay loam (2), Medium loam (1), Unknown  
(1), Medium to very fine, sandy loam (1), Medium silt (1), Fine silty clay (1), Fine clay (1), Coarse  
sand (1), Medium silt loam (1)

**Geology (field or map data):** Serpentine (17), Franciscan melange (9), Ultramafic rocks, mostly  
serpentine (2)

**Marin County Watersheds:** Lagunitas Creek (21), San Rafael (5), Bolinas (2)

### **Site Impacts**

This alliance has very low non-native plant cover (average 0.2%) relative to native cover.

### **Associations in Marin County**

*Arctostaphylos montana*

*Arctostaphylos montana* – *Adenostoma fasciculatum*

### **Classification Comments**

None.

**References:** Evens and Kentner 2006, Keeler-Wolf et al. 2003a

**Global Rarity Rank:** G3

**State Rarity Rank:** S3

**Surveys Used for Description**

**Total: N=29; Marin County (n=29):** MARIN048, MARIN088, MARIN089, MARIN141, MARINSP17, MMWD0016, MMWD0049, MMWD0053, MMWD0064, MMWD0074, MMWD0076, MMWD0080, MMWD0118, MMWD0121, MMWD0140, MMWD0165, MMWD0167, MMWD0202, MMWD0303, MMWD0347, MMWD0352, MOSD0080, MOSD0112, MOSD0122, MOSD0127, MOSD0134, MOSD0137, MOSD0143, PORE184

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Pseudotsuga menziesii</i>	31	22.5	1.1	0.2	9.0				
	<i>Umbellularia californica</i>	21	9.8	0.3	0.2	4.0				
<b>Shrub</b>										
	<b><i>Arctostaphylos montana</i></b>	<b>100</b>	<b>68.1</b>	<b>34.1</b>	<b>5.0</b>	<b>70.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Adenostoma fasciculatum</i>	76	11.9	5.9	0.2	40.0	<b>X</b>			<b>X</b>
	<i>Heteromeles arbutifolia</i>	66	4.0	2.0	0.2	19.0				<b>X</b>
	<i>Ceanothus jepsonii</i>	48	5.7	2.3	0.2	28.0				
	<i>Quercus durata</i>	31	2.1	0.8	0.2	7.0				
	<i>Eriodictyon californicum</i>	31	0.9	0.4	0.2	5.2				
	<i>Toxicodendron diversilobum</i>	21	0.2	0.1	0.2	1.0				
	<i>Lonicera hispidula</i>	21	0.2	0.0	0.2	0.2				
<b>Herb</b>										
	<i>Chlorogalum pomeridianum</i>	59	4.2	0.1	0.2	1.0				<b>X</b>
	<i>Calamagrostis ophitidis</i>	52	13.1	0.5	0.2	2.0				<b>X</b>
	<i>Melica torreyana</i>	38	4.0	0.3	0.2	4.0				
	<i>Sisyrinchium bellum</i>	34	1.1	0.1	0.2	0.2				
	<i>Vulpia microstachys</i>	34	1.7	0.1	0.2	0.2				
	<i>Monardella purpurea</i>	31	1.6	0.1	0.2	0.2				
	<i>Calochortus umbellatus</i>	28	2.6	0.1	0.2	1.0				
	<i>Galium porrigens</i>	24	1.2	0.1	0.2	1.0				
	<i>Iris douglasiana</i>	24	5.5	0.0	0.2	0.2				
	<i>Elymus glaucus</i>	21	2.8	0.2	0.2	3.0				
	<i>Zigadenus fremontii</i>	21	4.0	0.1	0.2	1.0				
	<i>Epilobium minutum</i>	21	1.0	0.1	0.2	1.0				
	<i>Navarretia</i> spp.	21	0.6	0.0	0.2	0.2				
	<i>Eriogonum luteolum</i>	21	1.4	0.0	0.2	0.2				
	<i>Aspidotis densa</i>	21	1.2	0.0	0.2	0.2				
	<i>Erigeron reductus</i>	21	1.1	0.0	0.2	0.2				
<b>Non-vascular</b>										
	Moss	31	21.3	0.2	0.2	2.0				
	Lichen	24	10.3	0.0	0.2	0.2				

## Arctostaphylos montana Association

**Common Name:** Mount Tamalpais Manzanita Shrubland Shrubland

**Alliance:** *Arctostaphylos (bakeri, montana)* Shrubland Alliance

### Local Vegetation Description

The Mount Tamalpais Manzanita Shrubland Association forms an open to continuous shrub layer. The emergent tree layer is typically sparse to open, and the herbaceous layer is sparse to intermittent. Dominant and characteristic shrubs include *Arctostaphylos montana* and *Adenostoma fasciculatum*, and those that are often present include *Ceanothus jepsonii* and *Heteromeles arbutifolia*. Commonly associated emergent trees at sparse cover include *Pseudotsuga menziesii* and *Umbellularia californica*. The herbaceous layer often includes *Calamagrostis ophitidis* and *Chlorogalum pomeridianum*, and herbs that are sometimes present include *Aspidotis densa*, *Calochortus umbellatus*, *Calycadenia multiglandulosa*, *Elymus glaucus*, *Epilobium minutum*, *Erigeron reductus*, *Eriogonum luteolum*, *Galium porrigens*, *Iris douglasiana*, *Melica torreyana*, *Monardella purpurea*, *Navarretia* spp., *Sisyrinchium bellum*, *Vulpia microstachys*, and *Zigadenus fremontii*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	1.4	0 – 5	7.7	2 – 15
Hardwood	1.4	0 – 7	5.0	1 – 10
Regenerating or Shrubby Tree	1.0	0 – 8.2	0.8	0.5 – 1
Shrub	43.5	15 – 80	1.1	0.5 – 2
Herb	11.5	0.2 – 55	0.4	0 – 1

### Local Environmental Description

**Elevation:** Mean 405 m, Range 164 – 630 m

**Aspect:** NW (6), SE (6), SW (6), NE (5), Variable (1)

**Slope:** Mean 15 degrees, Range 7 – 31 degrees

**Macro Topography:** Upper 1/3 of slope (10), Middle 1/3 of slope (9), Ridge top (2), Bottom (1), Middle to Upper 1/3 of slope (1), Not recorded (1)

**Large Rock:** Mean 9.1%, Range 0.2 – 31.0%

**Small Rock:** Mean 27.2%, Range 3.0 – 68.0%

**Fines Cover:** Mean 27.4%, Range 4.0 – 60.0%

**Litter Cover:** Mean 31.7%, Range 1.0 – 75%

**Soil Texture (field assessed):** Moderately fine sandy clay loam (6), Moderately coarse, sandy loam (5), Moderately fine clay loam (3), Moderately fine silty clay loam (2), Unknown (1), Medium loam (1), Fine silty clay (1), Fine clay (1), Coarse sand (1), Medium to very fine, sandy loam (1), Medium silt (1)

**Geology (field or map data):** Serpentine (15), Franciscan melange (7), Ultramafic rocks, mostly serpentine (1)

**Marin County Watersheds:** Lagunitas Creek (17), San Rafael (4), Bolinas (2)

### Site Impacts

This association has very low non-native plant cover (average 0.1%) relative to native cover.

### Classification Comments

None.

**References:** Evens and Kentner 2006, Keeler-Wolf et al. 2003a

Global Rarity Rank: G1

State Rarity Rank: S2

State Rare: Y

**Surveys Used for Description**

**Total: N=24; Marin County (n=24):** MARIN048, MARIN088, MARIN089, MARIN141, MARINSP17, MMWD0016, MMWD0049, MMWD0053, MMWD0064, MMWD0074, MMWD0076, MMWD0080, MMWD0118, MMWD0121, MMWD0167, MMWD0202, MMWD0303, MMWD0347, MMWD0352, MOSD0080, MOSD0134, MOSD0137, MOSD0143, PORE184

**Association Stand Table** \*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Pseudotsuga menziesii</i>	33	25.2	1.1	0.2	9.0				
	<i>Umbellularia californica</i>	21	11.5	0.3	0.2	4.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Pseudotsuga menziesii</i> *	21	16.3	0.3	0.2	4.2				
<b>Shrub</b>										
	<b><i>Arctostaphylos montana</i></b>	<b>100</b>	<b>73.9</b>	<b>37.1</b>	<b>7.0</b>	<b>70.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Adenostoma fasciculatum</i>	75	7.2	3.2	0.2	12.0	<b>X</b>			<b>X</b>
	<i>Heteromeles arbutifolia</i>	63	4.5	2.3	0.2	19.0				<b>X</b>
	<i>Ceanothus jepsonii</i>	50	5.3	2.3	0.2	28.0				<b>X</b>
	<i>Quercus durata</i>	33	2.3	0.8	0.2	7.0				
	<i>Eriodictyon californicum</i>	29	1.0	0.4	0.2	5.2				
	<i>Toxicodendron diversilobum</i>	21	0.2	0.1	0.2	1.0				
	<i>Lonicera hispidula</i>	21	0.1	0.0	0.2	0.2				
<b>Herb</b>										
	<i>Calamagrostis ophitidis</i>	58	15.2	0.5	0.2	2.0				<b>X</b>
	<i>Chlorogalum pomeridianum</i>	54	2.3	0.1	0.2	1.0				<b>X</b>
	<i>Melica torreyana</i>	38	4.4	0.3	0.2	4.0				
	<i>Vulpia microstachys</i>	38	1.8	0.1	0.2	0.2				
	<i>Monardella purpurea</i>	33	1.9	0.1	0.2	0.2				
	<i>Sisyrinchium bellum</i>	33	0.9	0.1	0.2	0.2				
	<i>Calochortus umbellatus</i>	29	2.8	0.1	0.2	1.0				
	<i>Elymus glaucus</i>	25	3.3	0.2	0.2	3.0				
	<i>Galium porrigens</i>	25	1.2	0.1	0.2	1.0				
	<i>Erigeron reductus</i>	25	1.3	0.1	0.2	0.2				
	<i>Eriogonum luteolum</i>	25	1.7	0.1	0.2	0.2				
	<i>Zigadenus fremontii</i>	21	4.5	0.1	0.2	1.0				
	<i>Epilobium minutum</i>	21	1.1	0.1	0.2	1.0				
	<i>Aspidotis densa</i>	21	1.1	0.0	0.2	0.2				
	<i>Calycadenia multiglandulosa</i>	21	1.9	0.0	0.2	0.2				
	<i>Iris douglasiana</i>	21	3.9	0.0	0.2	0.2				
	<i>Navarretia</i> spp.	21	0.6	0.0	0.2	0.2				
<b>Non-vasc</b>										
	Moss	33	25.0	0.2	0.2	2.0				
	Lichen	29	12.5	0.1	0.2	0.2				

***Arctostaphylos montana* – *Adenostoma fasciculatum* Association**

**Common Name:** Mount Tamalpais Manzanita – Chamise Shrubland

**Alliance:** *Arctostaphylos (bakeri, montana)* Shrubland Alliance

**Local Vegetation Description**

The Mount Tamalpais Manzanita – Chamise Association forms an open to continuous shrub layer. The emergent tree layer is typically sparse to open, and the herbaceous layer is sparse to open. Dominant and characteristic shrubs include *Adenostoma fasciculatum*, *Arctostaphylos montana*, and *Heteromeles arbutifolia*, and those that are often present include *Ceanothus cuneatus*. Commonly associated emergent trees at sparse cover include *Hesperocyparis sargentii*. The herbaceous layer typically includes *Chlorogalum pomeridianum*, and herbs that are sometimes present include *Aira caryophyllea*, *Iris douglasiana*, *Melica torreyana*, and *Sisyrinchium bellum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	2.7	0 – 8	3.5	2 – 5
Hardwood	2.7	0 – 8	no data	
Regenerating or Shrubby Tree	0.0	0 – 0.2	5.5	2 – 10
Shrub	65.3	30 – 90	1.5	1 – 2
Herb	2.7	0.2 – 6.6	0.4	0 – 1

**Local Environmental Description**

**Elevation:** Mean 413 m, Range 319 – 466 m

**Aspect:** SW (3), NW (1), SE (1)

**Slope:** Mean 10 degrees, Range 2 – 19 degrees

**Macro Topography:** Upper 1/3 of slope (2), Middle 1/3 of slope (1), Not recorded (1), Ridge top (1)

**Large Rock:** Mean 3.5%, Range 0.0 – 10.0%

**Small Rock:** Mean 26.8%, Range 1.0 – 50.0%

**Fines Cover:** Mean 22.8%, Range 0.2 – 55.0%

**Litter Cover:** Mean 41.2%, Range 2.0 – 87%

**Soil Texture (field assessed):** Moderately fine clay loam (3), Medium silt loam (1), Moderately coarse, sandy loam (1)

**Geology (field or map data):** Franciscan melange (2), Serpentine (2), Ultramafic rocks, mostly serpentine (1)

**Marin County Watersheds:** Lagunitas Creek (4), San Rafael (1)

**Site Impacts**

This association has very low non-native plant cover (average 0.4%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*.

**Classification Comments**

None.

**References:** Evens and Kentner 2006

**Global Rarity Rank:** G2

**State Rarity Rank:** S2

**State Rare:** Y

**Surveys Used for Description**

**Total: N=5; Marin County (n=5):** MMWD0140, MMWD0165, MOSD0112, MOSD0122, MOSD0127

*Arctostaphylos montana* – *Adenostoma fasciculatum* Association

*Arctostaphylos (bakeri, montana)* Shrubland Alliance

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>	<i>Hesperocyparis sargentii</i>	40	40.0	1.2	0.2	6.0				
<b>Shrub</b>	<b><i>Arctostaphylos montana</i></b>	<b>100</b>	<b>40.2</b>	<b>19.4</b>	<b>5.0</b>	<b>46.0</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<b><i>Adenostoma fasciculatum</i></b>	<b>80</b>	<b>34.5</b>	<b>18.6</b>	<b>10.0</b>	<b>40.0</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<i>Heteromeles arbutifolia</i>	80	1.5	0.7	0.2	1.2	<b>X</b>			<b>X</b>
	<i>Ceanothus cuneatus</i>	60	11.4	2.2	1.0	7.0				<b>X</b>
	<i>Ceanothus jepsonii</i>	40	7.5	2.4	2.0	10.0				
	<i>Eriodictyon californicum</i>	40	0.2	0.1	0.2	0.2				
<b>Herb</b>	<i>Chlorogalum pomeridianum</i>	80	13.6	0.2	0.2	0.2	<b>X</b>			<b>X</b>
	unknown Poaceae	40	16.0	0.4	0.2	2.0				
	<i>Aira caryophyllea</i>	40	2.0	0.1	0.2	0.2				
	<i>Iris douglasiana</i>	40	13.3	0.1	0.2	0.2				
	<i>Melica torreyana</i>	40	2.0	0.1	0.2	0.2				
	<i>Sisyrinchium bellum</i>	40	2.0	0.1	0.2	0.2				

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## ***Arctostaphylos* (*canescens*, *manzanita*, *stanfordiana*) Shrubland Alliance**

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**Common Name:** Hoary, common, and Stanford manzanita chaparral

**NVC Alliance Code:** A3859. *Arctostaphylos nummularia* - *Arctostaphylos stanfordiana* - *Chrysolepis chrysophylla* var. *minor* North Coast Chaparral Alliance

### **Statewide Description**

*Arctostaphylos canescens*, *A. manzanita* and/or *A. stanfordiana* dominate or co-dominate in the shrub canopy with *Adenostoma fasciculatum*, *Arctostaphylos auriculata*, *Arctostaphylos glandulosa*, *Arctostaphylos stanfordiana*, *Arctostaphylos viscida*, *Baccharis pilularis*, *Ceanothus* spp., *Diplacus aurantiacus*, *Eriodictyon californicum*, *Heteromeles arbutifolia*, *Lotus scoparius*, *Pickeringia montana*, *Quercus berberidifolia*, and *Quercus wislizeni*. Emergent trees may be present at low cover, including *Pinus attenuata*, *Pseudotsuga menziesii*, *Quercus chrysolepis*, *Quercus douglasii*, or *Quercus wislizeni*.

*Arctostaphylos canescens* appears as a dominant or co-dominant with other chaparral species, forming small stands within a matrix of chaparral and conifers.

*Arctostaphylos manzanita* is a variable species with six subspecies: ssp. *elegans*, ssp. *glaucescens*, ssp. *laevigata*, ssp. *manzanita*, ssp. *roofii*, and ssp. *wieslanderi* (Parker et al. 2007, 2012). The most widely ranging subspecies is ssp. *manzanita*, and it occurs in many chaparral and woodland types. The other subspecies have smaller ranges. This alliance includes stands of ssp. *laevigata* and ssp. *manzanita*.

*Arctostaphylos stanfordiana* has three subspecies, two of which, ssp. *decumbens* and ssp. *raichei*, are listed as California rare plants with a rank of 1B.1. *A. stanfordiana* ssp. *decumbens* is low in stature and is endemic to Sonoma County in the southern North Coast Ranges at around 100 m elevation. *A. stanfordiana* ssp. *stanfordiana* is larger in size and wider-ranging, found in both southern and central

North Coast Ranges up to 1300 m elevation. The third subspecies, ssp. *raichei*, with finely hairy and glandular leaves, is more restricted to Lake and Mendocino Cos. in the central North Coast Ranges.

### **Local Vegetation Description**

The Hoary, common, and Stanford manzanita chaparral Alliance forms an open to continuous shrub layer. The emergent tree layer is typically sparse to open, and the herbaceous layer is sparse to intermittent. Shrubs that are often present include *Adenostoma fasciculatum*, *Arctostaphylos manzanita* and *Diplacus aurantiacus*. Commonly associated emergent trees at sparse cover include *Arbutus menziesii* and *Quercus agrifolia*. The herbs that are sometimes present include *Aira caryophyllea*, *Briza maxima* and *Iris macrosiphon*. Commonly associated non-vascular plants include Moss.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.6	0 – 7	3.5	2 – 5
Hardwood	3.1	0 – 11	12.5	5 – 20
Regenerating or Shrubby Tree	0.6	0 – 6.0	0.7	0 – 2
Shrub	57.4	20.0 – 95.0	3.4	0– 10
Herb	8.5	0.2 – 65	0.3	0 – 1

### **Local Membership Rule**

*Arctostaphylos canescens* and/or *A. manzanita* dominate or co-dominate, sometimes with co-dominant *Adenostoma fasciculatum*. Found typically on volcanic, Franciscan, and greenstone substrates. One alliance is recognized for all three *Arctostaphylos* vegetation types, with associations specific to each species.

### **Local Environmental Description**

**Elevation:** Mean 315 m, Range 77 – 662 m

**Aspect:** SW (7), SE (3), NE (1), NW (1), Variable (1)

**Slope:** Mean 26 degrees, Range 14 – 48 degrees

**Macro Topography:** Upper 1/3 of slope (9), Middle 1/3 of slope (3), Ridge top (1)

**Large Rock:** Mean 0.4%, Range 0.0 – 2.0%

**Small Rock:** Mean 19.5%, Range 0.0 – 58.0%

**Fines Cover:** Mean 27.2%, Range 0.2 – 67.0%

**Litter Cover:** Mean 45.4%, Range 5.0 – 95%

**Soil Texture (field assessed):** Moderately coarse, sandy loam (4), Fine clay (2), Medium to very fine, sandy loam (2), Moderately fine clay loam (1), Moderately fine sandy clay loam (1), Medium to very fine, loamy sand (1)

**Geology (field or map data):** Franciscan melange (5), Sandstone and other sedimentary (5), Alluvium (1), Sandstone (1), Volcanic flow rocks (1)

**Marin County Watersheds:** Novato (6), Bolinas (4), San Rafael (2), Petaluma River (1)

### **Site Impacts**

This alliance has low non-native plant cover (average 8.6%) relative to native cover. Non-native species with highest frequency and abundance include *Aira caryophyllea* and *Briza maxima*.

### **Associations in Marin County**

*Arctostaphylos canescens*

*Arctostaphylos canescens* – *Arctostaphylos glandulosa* – *Adenostoma fasciculatum*

*Arctostaphylos manzanita*



### Classification Comments

None.

**References:** Buck and Evens 2010, Buck-Diaz et al. 2012, Evens and Kentner 2006, Klein et al. 2015

**Global Rarity Rank:** G3

**State Rarity Rank:** S3

### Surveys Used for Description

**Total: N=13; Marin County (n=13):** MARIN075, MARIN112, MARIN163, MMWD0301, MMWD0370, MMWD0372, MOSD0002, MOSD0017, MOSD0220, MOSD0226, MOSD0365, MOSD0368, VASE0072

### Alliance Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Quercus agrifolia</i>	31	16.9	1.2	1.0	8.0				
	<i>Arbutus menziesii</i>	23	6.9	0.6	0.2	6.0				
<b>Shrub</b>										
	<b><i>Arctostaphylos manzanita</i></b>	<b>69</b>	<b>52.6</b>	<b>30.1</b>	<b>7.0</b>	<b>95.0</b>				<b>X</b>
	<i>Adenostoma fasciculatum</i>	69	15.5	10.6	0.2	45.0				<b>X</b>
	<i>Diplacus aurantiacus</i>	54	2.6	0.8	0.2	5.0				<b>X</b>
	<i>Toxicodendron diversilobum</i>	46	0.4	0.2	0.2	1.0				
	<b><i>Arctostaphylos canescens</i></b>	<b>31</b>	<b>20.2</b>	<b>13.3</b>	<b>15.0</b>	<b>70.0</b>				
	<i>Arctostaphylos glandulosa</i>	31	5.2	4.4	1.0	40.2				
	<i>Heteromeles arbutifolia</i>	31	0.3	0.1	0.2	1.0				
	<i>Lonicera hispidula</i>	23	0.1	0.0	0.2	0.2				
<b>Herb</b>										
	<i>Briza maxima</i>	38	16.3	6.6	0.2	65.0				
	<i>Iris macrosiphon</i>	23	5.8	0.2	0.2	2.0				
	<i>Aira caryophylla</i>	23	0.4	0.0	0.2	0.2				
<b>Non-vascular</b>										
	Lichen	54	35.9	0.2	0.2	1.0				<b>X</b>
	Moss	46	17.9	0.1	0.2	0.2				

## **Arctostaphylos canescens Provisional Association**

**Common Name:** Hoary Manzanita Shrubland

**Alliance:** *Arctostaphylos (canescens, manzanita, stanfordiana)* Shrubland Alliance

### **Local Vegetation Description**

The Hoary Manzanita Association forms an open to continuous shrub layer. The emergent tree layer is typically sparse to open, and the herbaceous layer is sparse to open. Dominant and characteristic shrubs include *Arctostaphylos canescens* and *Adenostoma fasciculatum*, and those that are often present include *Arctostaphylos glandulosa* and *Arctostaphylos stanfordiana*. Commonly associated emergent trees at sparse cover include *Pinus attenuata* and *Pseudotsuga menziesii*. The herbaceous layer sometimes includes *Hypericum concinnum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	3.0	0 – 8	7.8	2 – 15
Hardwood	0.0	0 – 0.2	5.5	2 – 10
Regenerating or Shrubby Tree	0.6	0 – 3.2	2.8	1 – 5
Shrub	45.3	12 – 77	2.6	0.5 – 5
Herb	1.2	0.2 – 5	0.3	0 – 0.5

### **Local Environmental Description**

**Elevation:** Mean 459 m, Range 360 – 548 m

**Aspect:** SE (4), SW (3)

**Slope:** Mean 20 degrees, Range 13 – 30 degrees

**Macro Topography:** Upper 1/3 of slope (4), Middle 1/3 of slope (2), Ridge top (1)

**Large Rock:** Mean 1.3%, Range 0.2 – 3.4%

**Small Rock:** Mean 31.3%, Range 20.0 – 58.0%

**Fines Cover:** Mean 13.9%, Range 1.0 – 34.0%

**Litter Cover:** Mean 43.4%, Range 17.0 – 62%

**Soil Texture (field assessed):** Coarse, loamy sand (2), Moderately fine sandy clay loam (1), Moderately coarse, sandy loam (1), Medium loam (1)

**Geology (field or map data):** Volcanic flow rocks (2), General volcanic extrusives (2), Franciscan melange (2), Andesite (1)

**Marin County Watersheds:** Bolinas (2)

**Other Watersheds, Sonoma Co.:** Sonoma Creek (4), Middle Russian River (1)

### **Site Impacts**

This association has very low non-native plant cover (average 0.4%) relative to native cover.

### **Classification Comments**

This association is considered provisional since it is under-sampled in its expected range. Since the number of surveys of this association in Marin are low, data from nearby counties were included. Due to hybridization and morphological similarity between the species, plants identified as *Quercus wislizeni* may be *Quercus parvula*, which has been found to be the most widespread genotype in Marin County (Dodd and Afzul-Rafii 2004, Hauser et al. 2017).

**References:** Klein et al. 2015

**Global Rarity Rank:** G3

**State Rarity Rank:** S3

**State Rare:** Y

**Surveys Used for Description**

**Total: N=7; Marin County (n=2):** MMWD0370, MMWD0372

Sonoma County (n=5): MILOB002, MILOB005, MILOB011, SONO0810, SONO1107

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Pseudotsuga menziesii</i>	43	42.9	1.9	1.0	9.0				
	<i>Pinus attenuata</i>	29	27.9	1.5	2.0	8.2				
<b>Regenerating or Shrubby Trees</b>										
	<i>Quercus wislizeni</i>	43	35.7	0.1	0.2	0.2				
	<i>Pseudotsuga menziesii</i> *	29	12.5	0.2	0.2	1.2				
<b>Shrub</b>										
	<b><i>Arctostaphylos canescens</i></b>	<b>100</b>	<b>83.4</b>	<b>40.2</b>	<b>6.0</b>	<b>70.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Adenostoma fasciculatum</i>	86	7.2	1.8	0.2	5.0	<b>X</b>			<b>X</b>
	<i>Arctostaphylos stanfordiana</i>	57	5.9	2.0	2.0	8.0				<b>X</b>
	<i>Arctostaphylos glandulosa</i>	57	1.5	0.9	0.2	4.0				<b>X</b>
	<i>Dendromecon rigida</i>	29	0.4	0.2	0.2	1.0				
	<i>Heteromeles arbutifolia</i>	29	0.4	0.2	0.2	1.0				
<b>Herb</b>										
	<i>Hypericum concinnum</i>	43	17.1	0.1	0.2	0.2				
<b>Non-vasc</b>										
	Moss	43	28.6	2.2	0.2	15.0				
	Lichen	29	14.3	0.1	0.2	0.2				

***Arctostaphylos canescens* – *Arctostaphylos glandulosa* – *Adenostoma fasciculatum*  
Provisional Association**

**Common Name:** Hoary Manzanita – Eastwood Manzanita – Chamise Shrubland

**Alliance:** *Arctostaphylos (canescens, manzanita, stanfordiana)* Shrubland Alliance

**Local Vegetation Description**

The Hoary Manzanita – Eastwood Manzanita – Chamise Association forms an intermittent to continuous shrub layer. The emergent tree layer is typically sparse to open, and the herbaceous layer is sparse to open. Dominant and characteristic shrubs include *Adenostoma fasciculatum*, *Arctostaphylos canescens*, and *Arctostaphylos glandulosa*, and those that are often present include *Pickeringia montana*.

Regenerating or shrubby trees often include *Quercus wislizeni*. Commonly associated emergent trees at sparse cover include *Quercus wislizeni* and *Umbellularia californica*. The herbaceous layer sometimes includes *Castilleja foliolosa*, *Helianthus exilis*, and *Salvia sonomensis*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	2.5	0 – 5	7.5	5 – 10
Regenerating or Shrubby Tree	3.0	0 – 6.0	3.5	2 – 5
Shrub	55.0	40 – 72	0.3	0 – 0.5
Herb	3.6	0.2 – 7	0.3	0 – 0.5

**Local Environmental Description**

**Elevation:** Mean 517 m, Range 329 – 662 m

**Aspect:** SE (1), Variable (1), SW (1)

**Slope:** Mean 21 degrees, Range 12 – 35 degrees

**Macro Topography:** Upper 1/3 of slope (2), Lower to Upper 1/3 of slope (1)

**Large Rock:** Mean 0.1%, Range 0.0 – 0.2%

**Small Rock:** Mean 27.3%, Range 0.0 – 51.0%

**Fines Cover:** Mean 27.3%, Range 11.0 – 41.0%

**Litter Cover:** Mean 22.4%, Range 5.0 – 53%

**Soil Texture (field assessed):** Moderately coarse, sandy loam (1), Moderately fine clay loam (1)

**Geology (field or map data):** Sandstone (1), Basalt (1), Franciscan melange (1)

**Marin County Watersheds:** Bolinas (2)

**Other Watersheds, Sonoma Co.:** Sonoma Creek (1)

**Site Impacts**

This association has very low non-native plant cover (average 0.0%) relative to native cover. No non-native species were recorded by surveyors.

**Classification Comments**

This association is considered provisional since it is under-sampled in its expected range. Since the number of surveys of this association in Marin are low, data from nearby counties were included. Due to hybridization and morphological similarity between the species, plants identified as *Quercus wislizeni* may be *Quercus parvula*, which has been found to be the most widespread genotype in Marin County (Dodd and Afzul-Rafii 2004, Hauser et al. 2017).

**References:** Evens and Kentner 2006

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

*Arctostaphylos canescens* – *Arctostaphylos glandulosa* – *Adenostoma fasciculatum* Provisional Association

*Arctostaphylos (canescens, manzanita, stanfordiana)* Shrubland Alliance

**Surveys Used for Description**

Total: N=3; Marin County (n=2): MMWD0301, VASE0072

Sonoma County (n=1): MILOB008

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Quercus wislizeni</i>	67	46.7	2.4	2.0	5.1				X
	<i>Umbellularia californica</i>	33	20.0	1.0	3.0	3.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Quercus wislizeni</i> *	67	33.3	1.3	2.0	2.0				X
	<i>Quercus parvula</i> var. <i>shrevei</i>	33	22.2	1.3	4.0	4.0				
	<i>Umbellularia californica</i> *	33	11.1	0.3	1.0	1.0				
<b>Shrub</b>										
	<b><i>Arctostaphylos canescens</i></b>	<b>100</b>	<b>30.8</b>	<b>26.0</b>	<b>5.0</b>	<b>57.9</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<b><i>Arctostaphylos glandulosa</i></b>	<b>100</b>	<b>30.4</b>	<b>21.7</b>	<b>12.0</b>	<b>40.2</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<b><i>Adenostoma fasciculatum</i></b>	<b>100</b>	<b>32.7</b>	<b>18.6</b>	<b>15.0</b>	<b>22.0</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<i>Pickeringia montana</i>	67	0.2	0.1	0.1	0.2				X
	<i>Heteromeles arbutifolia</i>	33	2.5	1.0	3.0	3.0				
	<i>Eriodictyon californicum</i>	33	1.7	0.7	2.0	2.0				
	<i>Arctostaphylos stanfordiana</i>	33	0.8	0.3	1.0	1.0				
	<i>Diplacus aurantiacus</i>	33	0.8	0.3	1.0	1.0				
	<i>Ceanothus foliosus</i>	33	0.2	0.1	0.2	0.2				
<b>Herb</b>										
	<i>Salvia sonomensis</i>	33	32.3	2.0	6.0	6.0				
	<i>Castilleja foliolosa</i>	33	33.3	0.3	1.0	1.0				
	<i>Helianthus exilis</i>	33	1.1	0.1	0.2	0.2				
<b>Non-vasc</b>										
	Lichen	33	27.8	0.3	1.0	1.0				
	Moss	33	5.6	0.1	0.2	0.2				

*Arctostaphylos canescens* – *Arctostaphylos glandulosa* – *Adenostoma fasciculatum* Provisional Association

*Arctostaphylos* (*canescens*, *manzanita*, *stanfordiana*) Shrubland Alliance

**Arctostaphylos manzanita Association**

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**Common Name:** Common Manzanita Shrubland

**Alliance:** *Arctostaphylos (canescens, manzanita, stanfordiana)* Shrubland Alliance

**Local Vegetation Description**

The Common Manzanita Association forms an open to continuous shrub layer. The emergent tree layer is typically sparse to open, and the herbaceous layer is sparse to continuous. Dominant and characteristic shrubs include *Arctostaphylos manzanita* and *Diplacus aurantiacus*, and those that are often present include *Adenostoma fasciculatum* and *Toxicodendron diversilobum*. Commonly associated emergent trees at sparse cover include *Arbutus menziesii* and *Quercus agrifolia*. The herbaceous layer often includes *Briza maxima*, and herbs that are sometimes present include *Aira caryophyllea*, *Avena* spp., *Bromus carinatus*, *Bromus diandrus*, *Carduus pycnocephalus*, *Chlorogalum pomeridianum*, *Cynosurus echinatus*, *Iris macrosiphon*, *Melica torreyana*, and *Pentagramma triangularis*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	4.1	0 – 11	12.5	5 – 20
Regenerating or Shrubby Tree	0.2	0 – 1.0	0.7	0 – 2
Shrub	58.2	20 – 95	3.7	1 – 10
Herb	11.1	0.2 – 65	0.3	0 – 1

**Local Environmental Description**

**Elevation:** Mean 207 m, Range 77 – 416 m

**Aspect:** SW (4), NW (2), SE (2), NE (1)

**Slope:** Mean 26 degrees, Range 14 – 48 degrees

**Macro Topography:** Upper 1/3 of slope (6), Middle 1/3 of slope (2), Ridge top (1)

**Large Rock:** Mean 0.4%, Range 0.0 – 2.0%

**Small Rock:** Mean 10.4%, Range 0.0 – 36.0%

**Fines Cover:** Mean 30.6%, Range 0.2 – 67.0%

**Litter Cover:** Mean 54.0%, Range 20.0 – 95%

**Soil Texture (field assessed):** Moderately coarse, sandy loam (3), Fine clay (2), Medium to very fine, sandy loam (2), Medium to very fine, loamy sand (1)

**Geology (field or map data):** Sandstone and other sedimentary (5), Franciscan melange (2), Volcanic flow rocks (1), Alluvium (1)

**Marin County Watersheds:** Novato (6), San Rafael (2), Petaluma River (1)

**Site Impacts**

This association has low non-native plant cover (average 12.4%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*, *Avena* spp., *Briza maxima*, *Bromus diandrus*, *Carduus pycnocephalus*, and *Cynosurus echinatus*.

**Classification Comments**

None.

**References:** Buck and Evens 2010, Buck-Diaz et al. 2012, Klein et al. 2015

**Global Rarity Rank:** G3

**State Rarity Rank:** S3

**State Rare:** Y

*Arctostaphylos manzanita* Association  
*Arctostaphylos (canescens, manzanita, stanfordiana)* Shrubland Alliance

**Surveys Used for Description**

**Total: N=9; Marin County (n=9):** MARIN075, MARIN112, MARIN163, MOSD0002, MOSD0017, MOSD0220, MOSD0226, MOSD0365, MOSD0368

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Quercus agrifolia</i>	44	24.4	1.7	1.0	8.0				
	<i>Arbutus menziesii</i>	33	9.9	0.9	0.2	6.0				
<b>Shrub</b>										
	<b><i>Arctostaphylos manzanita</i></b>	<b>100</b>	<b>75.9</b>	<b>43.4</b>	<b>7.0</b>	<b>95.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Diplacus aurantiacus</i>	78	3.8	1.2	0.2	5.0	<b>X</b>			<b>X</b>
	<i>Adenostoma fasciculatum</i>	56	14.8	10.2	0.2	45.0				<b>X</b>
	<i>Toxicodendron diversilobum</i>	56	0.5	0.3	0.2	1.0				<b>X</b>
	<i>Heteromeles arbutifolia</i>	44	0.5	0.2	0.2	1.0				
	<i>Lonicera hispidula</i>	33	0.2	0.1	0.2	0.2				
	<i>Baccharis pilularis</i>	22	4.2	2.2	5.0	15.0				
<b>Herb</b>										
	<i>Briza maxima</i>	56	23.5	9.5	0.2	65.0				<b>X</b>
	<i>Iris macrosiphon</i>	33	8.4	0.3	0.2	2.0				
	<i>Aira caryophyllea</i>	33	0.6	0.1	0.2	0.2				
	<i>Avena</i> spp.	22	1.8	0.6	0.2	5.0				
	<i>Melica torreyana</i>	22	2.6	0.4	0.2	3.0				
	<i>Bromus carinatus</i>	22	4.1	0.1	0.2	1.0				
	<i>Cynosurus echinatus</i>	22	0.4	0.1	0.2	1.0				
	<i>Bromus diandrus</i>	22	0.1	0.0	0.2	0.2				
	<i>Carduus pycnocephalus</i>	22	0.1	0.0	0.2	0.2				
	<i>Chlorogalum pomeridianum</i>	22	0.5	0.0	0.2	0.2				
	<i>Pentagramma triangularis</i>	22	22.2	0.0	0.2	0.2				
<b>Non-vasc</b>										
	Lichen	44	31.5	0.2	0.2	1.0				
	Moss	33	13.0	0.1	0.2	0.2				

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***Arctostaphylos (nummularia, sensitiva) – Chrysolepis chrysophylla* Shrubland Alliance**

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**Common Name:** Glossy leaf manzanita - Golden chinquapin chaparral

**NVC Alliance Code:** A3859. *Arctostaphylos nummularia* - *Arctostaphylos stanfordiana* - *Chrysolepis chrysophylla* var. *minor* North Coast Chaparral Alliance

**Statewide Description**

*Arctostaphylos nummularia* or *Arctostaphylos sensitiva* dominate or co-dominate in the shrub canopy with *Arctostaphylos columbiana*, *Arctostaphylos glandulosa* ssp. *glandulosa*, *Arctostaphylos virgata*, *Chrysolepis chrysophylla* var. *minor*, *Pickeringia montana*, *Pteridium aquilinum*, and *Vaccinium ovatum*. Emergent trees may be present at low cover, including *Pinus muricata*, *Pseudotsuga menziesii*, or *Sequoia sempervirens*.

Taxonomic treatments of the *Arctostaphylos nummularia* complex vary (Hickman 1993, McMinn 1939, Parker et al. 2007, 2012). Parker et al. recognize *Arctostaphylos sensitiva*, *A. nummularia* ssp. *nummularia*, and *A. nummularia* ssp. *mendocinoensis* based on bark and habit differences. *Arctostaphylos sensitiva* grows in Marin and Santa Cruz Counties and it is included in this alliance. *Arctostaphylos nummularia* occurs from Sonoma to Mendocino County. The more erect plants of this species, from 0.5 to 3 m tall with lower stems gray and shredding (ssp. *nummularia*), are also included in this alliance. The more prostrate plants, <0.5 meters tall with lower stems gray or reddish and shredding (ssp. *mendocinoensis*), are more often associated with stands of the *Hesperocyparis pigmaea* and *Pinus muricata* Alliances in Mendocino County.

Stands of this alliance are part of the maritime chaparral -- see the maritime chaparral discussion in Sawyer et al. (2009). This alliance occurs on coastal slopes with nutrient poor soils and relatively high



amounts of the spring-summer fog, with its distribution in the northern Central Coast to North Coast from Santa Cruz to Mendocino Co., while the *Arctostaphylos (crustacea, tomentosa)* alliance has a broader distribution in the Central Coast region from San Mateo to Santa Barbara Co. on out to the Channel Islands.

### **Local Vegetation Description**

The Glossy leaf manzanita - Golden chinquapin chaparral Alliance forms a sparse to continuous shrub layer. The emergent tree layer is typically sparse to continuous, and the herbaceous layer is sparse to open. Shrubs that are often present include *Arctostaphylos glandulosa* and *Arctostaphylos sensitiva*. Commonly associated emergent trees at sparse cover include *Chrysolepis chrysophylla* var. *chrysophylla*, *Pseudotsuga menziesii*, *Quercus wislizeni* and *Sequoia sempervirens*. The herbs that are often present include *Pteridium aquilinum*. Commonly associated non-vascular plants include Lichen and Moss.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	2.2	0 – 20	10.8	0 – 35
Hardwood	12.1	0 – 80	8.4	1 – 20
Regenerating or Shrubby Tree	7.7	0 – 77.0	2.9	0 – 5
Shrub	63.1	1.0 – 90.0	2.1	0– 5
Herb	1.6	0 – 8	0.4	0–2

### **Local Membership Rule**

Some stands have *Chrysolepis chrysophylla* strongly dominant in dense, clonal stands occurring on upper slopes and ridges, often transitional between forest and chaparral, while other stands have *Arctostaphylos sensitiva*, *A. virgata*, *Chrysolepis chrysophylla* var. *minor* or *Vaccinium ovatum* dominant or co-dominant in maritime chaparral stands. *Arctostaphylos manzanita* and/or *Chrysolepis chrysophylla* stands particularly occur along Mt. Tamalpais – Bolinas Ridge. *Pinus muricata*, *Sequoia sempervirens*, and *Pteridium aquilinum* are often present. Stands are often transitional between forest and chaparral.

### **Local Environmental Description**

**Elevation:** Mean 372 m, Range 37 – 760 m

**Aspect:** NE (10), SW (9), SE (7), NW (5)

**Slope:** Mean 16 degrees, Range 3 – 36 degrees

**Macro Topography:** Upper 1/3 of slope (14), Middle 1/3 of slope (10), Ridge top (7), Middle to Upper 1/3 of slope (1)

**Large Rock:** Mean 1.0%, Range 0.0 – 10.0%

**Small Rock:** Mean 13.2%, Range 0.0 – 95%

**Fines Cover:** Mean 19.0%, Range 0.0 – 70%

**Litter Cover:** Mean 70.6%, Range 8 – 100%

**Soil Texture (field assessed):** Moderately coarse, sandy loam (10), Coarse, loamy sand (6), Moderately fine sandy clay loam (4), Medium loam (4), Medium to very fine, sandy loam (3), Moderately fine clay loam (3), Medium to very fine, loamy sand (1), Medium sand (1), Moderately fine silty clay loam (1)

**Geology (field or map data):** Franciscan melange (30), Granitic (4), Sandstone and other sedimentary (2), Sandstone (2), Shale (1), Ultramafic (type unknown) (1)

**Marin County Watersheds:** Bolinas (15), Lagunitas Creek (13), San Rafael (7), Inverness (4)

### **Site Impacts**

This alliance has very low non-native plant cover (average 0.1%) relative to native cover.

**Associations in Marin County**

*Arctostaphylos sensitiva*  
*Chrysolepis chrysophylla* – *Arctostaphylos glandulosa*  
*Chrysolepis chrysophylla* / *Vaccinium ovatum*

**Classification Comments**

None.

**References:** Buck and Evens 2010, Evens and Kentner 2006, Keeler-Wolf et al. 2003a, VegCAMP 2018

**Global Rarity Rank:** G2

**State Rarity Rank:** S2

**Surveys Used for Description**

**Total: N=44; Marin County (n=44):** BORI001, GGNRA292, GGNRA293, MARIN004, MARIN090, MARIN119, MARIN120, MARIN121, MARIN144, MARIN148, MMWD0192, MMWD0203, MMWD0208, MMWD0211, MMWD0214, MMWD0216A, MMWD0264, MMWD0279, MMWD0314, MMWD0357, MMWD0402, MMWD0403, MMWD0405, MMWD0413, MMWD0414, MOSD0029, MOSD0031, MOSD0107, PGA104, PGA1541, PGA1561, PGA1591, PGA1646, PGA1653, PGA1654A, PGA1662, PGA3759, PGA7716, PGA8827, PORE117, PORE126, PORE129, PORE190, VASE0083

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<b><i>Chrysolepis chrysophylla</i> <i>var. chrysophylla</i></b>	<b>34</b>	<b>31.1</b>	<b>13.1</b>	<b>3.0</b>	<b>80.0</b>				
	<i>Pseudotsuga menziesii</i>	34	14.1	0.8	0.2	6.0				
	<i>Sequoia sempervirens</i>	23	6.0	0.9	0.2	15.0				
	<i>Quercus wislizeni</i>	20	8.6	0.5	0.2	9.0				
<b>Regenerating or Shrubby Trees</b>										
	<b><i>Chrysolepis chrysophylla</i> <i>var. minor</i>*</b>	<b>32</b>	<b>23.8</b>	<b>5.4</b>	<b>0.2</b>	<b>75.0</b>				
	<i>Quercus wislizeni</i> *	32	17.4	1.5	0.2	20.0				
<b>Shrub</b>										
	<i>Vaccinium ovatum</i>	80	35.3	19.4	0.2	90.2	X		X	X
	<b><i>Arctostaphylos glandulosa</i></b>	<b>73</b>	<b>20.6</b>	<b>8.9</b>	<b>0.2</b>	<b>37.5</b>				X
	<b><i>Arctostaphylos sensitiva</i></b>	<b>57</b>	<b>36.7</b>	<b>28.9</b>	<b>1.0</b>	<b>95.2</b>				X
	<i>Pickeringia montana</i>	36	1.2	0.6	0.2	5.0				
	<i>Eriodictyon californicum</i>	23	0.2	0.1	0.2	2.0				
<b>Herb</b>										
	<i>Pteridium aquilinum</i>	52	37.6	0.9	0.2	12.0				X
<b>Non-vascular</b>										
	Lichen	27	24.1	0.6	0.2	5.0				
	Moss	20	12.3	0.1	0.2	1.0				

## Arctostaphylos sensitiva Association

**Common Name:** Glossyleaf Manzanita Shrubland

**Alliance:** *Arctostaphylos (nummularia, sensitiva) – Chrysolepis chrysophylla* Shrubland Alliance

### Local Vegetation Description

The Glossyleaf Manzanita Association forms an intermittent to continuous shrub layer. The emergent tree layer is typically sparse to open, and the herbaceous layer is sparse to open. Dominant and characteristic shrubs include *Arctostaphylos sensitiva*, *Arctostaphylos glandulosa*, and *Vaccinium ovatum*, and those that are often present include *Pickeringia montana*. Commonly associated emergent trees at sparse cover include *Pseudotsuga menziesii*, *Quercus wislizeni*, and *Sequoia sempervirens*. The herbaceous layer sometimes includes *Pteridium aquilinum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	2.6	0 – 20	6.0	0 – 20
Hardwood	1.7	0 – 10	4.5	1 – 15
Regenerating or Shrubby Tree	3.0	0 – 21.2	3.5	2 – 5
Shrub	75.1	54.2 – 90	2.3	0.5 – 5
Herb	1.6	0 – 6	0.3	0 – 1

### Local Environmental Description

**Elevation:** Mean 405 m, Range 181 – 561 m

**Aspect:** SW (6), SE (5), NE (2), Variable (1), NW (1)

**Slope:** Mean 13 degrees, Range 4 – 27 degrees

**Macro Topography:** Upper 1/3 of slope (6), Ridge top (5), Middle 1/3 of slope (3)

**Large Rock:** Mean 1.8%, Range 0.0 – 10.0%

**Small Rock:** Mean 14.7%, Range 0.0 – 95.0%

**Fines Cover:** Mean 20.8%, Range 1.0 – 70.0%

**Litter Cover:** Mean 67.7%, Range 8.0 – 100%

**Soil Texture (field assessed):** Moderately coarse, sandy loam (6), Coarse, loamy sand (4), Moderately fine sandy clay loam (3), Medium loam (1), Medium to very fine, sandy loam (1)

**Geology (field or map data):** Franciscan melange (15), Sandstone (2), Sandstone and other sedimentary (2), Shale (1)

**Marin County Watersheds:** Bolinas (12), Lagunitas Creek (6), San Rafael (1)

### Site Impacts

This association has very low non-native plant cover (average 0.1%) relative to native cover.

### Classification Comments

Due to hybridization and morphological similarity between the species, plants identified as *Quercus wislizeni* may be *Quercus parvula*, which has been found to be the most widespread genotype in Marin County (Dodd and Afzul-Rafii 2004, Hauser et al. 2017).

**References:** Evens and Kentner 2006, Keeler-Wolf et al. 2003a

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

**Total: N=22; Marin County (n=22):** BORI001, GGNRA293, MARIN090, MARIN119, MARIN121, MARIN144, MMWD0192, MMWD0203, MMWD0402, MMWD0403, MMWD0413, MMWD0414, PGA1541, PGA1561, PGA1591, PGA1646, PGA1653, PGA1654A, PGA1662, PORE126, PORE129, VASE0083

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Pseudotsuga menziesii</i>	45	22.8	1.1	0.2	5.0				
	<i>Sequoia sempervirens</i>	23	10.1	1.2	1.9	15.0				
	<i>Quercus wislizeni</i>	23	14.2	0.9	0.2	9.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Chrysolepis chrysophylla</i> var. <i>minor</i>	32	25.4	1.6	0.2	21.0				
	<i>Quercus wislizeni</i> *	23	18.2	0.8	0.2	10.0				
<b>Shrub</b>										
	<b><i>Arctostaphylos sensitiva</i></b>	<b>100</b>	<b>70.8</b>	<b>56.7</b>	<b>10.0</b>	<b>95.2</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Vaccinium ovatum</i>	86	10.1	8.6	0.2	48.7	<b>X</b>			<b>X</b>
	<i>Arctostaphylos glandulosa</i>	82	14.9	11.3	0.2	37.5	<b>X</b>			<b>X</b>
	<i>Pickeringia montana</i>	50	0.9	0.7	0.2	5.0				<b>X</b>
	<i>Eriodictyon californicum</i>	36	0.2	0.2	0.2	2.0				
<b>Herb</b>										
	<i>Pteridium aquilinum</i>	32	25.7	1.0	0.2	12.0				
<b>Non-vasc</b>										
	Lichen	32	29.2	0.9	0.2	5.0				

## ***Chrysolepis chrysophylla* – *Arctostaphylos glandulosa* Association**

**Common Name:** Chinquapin – Eastwood Manzanita Shrubland

**Alliance:** *Arctostaphylos (nummularia, sensitiva)* – *Chrysolepis chrysophylla* Shrubland Alliance

### **Local Vegetation Description**

The Chinquapin – Eastwood Manzanita Association forms a sparse to continuous shrub layer. The emergent tree layer can be sparse to intermittent, and the herbaceous layer is sparse to open. Dominant and characteristic shrubs include *Arctostaphylos glandulosa*. Regenerating or shrubby trees often includes *Chrysolepis chrysophylla* var. *minor* and *Quercus wislizeni*. Commonly associated emergent trees at sparse cover include *Chrysolepis chrysophylla* var. *chrysophylla*, *Pseudotsuga menziesii*, and *Quercus wislizeni*. The herbaceous layer often includes *Pteridium aquilinum*, and herbs that are sometimes present include *Aira caryophyllea*, *Clinopodium douglasii*, and *Hypericum concinnum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	1.4	0 – 6	12.5	10 – 15
Hardwood	15.6	0 – 50	9.2	5 – 15
Regenerating or Shrubby Tree	19.1	0.2 – 49.0	3.5	2 – 5
Shrub	48.4	1 – 78	1.9	0 – 5
Herb	2.0	0.2 – 6	0.3	0 – 0.5

### **Local Environmental Description**

**Elevation:** Mean 403 m, Range 234 – 760 m

**Aspect:** NE (2), NW (1), SW (1), Variable (1)

**Slope:** Mean 21 degrees, Range 9 – 31 degrees

**Macro Topography:** Middle 1/3 of slope (3), Upper 1/3 of slope (3)

**Large Rock:** Mean 0.9%, Range 0.0 – 3.0%

**Small Rock:** Mean 14.3%, Range 0.5 – 35.0%

**Fines Cover:** Mean 24.1%, Range 0.5 – 44.0%

**Litter Cover:** Mean 58.2%, Range 22.0 – 95%

**Soil Texture (field assessed):** Medium loam (2), Moderately coarse, sandy loam (2), Medium sand (1), Moderately fine clay loam (1)

**Geology (field or map data):** Franciscan melange (5), Ultramafic (type unknown) (1), Granitic (1)

**Marin County Watersheds:** Lagunitas Creek (3), San Rafael (2), Bolinas (1), Inverness (1)

### **Site Impacts**

This association has very low non-native plant cover (average 0.1%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*.

### **Classification Comments**

Due to hybridization and morphological similarity between the species, plants identified as *Quercus wislizeni* may be *Quercus parvula*, which has been found to be the most widespread genotype in Marin County (Dodd and Afzul-Rafii 2004, Hauser et al. 2017).

**References:** Evens and Kentner 2006

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

**Total: N=7; Marin County (n=7):** MARIN004, MMWD0208, MMWD0214, MMWD0279, MMWD0314, MMWD0357, PGA3759

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<b><i>Chrysolepis chrysophylla</i></b> <b>var. <i>chrysophylla</i></b>	<b>57</b>	<b>52.3</b>	<b>21.4</b>	<b>10.0</b>	<b>50.0</b>				<b>X</b>
	<i>Pseudotsuga menziesii</i>	29	15.2	1.0	1.0	6.0				
	<i>Quercus wislizeni</i>	29	2.0	0.3	0.2	2.0				
<b>Regenerating or Shrubby Trees</b>										
	<b><i>Chrysolepis chrysophylla</i></b> <b>var. <i>minor</i></b>	<b>57</b>	<b>28.3</b>	<b>11.1</b>	<b>2.0</b>	<b>46.0</b>				<b>X</b>
	<i>Quercus wislizeni</i> *	57	36.9	6.1	1.0	20.0				<b>X</b>
	<i>Pseudotsuga menziesii</i> *	29	1.3	0.6	1.0	3.0				
<b>Shrub</b>										
	<b><i>Arctostaphylos glandulosa</i></b>	<b>100</b>	<b>71.3</b>	<b>15.7</b>	<b>1.0</b>	<b>34.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Pickeringia montana</i>	43	3.5	1.1	2.0	4.0				
	<i>Dendromecon rigida</i>	43	0.6	0.2	0.2	1.0				
	<i>Adenostoma fasciculatum</i>	29	6.2	2.0	7.0	7.0				
<b>Herb</b>										
	<i>Pteridium aquilinum</i>	71	40.7	0.6	0.2	2.0				<b>X</b>
	<i>Clinopodium douglasii</i>	29	7.3	0.2	0.2	1.0				
	<i>Aira caryophyllea</i>	29	15.2	0.1	0.2	0.2				
	<i>Hypericum concinnum</i>	29	3.8	0.1	0.2	0.2				
<b>Non-vasc</b>										
	Moss	43	42.9	0.2	0.2	1.0				
	Lichen	29	28.6	0.1	0.2	0.2				

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

**Common Name:** Giant Chinquapin / Black Huckleberry Shrubland

**Alliance:** *Arctostaphylos (nummularia, sensitiva)* – *Chrysolepis chrysophylla* Shrubland Alliance

### **Local Vegetation Description**

The Giant Chinquapin / Black Huckleberry Association forms an open to continuous shrub layer. The emergent tree layer can be sparse to continuous, and the herbaceous layer is sparse to open. Dominant and characteristic shrubs include *Vaccinium ovatum*. Commonly associated emergent trees at sparse cover include *Chrysolepis chrysophylla* var. *chrysophylla*, *Notholithocarpus densiflorus*, and *Sequoia sempervirens*. The herbaceous layer often includes *Pteridium aquilinum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	2.2	0 – 9	19.2	10 – 35
Hardwood	28.3	0 – 80	11.6	5 – 20
Regenerating or Shrubby Tree	9.2	0 – 77.0	2.4	0 – 5
Shrub	53.7	5 – 90	1.9	0.5 – 5
Herb	1.5	0.2 – 8	0.6	0 – 2

### **Local Environmental Description**

**Elevation:** Mean 308 m, Range 37 – 486 m

**Aspect:** NE (6), NW (3), SW (1), Variable (1), SE (1)

**Slope:** Mean 17 degrees, Range 3 – 36 degrees

**Macro Topography:** Upper 1/3 of slope (5), Middle 1/3 of slope (4), Ridge top (2), Middle to Upper 1/3 of slope (1)

**Large Rock:** Mean 0.1%, Range 0.0 – 0.5%

**Small Rock:** Mean 11.1%, Range 0.0 – 70.0%

**Fines Cover:** Mean 13.9%, Range 0.0 – 40.0%

**Litter Cover:** Mean 79.3%, Range 40.0 – 100%

**Soil Texture (field assessed):** Medium to very fine, sandy loam (2), Moderately coarse, sandy loam (2), Moderately fine clay loam (2), Coarse, loamy sand (2), Medium loam (1), Moderately fine sandy clay loam (1), Moderately fine silty clay loam (1), Medium to very fine, loamy sand (1)

**Geology (field or map data):** Franciscan melange (10), Granitic (3)

**Marin County Watersheds:** Lagunitas Creek (4), San Rafael (4), Inverness (3), Bolinas (2)

### **Site Impacts**

This association has very low non-native plant cover (average 0.0%) relative to native cover.

### **Classification Comments**

Due to hybridization and morphological similarity between the species, plants identified as *Quercus wislizeni* may be *Quercus parvula*, which has been found to be the most widespread genotype in Marin County (Dodd and Afzul-Rafii 2004, Hauser et al. 2017).

**References:** Buck and Evens 2010, Evens and Kentner 2006, Keeler-Wolf et al. 2003a, VegCAMP 2018

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

**Total: N=15; Marin County (n=15):** GGNRA292, MARIN120, MARIN148, MMWD0211, MMWD0216A, MMWD0264, MMWD0405, MOSD0029, MOSD0031, MOSD0107, PGA104, PGA7716, PGA8827, PORE117, PORE190

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Chrysolepis chrysophylla</i> var. <i>chrysophylla</i>	67	60.3	28.3	12.0	80.0				X
	<i>Sequoia sempervirens</i>	33	2.8	0.9	0.2	7.0				
	<i>Notholithocarpus densiflorus</i>	33	1.4	0.3	0.2	2.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Quercus wislizeni</i>	33	7.2	0.4	0.2	2.0				
<b>Shrub</b>										
	<i>Vaccinium ovatum</i>	100	87.0	43.7	5.0	90.2	X	X		X
	<i>Arctostaphylos glandulosa</i>	47	5.2	2.2	0.2	17.0				
<b>Herb</b>										
	<i>Pteridium aquilinum</i>	73	53.5	0.8	0.2	4.0				X



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## ***Arctostaphylos glandulosa* Shrubland Alliance**

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**Common Name:** Eastwood manzanita chaparral

**NVC Alliance Code:** A3860. *Quercus wislizeni* var. *frutescens* - *Arctostaphylos glandulosa* Pre-montane Chaparral Alliance

### **Statewide Description**

*Arctostaphylos glandulosa* is dominant or co-dominant in the shrub canopy with *Adenostoma fasciculatum*, *Arctostaphylos glauca*, *Baccharis pilularis*, *Ceanothus crassifolius*, *Ceanothus cuneatus*, *Ceanothus greggii*, *Ceanothus leucodermis*, *Cercocarpus montanus*, *Eriogonum fasciculatum*, *Hesperoyucca whipplei*, *Heteromeles arbutifolia*, *Quercus berberidifolia*, *Quercus wislizeni*, and *Rhus ovata*. Emergent trees may be present at low cover, including *Pinus attenuata*, *Pinus coulteri*, or *Quercus agrifolia*.

All forms of *Arctostaphylos glandulosa* are included in this alliance. Mixed stands formerly considered members of the *Adenostoma fasciculatum* – *Arctostaphylos glandulosa* Alliance (Gordon and White 1994, Sawyer and Keeler-Wolf 1995, Borchert et al. 2004) are now considered part of this alliance. This placement is based on ecological similarities between pure and mixed stands, which include slope position, elevation, and fire history.

The *Arctostaphylos glandulosa* Alliance tends to occur at middle or moderately high elevations in the northern, central, and southern Coast Ranges that regularly experience winter freezes. Stands often occur on upper hill slopes and they are particularly common on ridges in very well-drained settings. Stands at higher elevations and on ridges tend to be of short stature and weather-beaten.

### Local Vegetation Description

The Eastwood manzanita chaparral Alliance forms an open to continuous shrub layer. The emergent tree layer is typically sparse to intermittent, and the herbaceous layer is sparse to intermittent. Dominant and characteristic shrubs include *Arctostaphylos glandulosa* and *Adenostoma fasciculatum*, and those that are often present include *Diplacus aurantiacus* and *Heteromeles arbutifolia*. Commonly associated emergent trees at sparse cover include *Quercus wislizeni*. The herbs that are sometimes present include *Aira caryophyllea*, *Chlorogalum pomeridianum* and *Iris douglasiana*. Commonly associated non-vascular plants include Lichen and Moss.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.4	0 – 5	10.4	2 – 35
Hardwood	3.9	0 – 22	5.9	1 – 15
Regenerating or Shrubby Tree	4.8	0 – 35.6	3.5	0.5 – 10
Shrub	69.6	12.0 – 98.0	2.3	0 – 5
Herb	3.0	0 – 37	0.4	0 – 5

### Local Membership Rule

*Arctostaphylos glandulosa* dominates or co-dominates with *Adenostoma fasciculatum* and/or *Quercus wislizeni* on convexities, outcrops, ridges, or slopes. Sometimes *Q. wislizeni* may be a tree, though often it is shrubby in stands sampled. Soils may be derived from sandstone, serpentine, or gabbro. Species commonly found as emergent trees or sub-dominant shrubs include *Arbutus menziesii*, *Arctostaphylos* spp., *Diplacus aurantiacus*, and *Heteromeles arbutifolia*.

### Local Environmental Description

**Elevation:** Mean 356 m, Range 9 – 739 m

**Aspect:** SE (18), SW (13), NW (8), NE (7), Flat (2), Variable (1)

**Slope:** Mean 22 degrees, Range 0 – 60 degrees

**Macro Topography:** Upper 1/3 of slope (28), Middle 1/3 of slope (9), Ridge top (9), Lower 1/3 of slope (2), Bottom (1)

**Large Rock:** Mean 2.7%, Range 0.0 – 35.0%

**Small Rock:** Mean 13.2%, Range 0.0 – 75%

**Fines Cover:** Mean 23.3%, Range 0.2 – 80%

**Litter Cover:** Mean 57.7%, Range 0.2 – 99%

**Soil Texture (field assessed):** Moderately coarse, sandy loam (10), Moderately fine clay loam (8), Medium to very fine, sandy loam (7), Moderately fine sandy clay loam (6), Coarse, loamy sand (4), Medium loam (3), Medium to very fine, loamy sand (3), Medium silt loam (2), Medium sand (2), Moderately fine silty clay loam (2)

**Geology (field or map data):** Franciscan melange (38), Sandstone and other sedimentary (5), Ultramafic rocks, mostly serpentine (4), Sandstone (3), Serpentine (2), Alluvium (1), Siltstone (1), Ultramafic (type unknown) (1), Volcanic and metavolcanic rocks (1), Granitic (1)

**Marin County Watersheds:** Lagunitas Creek (19), San Rafael (18), Bolinas (12), Novato (3), Bay Waters (1), Point Reyes (1), Walker Creek (1)

### Site Impacts

This alliance has very low non-native plant cover (average 0.7%) relative to native cover. Non-native species with highest frequency and abundance include *Aira caryophyllea*.

### Associations in Marin County

*Arctostaphylos glandulosa*

*Arctostaphylos glandulosa* – *Adenostoma fasciculatum*

*Arctostaphylos glandulosa* – *Adenostoma fasciculatum* – *Quercus wislizeni*

*Arctostaphylos glandulosa* Shrubland Alliance

**Classification Comments**

None.

**References:** AECOM 2013, Borchert et al. 2004, Buck and Evens 2010, Evens and Kentner 2006, Evens and San 2005, Evens et al. 2006, Gordon and White 1994, Keeler-Wolf and Evens 2006, Keeler-Wolf et al. 2003a, Klein and Evens 2005, Klein et al. 2015, Parker 1990b, Sproul et al. 2011

**Global Rarity Rank:** G4

**State Rarity Rank:** S4

**Surveys Used for Description**

**Total: N=62; Marin County (n=62):** GGNRA277, GGNRA296, MARIN076, MARIN122, MARIN139, MARIN143, MMWD0120, MMWD0164, MMWD0194, MMWD0206, MMWD0213, MMWD0218A, MMWD0222, MMWD0231, MMWD0236, MMWD0263A, MMWD0277, MMWD0281, MMWD0294, MMWD0307, MMWD0309, MMWD0343, MMWD0344, MMWD0360, MMWD0362, MMWD0364, MMWD0399, MOSD0001, MOSD0005, MOSD0027, MOSD0035, MOSD0038, MOSD0070, MOSD0072, MOSD0101, MOSD0102, MOSD0109, MOSD0116, MOSD0123, MOSD0145, MOSD0231, MOSD0237, PGA1343, PGA1346, PGA1546, PGA1554, PGA1572, PGA1578, PGA1602, PGA1604, PGA1610, PGA1634, PGA1651, PGA1658, PGA1670, PORE128, PORE131, PORE183, PORE185, PORE188, PORE189, VASE0047

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Quercus wislizeni</i>	23	15.7	1.4	0.2	20.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Quercus wislizeni</i> *	48	43.3	4.0	0.2	32.0				
	<i>Pseudotsuga menziesii</i>	29	13.5	0.2	0.2	3.0				
<b>Shrub</b>										
	<b><i>Arctostaphylos glandulosa</i></b>	<b>100</b>	<b>60.0</b>	<b>41.9</b>	<b>2.0</b>	<b>95.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Adenostoma fasciculatum</i>	84	26.2	18.0	0.2	85.0	<b>X</b>			<b>X</b>
	<i>Diplacus aurantiacus</i>	55	0.9	0.6	0.2	10.0				<b>X</b>
	<i>Heteromeles arbutifolia</i>	52	2.8	1.6	0.2	20.0				<b>X</b>
	<i>Toxicodendron diversilobum</i>	44	1.0	0.6	0.2	8.0				
	<i>Lonicera hispidula</i>	35	0.7	0.6	0.1	10.0				
	<i>Eriodictyon californicum</i>	29	0.4	0.3	0.2	5.0				
	<i>Baccharis pilularis</i>	26	1.4	1.0	0.2	30.0				
	<i>Ceanothus cuneatus</i>	26	1.5	1.0	0.2	26.0				
	<i>Pickeringia montana</i>	26	0.7	0.5	0.2	10.0				
<b>Herb</b>										
	<i>Iris douglasiana</i>	26	8.3	0.1	0.2	3.0				
	<i>Aira caryophyllea</i>	24	4.0	0.2	0.2	6.0				
	<i>Chlorogalum pomeridianum</i>	21	3.1	0.1	0.2	2.0				
<b>Non-vascular</b>										
	Lichen	24	18.3	0.6	0.2	15.0				
	Moss	21	13.9	0.2	0.2	3.0				

## Arctostaphylos glandulosa Association

**Common Name:** Eastwood Manzanita Shrubland

**Alliance:** *Arctostaphylos glandulosa* Shrubland Alliance

### Local Vegetation Description

The Eastwood Manzanita Association forms an open to continuous shrub layer. The emergent tree layer is typically sparse to open, and the herbaceous layer is sparse to intermittent. Dominant and characteristic shrubs include *Arctostaphylos glandulosa*, and those that are often present include *Adenostoma fasciculatum* and *Heteromeles arbutifolia*. Commonly associated emergent trees at sparse cover include *Arbutus menziesii*, *Pseudotsuga menziesii*, and *Quercus wislizeni*. The herbaceous layer sometimes includes *Iris douglasiana* and *Pteridium aquilinum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.8	0 – 4	12.7	2 – 35
Hardwood	2.6	0 – 13	7.1	2 – 15
Regenerating or Shrubby Tree	2.1	0 – 8.0	3.4	0.5 – 10
Shrub	68.5	12 – 92	2.6	1 – 5
Herb	3.3	0.2 – 37	0.5	0 – 5

### Local Environmental Description

**Elevation:** Mean 337 m, Range 179 – 560 m

**Aspect:** SW (5), NW (5), NE (4), SE (3)

**Slope:** Mean 20 degrees, Range 5 – 35 degrees

**Macro Topography:** Upper 1/3 of slope (11), Middle 1/3 of slope (4), Bottom (1), Lower 1/3 of slope (1)

**Large Rock:** Mean 0.5%, Range 0.0 – 2.0%

**Small Rock:** Mean 3.6%, Range 0.2 – 15.0%

**Fines Cover:** Mean 14.5%, Range 0.2 – 74.0%

**Litter Cover:** Mean 74.3%, Range 10.0 – 94%

**Soil Texture (field assessed):** Moderately fine sandy clay loam (4), Moderately coarse, sandy loam (3), Medium silt loam (2), Medium to very fine, loamy sand (2), Medium to very fine, sandy loam (2), Coarse, loamy sand (2), Medium loam (1), Moderately fine clay loam (1)

**Geology (field or map data):** Franciscan melange (14), Ultramafic rocks, mostly serpentine (2), Sandstone and other sedimentary (2), Granitic (1), Volcanic and metavolcanic rocks (1)

**Marin County Watersheds:** Lagunitas Creek (9), San Rafael (7), Bolinas (3), Point Reyes (1)

### Site Impacts

This association has very low non-native plant cover (average 0.1%) relative to native cover.

### Classification Comments

Due to hybridization and morphological similarity between the species, plants identified as *Quercus wislizeni* may be *Quercus parvula*, which has been found to be the most widespread genotype in Marin County (Dodd and Afzul-Rafii 2004, Hauser et al. 2017).

**References:** AECOM 2013, Borchert et al. 2004, Buck and Evens 2010, Evens and San 2005, Evens et al. 2006, Gordon and White 1994, Keeler-Wolf and Evens 2006, Klein and Evens 2005, Klein et al. 2015

**Global Rarity Rank:** G3G4

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

**Total: N=20; Marin County (n=20):** MARIN122, MARIN143, MMWD0164, MMWD0218A, MMWD0222, MMWD0263A, MMWD0360, MMWD0364, MMWD0399, MOSD0005, MOSD0027, MOSD0072, MOSD0101, MOSD0102, MOSD0123, MOSD0145, PGA1546, PGA1554, PGA1602, PORE189

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Quercus wislizeni</i>	30	17.8	0.6	0.2	7.0				
	<i>Pseudotsuga menziesii</i>	30	18.9	0.5	0.2	4.0				
	<i>Arbutus menziesii</i>	25	4.1	0.2	0.2	2.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Pseudotsuga menziesii</i> *	45	20.5	0.3	0.2	2.0				
	<i>Quercus wislizeni</i> *	40	31.5	1.2	0.2	8.0				
<b>Shrub</b>										
	<b><i>Arctostaphylos glandulosa</i></b>	<b>100</b>	<b>87.3</b>	<b>63.4</b>	<b>10.0</b>	<b>95.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Adenostoma fasciculatum</i>	60	2.5	1.5	0.2	6.0				<b>X</b>
	<i>Heteromeles arbutifolia</i>	50	3.1	1.3	0.2	12.0				<b>X</b>
	<i>Diplacus aurantiacus</i>	35	0.2	0.1	0.2	1.0				
	<i>Toxicodendron diversilobum</i>	35	0.1	0.1	0.2	0.2				
	<i>Vaccinium ovatum</i>	25	3.7	2.0	0.2	30.0				
	<i>Pickeringia montana</i>	25	0.3	0.2	0.2	2.0				
<b>Herb</b>										
	<i>Iris douglasiana</i>	45	13.3	0.1	0.2	0.2				
	<i>Pteridium aquilinum</i>	35	25.9	0.6	0.2	5.0				
<b>Non-vasc</b>										
	Lichen	40	28.8	0.3	0.2	2.0				

## ***Arctostaphylos glandulosa* – *Adenostoma fasciculatum* Association**

**Common Name:** Chamise – Eastwood's Manzanita Shrubland Shrubland

**Alliance:** *Arctostaphylos glandulosa* Shrubland Alliance

### **Local Vegetation Description**

The Chamise – Eastwood's Manzanita Shrubland Association forms an open to continuous shrub layer. The emergent tree layer is typically sparse, and the herbaceous layer is sparse to open. *Adenostoma fasciculatum* and *Arctostaphylos glandulosa* are co-dominant in the shrub layer, and those that are often present include *Diplacus aurantiacus*. The herbaceous layer sometimes includes *Aira caryophyllea*, *Chlorogalum pomeridianum*, *Melica torreyana*, *Pentagramma triangularis*, and *Zigadenus fremontii*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.3	0 – 5	3.5	2 – 5
Hardwood	0.6	0 – 3	4.7	1 – 10
Regenerating or Shrubby Tree	0.5	0 – 4	2.8	0.5 – 5
Shrub	68.4	12 – 98	2.1	0 – 5
Herb	2.8	0.2 – 24.5	0.3	0 – 1

### **Local Environmental Description**

**Elevation:** Mean 387 m, Range 196 – 739 m

**Aspect:** SE (8), SW (4), NE (2), Variable (1), Flat (1)

**Slope:** Mean 20 degrees, Range 0 – 32 degrees

**Macro Topography:** Upper 1/3 of slope (10), Ridge top (5), Middle 1/3 of slope (1)

**Large Rock:** Mean 3.9%, Range 0.0 – 35.0%

**Small Rock:** Mean 19.4%, Range 0.2 – 50.0%

**Fines Cover:** Mean 34.5%, Range 0.2 – 80.0%

**Litter Cover:** Mean 39.8%, Range 0.2 – 89%

**Soil Texture (field assessed):** Moderately fine clay loam (4), Moderately coarse, sandy loam (3), Medium to very fine, sandy loam (2), Medium sand (2), Moderately fine silty clay loam (1), Coarse, loamy sand (1), Medium loam (1), Medium to very fine, loamy sand (1)

**Geology (field or map data):** Franciscan melange (10), Sandstone and other sedimentary (3), Serpentine (2), Ultramafic rocks, mostly serpentine (2), Ultramafic (type unknown) (1), Sandstone (1)

**Marin County Watersheds:** San Rafael (6), Bolinas (4), Lagunitas Creek (4), Novato (3)

### **Site Impacts**

This association has low non-native plant cover (average 1.3%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*.

### **Classification Comments**

Due to hybridization and morphological similarity between the species, plants identified as *Quercus wislizeni* may be *Quercus parvula*, which has been found to be the most widespread genotype in Marin County (Dodd and Afzul-Rafii 2004, Hauser et al. 2017).

**References:** AECOM 2013, Evens and Kentner 2006, Evens and San 2005, Keeler-Wolf and Evens 2006, Klein and Evens 2005, Klein et al. 2015, Parker 1990b, Sproul et al. 2011

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** N

**Surveys Used for Description**

**Total: N=21; Marin County (n=21):** GGNRA277, MARIN076, MARIN139, MMWD0120, MMWD0194, MMWD0236, MMWD0343, MOSD0001, MOSD0038, MOSD0070, MOSD0109, MOSD0116, MOSD0231, MOSD0237, PGA1346, PGA1610, PGA1634, PGA1651, PGA1670, PORE128, PORE131

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Regenerating or Shrubby Trees</b>										
	<i>Quercus wislizeni</i>	29	28.6	0.2	0.2	3.0				
<b>Shrub</b>										
	<b><i>Adenostoma fasciculatum</i></b>	<b>100</b>	<b>46.5</b>	<b>31.2</b>	<b>10.0</b>	<b>85.0</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<b><i>Arctostaphylos glandulosa</i></b>	<b>100</b>	<b>38.8</b>	<b>26.8</b>	<b>2.0</b>	<b>58.0</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<i>Diplacus aurantiacus</i>	62	1.5	1.2	0.2	10.0				<b>X</b>
	<i>Heteromeles arbutifolia</i>	43	2.2	1.6	0.2	10.0				
	<i>Toxicodendron diversilobum</i>	43	1.1	0.7	0.2	6.0				
	<i>Eriodictyon californicum</i>	38	0.6	0.5	0.2	5.0				
	<i>Baccharis pilularis</i>	33	2.9	2.4	0.2	30.0				
	<i>Lonicera hispidula</i>	33	0.7	0.6	0.2	5.0				
	<i>Ceanothus cuneatus</i>	29	1.3	0.9	0.2	7.0				
	<i>Pickeringia montana</i>	29	0.4	0.3	0.2	3.0				
	<i>Garrya elliptica</i>	24	0.5	0.4	0.2	3.0				
<b>Herb</b>										
	<i>Aira caryophyllea</i>	38	8.1	0.4	0.2	6.0				
	<i>Chlorogalum pomeridianum</i>	29	3.8	0.2	0.2	2.0				
	<i>Melica torreyana</i>	24	5.4	0.2	0.2	2.0				
	<i>Zigadenus fremontii</i>	24	6.0	0.1	0.2	1.0				
	<i>Pentagramma triangularis</i>	24	5.4	0.0	0.2	0.2				
<b>Non-vasc</b>										
	Moss	24	13.8	0.1	0.2	1.0				



## Arctostaphylos glandulosa – Adenostoma fasciculatum – Quercus wislizeni Association

**Common Name:** Chamise – Bigberry Manzanita – Interior Live Oak Shrubland

**Alliance:** *Arctostaphylos glandulosa* Shrubland Alliance

### Local Vegetation Description

The Chamise – Bigberry Manzanita – Interior Live Oak Association forms an intermittent to continuous shrub layer. The emergent tree layer is typically sparse to open, and the herbaceous layer is sparse to open. *Arctostaphylos glandulosa* and *Adenostoma fasciculatum* are co-dominant in the shrub layer along with *Quercus wislizeni*, which is regenerating as a shrub or shrubby trees as another co-dominant or characteristic plant. Those shrubs that are often present include *Diplacus aurantiacus*, *Heteromeles arbutifolia*, *Lonicera hispidula*, and *Toxicodendron diversilobum*. Commonly associated emergent trees at sparse cover include *Quercus wislizeni*. The herbaceous layer sometimes includes *Aira caryophyllea*, *Iris douglasiana*, and *Pentagramma triangularis*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.2	0 – 3	3.5	2 – 5
Hardwood	8.7	0 – 22	5.7	2 – 15
Regenerating or Shrubby Tree	11.8	0 – 35.6	7.5	5 – 10
Shrub	72.3	50 – 95	2.3	0.5 – 5
Herb	2.9	0.2 – 6	0.3	0 – 2

### Local Environmental Description

**Elevation:** Mean 345 m, Range 9 – 696 m

**Aspect:** SE (7), SW (4), NW (3), Flat (1), NE (1)

**Slope:** Mean 27 degrees, Range 3 – 60 degrees

**Macro Topography:** Upper 1/3 of slope (7), Middle 1/3 of slope (4), Ridge top (4), Lower 1/3 of slope (1)

**Large Rock:** Mean 3.9%, Range 0.0 – 30.0%

**Small Rock:** Mean 17.6%, Range 0.0 – 75.0%

**Fines Cover:** Mean 22.9%, Range 4.0 – 45.0%

**Litter Cover:** Mean 58.0%, Range 2.8 – 99%

**Soil Texture (field assessed):** Moderately coarse, sandy loam (4), Moderately fine clay loam (3), Medium to very fine, sandy loam (3), Moderately fine sandy clay loam (2), Medium loam (1), Coarse, loamy sand (1), Moderately fine silty clay loam (1)

**Geology (field or map data):** Franciscan melange (14), Sandstone (2), Alluvium (1), Siltstone (1)

**Marin County Watersheds:** Lagunitas Creek (6), Bolinas (5), San Rafael (5), Bay Waters (1), Walker Creek (1)

### Site Impacts

This association has very low non-native plant cover (average 0.7%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*.

### Classification Comments

Due to hybridization and morphological similarity between the species, plants identified as *Quercus wislizeni* may be *Quercus parvula*, which has been found to be the most widespread genotype in Marin County (Dodd and Afzul-Rafii 2004, Hauser et al. 2017).

**References:** Evens and Kentner 2006, Keeler-Wolf et al. 2003a

**Global Rarity Rank:** G3

**State Rarity Rank:** S3?

**State Rare:** Y



**Surveys Used for Description**

**Total: N=21; Marin County (n=21):** GGNRA296, MMWD0206, MMWD0213, MMWD0231, MMWD0277, MMWD0281, MMWD0294, MMWD0307, MMWD0309, MMWD0344, MMWD0362, MOSD0035, PGA1343, PGA1572, PGA1578, PGA1604, PGA1658, PORE183, PORE185, PORE188, VASE0047

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Quercus wislizeni</i>	24	18.8	3.3	4.3	20.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Quercus wislizeni</i> *	76	69.3	10.6	5.0	32.0	X	X		X
	<i>Umbellularia californica</i>	29	7.3	0.6	0.2	6.0				
	<i>Pseudotsuga menziesii</i>	24	5.5	0.1	0.2	2.0				
<b>Shrub</b>										
	<i>Arctostaphylos glandulosa</i>	100	55.1	36.7	5.0	75.0	X	X		X
	<i>Adenostoma fasciculatum</i>	90	28.6	20.6	1.0	70.0	X			X
	<i>Diplacus aurantiacus</i>	67	0.9	0.6	0.2	4.0				X
	<i>Heteromeles arbutifolia</i>	62	3.1	2.0	0.2	20.0				X
	<i>Lonicera hispidula</i>	57	1.2	1.1	0.1	10.0				X
	<i>Toxicodendron diversilobum</i>	52	1.6	0.9	0.2	8.0				X
	<i>Ceanothus cuneatus</i>	33	2.5	1.6	0.2	26.0				
	<i>Baccharis pilularis</i>	33	1.1	0.7	0.2	5.0				
	<i>Eriodictyon californicum</i>	33	0.5	0.4	0.2	5.0				
	<i>Pickeringia montana</i>	24	1.5	1.1	1.0	10.0				
<b>Herb</b>										
	<i>Pentagramma triangularis</i>	29	3.9	0.1	0.2	0.2				
	<i>Iris douglasiana</i>	24	11.6	0.3	0.2	3.0				
	<i>Aira caryophyllea</i>	24	2.4	0.0	0.2	0.2				

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## ***Artemisia californica* – (*Salvia leucophylla*) Shrubland Alliance**

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**Common Name:** California sagebrush – (purple sage) scrub

**NVC Alliance Code:** A3883. *Artemisia californica* - *Salvia leucophylla* Mesic Scrub Alliance

### **Statewide Description**

*Artemisia californica* is dominant or co-dominant in the shrub canopy with *Adenostoma fasciculatum*, *Baccharis pilularis*, *Cleome isomeris*, *Diplacus aurantiacus*, *Encelia californica*, *Eriogonum fasciculatum*, *Hesperoyucca whipplei*, *Isocoma menziesii*, *Keckiella cordifolia*, *Lotus scoparius*, *Opuntia littoralis*, *Rhus integrifolia*, *Salvia apiana*, *Salvia leucophylla*, *Salvia mellifera*, *Sambucus nigra*, and *Toxicodendron diversilobum*. Emergent trees or tall shrubs may be present at low cover.

Stands of this alliance occur in modal settings of coastal scrub throughout the central and southern California Coast Ranges. It is found particularly on steep slopes and in high abundance on protected, north-facing hillsides. Closer to the coast in the northern portion of its range, *A. californica* commonly mixes with *Baccharis pilularis* and transitions into the *Baccharis pilularis* alliance when that species becomes co-dominant. Farther inland and in drier portions of the southern coastal area, *A. californica* mixes with *Eriogonum fasciculatum* and transitions to the *Eriogonum fasciculatum* alliance where both species can co-dominate (Rundel 2007).

### **Local Vegetation Description**

The California sagebrush – (purple sage) scrub Alliance forms an open to continuous shrub layer. The emergent tree layer is typically sparse to open, and the herbaceous layer is sparse to continuous. Dominant and characteristic shrubs include *Artemisia californica*, *Baccharis pilularis* and *Diplacus aurantiacus*, and those that are often present include *Toxicodendron diversilobum*. The herbs that are often present include *Avena* spp., and herbs that are sometimes present include *Achillea millefolium*,

*Anagallis arvensis*, *Brachypodium distachyon*, *Briza maxima*, *Bromus diandrus*, *Chlorogalum pomeridianum*, *Elymus glaucus*, *Nassella pulchra* and *Plantago lanceolata*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	No data	
Hardwood	0.4	0 – 5	7.0	1 – 15
Regenerating or Shrubby Tree	0.0	0 – 1.0	4.5	1 – 10
Shrub	45.3	10.0 – 85.0	0.8	0 – 2
Herb	27.9	1 – 98	0.3	0 – 2

### **Local Membership Rule**

*Artemisia californica* dominates and may intermix with *Baccharis pilularis*, *Diplacus aurantiacus*, and/or *Toxicodendron diversilobum*. If *Baccharis pilularis* is present, *Artemisia californica* is greater in cover for this alliance.

### **Local Environmental Description**

**Elevation:** Mean 155 m, Range 8 – 422 m

**Aspect:** SE (16), SW (13)

**Slope:** Mean 34 degrees, Range 18 – 75 degrees

**Macro Topography:** Middle 1/3 of slope (10), Upper 1/3 of slope (8), Lower 1/3 of slope (3), Ridge top (1)

**Large Rock:** Mean 8.3%, Range 0.0 – 64.0%

**Small Rock:** Mean 15.4%, Range 0.2 – 50%

**Fines Cover:** Mean 23.2%, Range 0.2 – 80%

**Litter Cover:** Mean 30.1%, Range 0.2 – 90%

**Soil Texture (field assessed):** Moderately coarse, sandy loam (4), Moderately fine sandy clay loam (4), Medium to very fine, sandy loam (4), Medium loam (2), Moderately fine silty clay loam (2), Fine silty clay (1), Coarse, loamy sand (1), Not recorded (1), Unknown (1), Medium silt loam (1)

**Geology (field or map data):** Sandstone and other sedimentary (21), Franciscan melange (12), Chert (2), Sandstone, shale, and conglomerate (1), Large landslides (1), Granitic (1), Blueschist and semi-schist (1)

**Marin County Watersheds:** Bolinas (17), Novato (8), San Rafael (8), Lagunitas Creek (3), Petaluma River (1), Point Reyes (1), Walker Creek (1)

### **Site Impacts**

This alliance has moderate non-native plant cover (average 20.4%) relative to native cover. Non-native species with highest frequency and abundance include *Anagallis arvensis*, *Brachypodium distachyon*, *Briza maxima*, *Bromus diandrus* and *Plantago lanceolata*.

### **Associations in Marin County**

*Artemisia californica*

*Artemisia californica* – *Diplacus aurantiacus*

*Artemisia californica* / *Nassella (pulchra)*

### **Classification Comments**

None.

**References:** AECOM 2013, Buck and Evens 2010, Buck-Diaz and Evens 2011b, CNPS Vegetation Program 2015, Dixon 2019, Evens and San 2005, Evens et al. 2006, Gordon and White 1994, HDR 2014b, Keeler-Wolf and Evens 2006, Keeler-Wolf et al. 2003a, Kirkpatrick and Hutchinson 1977, Kittel et al. 2012, Reyes et al. 2020, Rodriguez et al. 2017, Sproul et al. 2011, Verdone and Evens 2010

**Global Rarity Rank:** G5

**State Rarity Rank:** S5

**Surveys Used for Description**

**Total: N=41; Marin County (n=41):** GGNRA309, GGNRA311, MARIN100, MMWD0040, MMWD0073, MMWD0093, MMWD0100, MMWD0358, MOSD0192, MOSD0195, MOSD0218, MOSD0233, MOSD0238, MOSD0241, MOSD0245, MOSD0248, MOSD0251, MOSD0287, MOSD0307, MOSD0370, MOSD0400, PGA1279, PGA1313A, PGA1351, PGA1368, PGA1676, PGA1694, PGA1715, PGA6828, PGA7976, PGA8517, PGA8559, PGA8797, SFANB08C, SFANS01, SFANS04, SFANS07, SFANS13, SFANS14, SFANS18, TAMG007C

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Artemisia californica</i>	100	60.1	31.7	5.0	85.4	X	X		X
	<i>Diplacus aurantiacus</i>	80	12.6	5.7	0.2	30.0	X			X
	<i>Baccharis pilularis</i>	78	15.1	10.1	0.2	49.4	X			X
	<i>Toxicodendron diversilobum</i>	71	5.5	4.0	0.2	28.4				X
	<i>Rubus ursinus</i>	22	1.3	0.9	0.2	20.0				
<b>Herb</b>										
	<i>Avena</i> spp.	54	8.0	3.7	0.2	80.0				X
	<i>Nassella pulchra</i>	39	4.3	3.1	0.2	51.0				
	<i>Anagallis arvensis</i>	34	2.6	1.4	0.2	35.0				
	<i>Plantago lanceolata</i>	34	2.0	1.4	0.2	20.0				
	<i>Briza maxima</i>	34	3.7	0.6	0.2	11.0				
	<i>Brachypodium distachyon</i>	29	11.6	3.6	0.2	50.0				
	<i>Chlorogalum pomeridianum</i>	29	2.1	0.6	0.2	15.0				
	<i>Elymus glaucus</i>	27	1.8	1.0	0.2	22.0				
	<i>Bromus diandrus</i>	24	2.9	1.1	0.2	35.0				
	<i>Achillea millefolium</i>	22	1.4	0.4	0.2	6.0				

## ***Artemisia californica* Association**

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**Common Name:** California Sagebrush Shrubland

**Alliance:** *Artemisia californica* – (*Salvia leucophylla*) Shrubland Alliance

### **Local Vegetation Description**

The California Sagebrush Association forms an open to continuous shrub layer. The emergent tree layer is typically absent, and the herbaceous layer is open to continuous. The dominant and characteristic shrub is *Artemisia californica*, and those that are often present include *Baccharis pilularis* and *Toxicodendron diversilobum*. The herbaceous layer often includes *Avena* spp., and herbs that are sometimes present include *Achillea millefolium*, *Brachypodium distachyon*, *Briza maxima*, *Bromus diandrus*, *Chlorogalum pomeridianum*, *Erodium botrys*, *Eschscholzia californica*, *Hypochaeris radicata*, *Lolium perenne*, *Nassella pulchra*, *Plantago lanceolata*, *Pteridium aquilinum*, and *Vulpia bromoides*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.4	0 – 4	1.5	1 – 2
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	40.6	10 – 85	0.6	0 – 1
Herb	32.0	5 – 85	0.3	0 – 0.5

### **Local Environmental Description**

**Elevation:** Mean 83 m, Range 8 – 179 m

**Aspect:** SW (4), SE (2)

**Slope:** Mean 30 degrees, Range 18 – 46 degrees

**Macro Topography:** Lower 1/3 of slope (2), Middle 1/3 of slope (2), Upper 1/3 of slope (1)

**Large Rock:** Mean 12.8%, Range 0.0 – 30.0%

**Small Rock:** Mean 14.6%, Range 6.0 – 25.0%

**Fines Cover:** Mean 27.2%, Range 0.2 – 80.0%

**Litter Cover:** Mean 40.4%, Range 12.0 – 87%

**Soil Texture (field assessed):** Moderately fine sandy clay loam (2), Not recorded (1), Medium to very fine, sandy loam (1), Moderately coarse, sandy loam (1)

**Geology (field or map data):** Sandstone and other sedimentary (5), Franciscan melange (3), Sandstone, shale, and conglomerate (1), Blueschist and semi-schist (1)

**Marin County Watersheds:** Bolinas (5), San Rafael (4), Petaluma River (1)

### **Site Impacts**

This association has moderate non-native plant cover (average 37.0%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Avena* spp., *Brachypodium distachyon*, *Briza maxima*, *Bromus diandrus*, *Erodium botrys*, *Hypochaeris radicata*, *Lolium perenne*, *Plantago lanceolata*, and *Vulpia bromoides*.

### **Classification Comments**

None.

**References:** AECOM 2013, Buck-Diaz and Evens 2011b, CNPS Vegetation Program 2015, Dixon 2019, Evens and San 2005, Evens et al. 2006, Gordon and White 1994, HDR 2014b, Keeler-Wolf and Evens 2006, Keeler-Wolf et al. 2003a, Kirkpatrick and Hutchinson 1977, Kittel et al. 2012, Reyes et al. 2020, Rodriguez et al. 2017, Sproul et al. 2011, Verdone and Evens 2010

Global Rarity Rank: G4

State Rarity Rank: S4

State Rare: N

**Surveys Used for Description**

**Total: N=11; Marin County (n=11):** MOSD0195, MOSD0287, MOSD0307, MOSD0400, PGA1279, PGA1676, PGA6828, PGA7976, PGA8797, SFANB08C, TAMG007C

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Artemisia californica</i>	100	73.5	25.5	8.0	55.0	X	X		X
	<i>Baccharis pilularis</i>	64	13.0	5.9	0.2	20.0				X
	<i>Toxicodendron diversilobum</i>	55	3.2	1.8	0.2	10.0				X
	<i>Diplacus aurantiacus</i>	45	1.5	0.7	0.2	2.0				
	<i>Rubus ursinus</i>	36	2.1	0.9	0.3	5.0				
<b>Herb</b>										
	<i>Avena</i> spp.	55	11.7	9.2	0.2	80.0				X
	<i>Briza maxima</i>	45	1.2	0.2	0.2	1.0				
	<i>Brachypodium distachyon</i>	36	17.8	9.6	5.0	50.0				
	<i>Bromus diandrus</i>	36	8.9	3.7	0.2	35.0				
	<i>Lolium perenne</i>	36	2.2	0.8	0.2	4.7				
	<i>Plantago lanceolata</i>	36	1.5	0.7	0.2	5.3				
	<i>Nassella pulchra</i>	36	1.5	0.7	0.2	4.0				
	<i>Chlorogalum pomeridianum</i>	36	0.3	0.1	0.2	0.2				
	<i>Erodium botrys</i>	27	1.2	1.2	0.3	8.2				
	<i>Vulpia bromoides</i>	27	1.4	1.0	0.2	10.0				
	<i>Eschscholzia californica</i>	27	1.3	0.8	1.0	6.0				
	<i>Pteridium aquilinum</i>	27	2.7	0.6	0.2	5.0				
	<i>Achillea millefolium</i>	27	3.6	0.5	0.2	5.0				
	<i>Hypochaeris radicata</i>	27	1.6	0.4	0.2	3.0				

## ***Artemisia californica* – *Diplacus aurantiacus* Association**

**Common Name:** California Sagebrush – Bush Monkeyflower Shrubland

**Alliance:** *Artemisia californica* – (*Salvia leucophylla*) Shrubland Alliance

### **Local Vegetation Description**

The California Sagebrush – Bush Monkeyflower Association forms an open to continuous shrub layer. The emergent tree layer is typically sparse, and the herbaceous layer is sparse to intermittent. *Artemisia californica* is typically dominant in the shrub layer, and *Diplacus aurantiacus* is characteristically present and sometimes co-dominant. Those that are often present include *Baccharis pilularis* and *Toxicodendron diversilobum*. Commonly associated emergent trees at sparse cover include *Quercus agrifolia*. The herbaceous layer often includes *Avena* spp., and herbs that are sometimes present include *Anagallis arvensis*, *Brachypodium distachyon*, *Briza maxima*, *Bromus carinatus*, *Bromus diandrus*, *Carduus pycnocephalus*, *Cynosurus echinatus*, *Elymus glaucus*, *Eriophyllum stoechadifolium*, *Galium* spp., *Nassella pulchra*, and *Pentagramma triangularis*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.6	0 – 5	7.9	5 – 15
Regenerating or Shrubby Tree	0.1	0 – 1	4.5	1 – 10
Shrub	48.1	10 – 84	0.9	0.5 – 2
Herb	18.1	1 – 55	0.4	0 – 2

### **Local Environmental Description**

**Elevation:** Mean 227 m, Range 48 – 422 m

**Aspect:** SE (10), SW (5)

**Slope:** Mean 40 degrees, Range 24 – 75 degrees

**Macro Topography:** Middle 1/3 of slope (8), Upper 1/3 of slope (5), Ridge top (1), Lower 1/3 of slope (1)

**Large Rock:** Mean 7.7%, Range 0.0 – 64.0%

**Small Rock:** Mean 17.3%, Range 0.2 – 50.0%

**Fines Cover:** Mean 26.9%, Range 1.0 – 79.0%

**Litter Cover:** Mean 30.8%, Range 0.2 – 90%

**Soil Texture (field assessed):** Medium to very fine, sandy loam (3), Moderately coarse, sandy loam (3), Moderately fine sandy clay loam (2), Medium loam (2), Moderately fine silty clay loam (1), Unknown (1), Fine silty clay (1), Coarse, loamy sand (1)

**Geology (field or map data):** Sandstone and other sedimentary (10), Franciscan melange (7), Large landslides (1)

**Marin County Watersheds:** Novato (8), Bolinas (3), Lagunitas Creek (3), San Rafael (3), Walker Creek (1)

### **Site Impacts**

This association has low non-native plant cover (average 17.3%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Anagallis arvensis*, *Avena* spp., *Brachypodium distachyon*, *Briza maxima*, *Bromus diandrus*, *Carduus pycnocephalus*, and *Cynosurus echinatus*.

### **Classification Comments**

None.

**References:** AECOM 2013, Buck and Evens 2010, Keeler-Wolf and Evens 2006, Sproul et al. 2011

Global Rarity Rank: G3

State Rarity Rank: S3

State Rare: Y

**Surveys Used for Description**

**Total: N=19; Marin County (n=19):** MARIN100, MMWD0040, MMWD0073, MMWD0093, MMWD0100, MMWD0358, MOSD0192, MOSD0218, MOSD0233, MOSD0238, MOSD0241, MOSD0245, MOSD0248, MOSD0251, MOSD0370, PGA1313A, PGA1351, PGA1368, PGA1694

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>	<i>Quercus agrifolia</i>	21	18.4	0.1	0.2	1.0				
<b>Shrub</b>	<i>Artemisia californica</i>	100	54.6	25.8	5.0	56.0	X	X		X
	<i>Diplacus aurantiacus</i>	100	24.7	10.6	3.0	30.0	X			X
	<i>Baccharis pilularis</i>	74	9.5	5.7	0.2	35.0				X
	<i>Toxicodendron diversilobum</i>	74	3.7	1.9	0.2	7.0				X
<b>Herb</b>	<i>Avena</i> spp.	63	9.6	1.9	0.2	20.0				X
	<i>Brachypodium distachyon</i>	42	14.8	2.3	0.2	15.0				
	<i>Briza maxima</i>	42	7.2	1.2	0.2	11.0				
	<i>Elymus glaucus</i>	32	1.8	0.5	0.2	7.0				
	<i>Nassella pulchra</i>	32	2.2	0.4	0.2	5.0				
	<i>Pentagramma triangularis</i>	32	2.3	0.1	0.2	1.0				
	<i>Eriophyllum stoechadifolium</i>	21	2.5	0.7	0.2	9.0				
	<i>Carduus pycnocephalus</i>	21	1.8	0.5	0.2	7.0				
	<i>Cynosurus echinatus</i>	21	2.6	0.2	0.2	1.0				
	<i>Bromus carinatus</i>	21	0.4	0.2	0.2	2.0				
	<i>Anagallis arvensis</i>	21	1.2	0.1	0.2	2.0				
	<i>Bromus diandrus</i>	21	0.8	0.1	0.2	1.0				
	<i>Galium</i> spp.	21	0.7	0.0	0.2	0.2				



***Artemisia californica* / *Nassella (pulchra)* Association**

**Common Name:** Coastal Sagebrush / Purple Needlegrass Scrub Shrubland

**Alliance:** *Artemisia californica* – (*Salvia leucophylla*) Shrubland Alliance

**Local Vegetation Description**

The Coastal Sagebrush / Purple Needlegrass Scrub Association forms an open to intermittent shrub layer. The emergent tree layer is typically absent, and the herbaceous layer is intermittent to open. *Artemisia californica* is typically dominant in the shrub layer, and other characteristic shrubs include *Baccharis pilularis*, *Diplacus aurantiacus*, and *Toxicodendron diversilobum*. The herbaceous layer often includes *Anagallis arvensis*, *Nassella lepida*, *Nassella pulchra*, *Plantago lanceolata*, and herbs that are sometimes present include *Achillea millefolium*, *Avena* spp., *Bromus carinatus*, *Chlorogalum pomeridianum*, *Clinopodium douglasii*, *Elymus glaucus*, *Eriogonum latifolium*, *Fragaria vesca*, *Galium porrigens*, *Horkelia californica*, *Pseudognaphalium californicum*, and *Stachys ajugoides*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0.2	no data	
Shrub	44.4	21 – 65	no data	
Herb	46.5	15 – 89	0.3	0 – 0.5

**Local Environmental Description**

**Elevation:** Mean 104 m, Range 62 – 143 m

**Aspect:** SE (4), SW (4)

**Slope:** Mean 25 degrees, Range 18 – 32 degrees

**Macro Topography:** Upper 1/3 of slope (2)

**Large Rock:** Mean 1.5%, Range 0.0 – 3.0%

**Small Rock:** Mean 4.0%, Range 3.0 – 5.0%

**Fines Cover:** Mean 4.2%, Range 2.0 – 8.0%

**Litter Cover:** Mean 0.2%, Range 0.2 – 0.2%

**Soil Texture (field assessed):** Moderately fine silty clay loam (1), Medium silt loam (1)

**Geology (field or map data):** Sandstone and other sedimentary (6), Chert (2), Franciscan melange (2), Granitic (1)

**Marin County Watersheds:** Bolinas (9), Point Reyes (1), San Rafael (1)

**Site Impacts**

This association has low non-native plant cover (average 9.3%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Anagallis arvensis*, *Avena* spp., and *Plantago lanceolata*.

**Classification Comments**

None.

**References:** Dixon 2019, Reyes et al. 2020, Rodriguez et al. 2017

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

**Total: N=11; Marin County (n=11):** GGNRA309, GGNRA311, PGA1715, PGA8517, PGA8559, SFANS01, SFANS04, SFANS07, SFANS13, SFANS14, SFANS18

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Artemisia californica</i>	100	56.3	47.9	11.0	85.4	X	X		X
	<i>Baccharis pilularis</i>	100	27.0	21.8	6.0	49.4	X			X
	<i>Toxicodendron diversilobum</i>	82	10.7	9.7	0.7	28.4	X			X
	<i>Diplacus aurantiacus</i>	82	2.8	2.4	0.2	6.7	X			X
	<i>Rubus ursinus</i>	36	0.7	0.7	0.2	4.9				
<b>Herb</b>										
	<i>Anagallis arvensis</i>	73	7.7	4.9	0.2	35.0				X
	<i>Plantago lanceolata</i>	64	4.4	4.2	0.2	20.0				X
	<b><i>Nassella lepida</i></b>	55	31.1	13.6	10.7	40.0				X
	<b><i>Nassella pulchra</i></b>	<b>55</b>	<b>10.8</b>	<b>10.4</b>	<b>0.5</b>	<b>51.0</b>				<b>X</b>
	<i>Elymus glaucus</i>	45	3.5	2.9	0.2	22.0				
	<i>Chlorogalum pomeridianum</i>	45	5.6	2.2	0.2	15.0				
	<i>Clinopodium douglasii</i>	45	1.2	0.5	0.2	3.5				
	<i>Avena</i> spp.	36	1.7	1.1	0.2	6.0				
	unknown Poaceae	36	1.9	1.0	0.2	10.0				
	<i>Galium porrigens</i>	36	1.4	1.0	0.2	6.7				
	<i>Fragaria vesca</i>	36	0.7	0.9	0.2	9.3				
	<i>Bromus carinatus</i>	27	3.3	2.7	2.0	25.0				
	<i>Achillea millefolium</i>	27	0.8	0.8	0.2	6.0				
	<i>Pseudognaphalium californicum</i>	27	0.6	0.5	0.2	5.0				
	<i>Eriogonum latifolium</i>	27	0.9	0.3	0.7	2.0				
	<i>Horkelia californica</i>	27	0.1	0.1	0.2	0.4				
	<i>Stachys ajugoides</i>	27	0.1	0.1	0.2	0.2				

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## ***Baccharis pilularis* Shrubland Alliance**

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**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).

*Baccharis pilularis* stands in the Sierra Nevada foothills, along the central coast, and in southern California tend to be largely seral to other scrub and woodland types. However, the natural seral relationships between *Baccharis pilularis* and adjacent herbaceous and woody alliances are complex and varied. The core of diverse, older stands of *Baccharis pilularis* lies along the coast from Monterey County to Sonoma County. For example, Borchert et al. (2004) identify a *Baccharis pilularis* Alliance in the northern Santa Lucia Range, where they sampled mid- to late-seral stands (with >25 years since fire).

### Local Vegetation Description

The Coyote brush scrub Alliance forms an open to continuous shrub layer. The emergent tree layer is typically sparse to open, and the herbaceous layer is sparse to continuous. Dominant and characteristic shrubs include *Baccharis pilularis*, and those that are often present include *Rubus ursinus* and *Toxicodendron diversilobum*. The herbs that are often present include *Holcus lanatus*, and herbs that are sometimes present include *Achillea millefolium*, *Aira caryophylla*, *Anagallis arvensis*, *Avena* spp., *Bromus hordeaceus*, *Elymus glaucus*, *Hypochaeris radicata*, *Iris douglasiana*, *Lolium perenne*, *Nassella pulchra*, *Plantago lanceolata* and *Pteridium aquilinum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.6	0 – 15	4.6	0.5 – 15
Hardwood	0.7	0 – 14	5.4	2 – 15
Regenerating or Shrubby Tree	0.3	0 – 32.0	4.2	0.5 – 10
Shrub	54.6	10.0 – 99.0	1.4	0– 10
Herb	47.4	0 – 98	0.4	0 –5

### Local Membership Rule

In most stands, *Baccharis pilularis* dominates or co-dominates with *Frangula californica*, *Toxicodendron diversilobum*, and/or *Rubus* spp. in the shrub overstory. In some stands, *Frangula californica* or *Garrya elliptica* dominates, and is still keyed to this alliance. If *Calamagrostis nutkaensis* or *Carex obnupta* is co-dominant with *B. pilularis*, key to the *C. nutkaensis* Alliance (see Class C, step 9c3a). If stands have greater cover of *Artemisia californica*, *Ceanothus thyrsiflorus* or *Toxicodendron diversilobum* than *Baccharis pilularis*, key to those respective alliances. A variety of native and non-native forbs and grasses may intermix in the herbaceous layer, sometimes with higher cover than *Baccharis* – including *Avena*, *Bromus*, *Danthonia*, *Deschampsia*, *Elymus glaucus*, *Festuca*, *Hypochaeris*, *Nassella pulchra*, and others.

### Local Environmental Description

**Elevation:** Mean 117 m, Range 3 – 483 m

**Aspect:** SW (47), NW (28), SE (27), NE (25), Flat (4), W (1)

**Slope:** Mean 20 degrees, Range 0 – 65 degrees

**Macro Topography:** Upper 1/3 of slope (45), Middle 1/3 of slope (34), Lower 1/3 of slope (14), Ridge top (11), Bottom (5), Not recorded (3), Other (2), Entire slope (1), Dune/sandfield (1), Bench (1), Terrace (former shoreline or floodplain) (1), Toeslope (1), Upper 1/3 of slope to Ridgetop (1), Lower to Middle 1/3 of slope (1), Middle to Upper 1/3 of slope (1)

**Large Rock:** Mean 0.6%, Range 0.0 – 26.0%

**Small Rock:** Mean 3.7%, Range 0.0 – 85.0%

**Fines Cover:** Mean 24.5%, Range 0.2 – 82.0%

**Litter Cover:** Mean 48.6%, Range 0.0 – 96%

**Soil Texture (field assessed):** Not recorded (18), Moderately fine clay loam (16), Medium to very fine, sandy loam (15), Moderately fine sandy clay loam (11), Moderately fine silty clay loam (10), Fine silty clay (9), Moderately coarse, sandy loam (7), Medium loam (6), Fine clay (6), Coarse, loamy sand (5), Clay, (class unknown) (5), Medium sand (3), Fine sandy clay (3), Medium silt loam (2), Loam, (class unknown) (2), Unknown (1), Medium silt (1), Medium to very fine, loamy sand (1), Sand, (class unknown) (1)

**Geology (field or map data):** Sandstone and other sedimentary (190), Franciscan melange (74), Granitic (54), Volcanic and metavolcanic rocks (11), Siltstone (9), Granitic (generic) (8), Shale (8), Blueschist and semi-schist (7), Sandstone (5), Alluvium (5), Large landslides (3), Sedimentary (type unknown) (2), Chert (2), Conglomerate (1), Ultramafic rocks, mostly serpentine (1), Sand dunes (1), Mixed alluvium (1)

**Marin County Watersheds:** Point Reyes (165), Bolinas (118), Inverness (32), San Rafael (29), Lagunitas Creek (21), Walker Creek (11), Novato (8)

### **Site Impacts**

This alliance has moderate non-native plant cover (average 22.6%) relative to native cover. Non-native species with highest frequency and abundance include *Aira caryophyllea*, *Anagallis arvensis*, *Bromus hordeaceus*, *Holcus lanatus*, *Hypochaeris radicata* and *Plantago lanceolata*.

### **Associations in Marin County**

*Baccharis pilularis*  
*Baccharis pilularis* – (*Frangula californica*) – *Rubus* spp.  
*Baccharis pilularis* – *Artemisia californica*  
*Baccharis pilularis* – *Ceanothus thyrsiflorus*  
*Baccharis pilularis* – *Toxicodendron diversilobum*  
*Baccharis pilularis* / (*Nassella pulchra* – *Elymus glaucus* – *Bromus carinatus*)  
*Baccharis pilularis* / Annual Grass – Herb  
*Baccharis pilularis* / *Carex obnupta* – *Juncus patens*  
*Baccharis pilularis* / *Danthonia californica*  
*Baccharis pilularis* / *Deschampsia cespitosa*  
*Baccharis pilularis* / *Eriophyllum staechadifolium*  
*Frangula californica* ssp. *californica* – *Baccharis pilularis* / *Scrophularia californica*  
*Garrya elliptica*

### **Classification Comments**

None.

**References:** AECOM 2013, Baxter 1992, Belsher 1999, Borchert et al. 2004, Buck-Diaz et al. 2012, Buck-Diaz et al. 2019, Elliott and Wehausen 1974, Evens and Kentner 2006, Evens and San 2004, Evens and San 2005, HDR 2014b, Keeler-Wolf and Evens 2006, Keeler-Wolf and Vaghti 2000, Keeler-Wolf et al. 2003a, Kittel et al. 2012, Klein et al. 2015, McBride and Stone 1976, O'Neil and Egan 2004, Parker 1974, Rodriguez et al. 2017, Sproul et al. 2011, Verdone and Evens 2010

**Global Rarity Rank:** G5

**State Rarity Rank:** S5

### **Surveys Used for Description**

**Total: N=418; Marin County (n=418):** CPRAIR02, GGNRA270, GGNRA288, GGNRA297, GGNRA299, GGNRA300, GGNRA302, GGNRA303, GGNRA390, HEAD0027, HEAD0028, HEAD0305, HEAD0310, HEAD0317, HMRA010, MARIN002, MARIN079, MARIN245, MARIN276, MARIN279, MARIN288, MARINSP12, MARINSP14, MARINSP21, MMWD0005, MMWD0008, MMWD0011, MMWD0019, MMWD0072, MMWD0078, MMWD0082, MMWD0239, MMWD0241, MMWD0256, MMWD0367, MMWD0377, MMWD0382, MMWD0384, MMWD0386, MMWD0394, MOSD0013, MOSD0046, MOSD0052, MOSD0054, MOSD0055, MOSD0065, MOSD0067, MOSD0082, MOSD0085, MOSD0088, MOSD0091, MOSD0108, MOSD0148, MOSD0189, MOSD0196, MOSD0197, MOSD0198, MOSD0202, MOSD0206, MOSD0208, MOSD0209, MOSD0240, MOSD0242, MOSD0246, MOSD0294, MOSD0357, MOSD0384, MOSD0387, MOSD0391, MOSD0395, MOSD0402, PGA100, PGA103, PGA1060, PGA10629, PGA1063, PGA10647, PGA1066, PGA1097, PGA110, PGA115, PGA1245, PGA1265, PGA1267, PGA1280, PGA1296, PGA1297, PGA1310, PGA1322, PGA1328, PGA1331, PGA1344, PGA1345, PGA1349, PGA1359, PGA136, PGA1363A, PGA1364, PGA1366, PGA1367, PGA1380, PGA1409, PGA1411, PGA1488, PGA1498, PGA1500, PGA1505, PGA1509, PGA153, PGA1532, PGA1556, PGA1565, PGA158, PGA1582, PGA159, PGA1603, PGA1624, PGA1686, PGA1688, PGA1691, PGA1693, PGA1698, PGA170, PGA171, PGA1711, PGA1714, PGA1717, PGA1721, PGA1724, PGA1726, PGA173, PGA1735, PGA1737, PGA185, PGA191, PGA192, PGA195, PGA212, PGA2196, PGA2222, PGA230, PGA2303, PGA232, PGA2359, PGA2361, PGA24, PGA2405, PGA242, PGA2481, PGA2510, PGA261, PGA2718, PGA276, PGA284, PGA292, PGA299, PGA3017, PGA302, PGA305, PGA312, PGA314, PGA315, PGA323, PGA3296, PGA331, PGA3402, PGA3455, PGA3590, PGA36, PGA363, PGA3672, PGA3699, PGA372, PGA3732, PGA376A, PGA3770, PGA383, PGA3846, PGA3872, PGA3896, PGA39, PGA3912, PGA3914, PGA3928, PGA3932, PGA3957, PGA402, PGA406, PGA4070, PGA4076, PGA409, PGA4095, PGA4098, PGA41, PGA4125, PGA415, PGA4157, PGA4179, PGA419, PGA42, PGA421, PGA4229, PGA4270,

PGA4289, PGA4291, PGA43, PGA433, PGA4368, PGA4426, PGA4456, PGA448, PGA4486, PGA451, PGA4511, PGA463, PGA467, PGA4672, PGA4673, PGA4699, PGA4704, PGA4766, PGA4799, PGA48, PGA4822, PGA4853, PGA4862, PGA4874, PGA4918, PGA4918A, PGA4939, PGA494, PGA495A, PGA4973, PGA5016, PGA5018, PGA5019, PGA5039, PGA5101, PGA5108, PGA511, PGA511A, PGA513, PGA5132, PGA514, PGA5141, PGA516, PGA518, PGA51A, PGA52, PGA5213, PGA522, PGA5221, PGA5228, PGA524, PGA525, PGA527, PGA5288, PGA532, PGA533, PGA5343, PGA535, PGA5357, PGA536, PGA5367, PGA539A, PGA540, PGA5409, PGA540A, PGA5424, PGA544, PGA545, PGA5458, PGA553, PGA554, PGA5542, PGA5553, PGA560, PGA5614, PGA5616, PGA566, PGA567, PGA568, PGA570, PGA572, PGA5730, PGA574, PGA576, PGA577, PGA5778, PGA578, PGA5786, PGA580, PGA581, PGA585, PGA586, PGA587, PGA5874, PGA5914, PGA6033, PGA6035, PGA6043, PGA6079, PGA6122, PGA6123, PGA6173, PGA6214, PGA6240, PGA6248, PGA6264, PGA6267, PGA6317, PGA6370, PGA6393, PGA6397, PGA6430, PGA6462, PGA6520, PGA6557, PGA66, PGA6604, PGA6665, PGA6671, PGA6709, PGA6937, PGA70, PGA71, PGA73, PGA7389, PGA76, PGA7604, PGA8109, PGA8128, PGA8187, PGA8282, PGA8301, PGA8387, PGA84, PGA8405, PGA8451, PGA8503, PGA8518, PGA8997, PGA92, PGA9293, PGA9297, PGA9755, PGA9762, PGA98, PORE002, PORE003, PORE008, PORE010, PORE011, PORE012, PORE013, PORE018, PORE019, PORE021, PORE025, PORE039, PORE045, PORE048, PORE053, PORE063, PORE065, PORE074, PORE094, PORE098, PORE099, PORE109, PORE119, PORE124, PORE154, PORE155, PORE156, PORE164, PORE167, PORE170, PORE182, PORE194, PORE197, PORE200, PORE206, PRGT011H, PRGT020H, PRGT023H, PRGT024I, SFANF07, SFANS02, SFANS05, SFANS06, SFANS15, SFANS16, SFANT04B, SFANT12B, TAMG003C, TAMG004N, TAMG006C, TAMG014C, TAMG016N, TAMG018C, TAMG019N, TEVA013c, TEVA015c, TEVA019c, WRBL004, WRBL008, WRBL010, WRBL012, WRBL013, WRBL018, WRBL019, WRBL020, WRBL022, WRBL024, WRBL029, WRBL030, WRBL087

### Alliance Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>	<i>Baccharis pilularis</i>	100	65.2	35.2	3.0	99.0	X	X		X
	<i>Rubus ursinus</i>	64	9.5	5.8	0.2	55.0				X
	<i>Toxicodendron diversilobum</i>	60	7.6	5.9	0.2	70.0				X
	<i>Diplacus aurantiacus</i>	39	2.9	1.9	0.1	35.0				
	<i>Artemisia californica</i>	27	5.4	4.0	0.1	57.6				
	<i>Frangula californica</i>	26	3.6	3.3	0.2	92.0				
<b>Herb</b>	<i>Holcus lanatus</i>	50	16.9	9.4	0.2	75.0				X
	<i>Pteridium aquilinum</i>	39	7.2	2.4	0.2	37.5				
	<i>Plantago lanceolata</i>	38	4.1	3.1	0.2	60.0				
	<i>Elymus glaucus</i>	29	1.8	1.1	0.2	25.0				
	<i>Nassella pulchra</i>	25	4.0	2.6	0.2	45.0				
	<i>Lolium perenne</i>	25	2.3	1.7	0.2	40.0				
	<i>Iris douglasiana</i>	24	1.7	1.1	0.2	20.0				
	<i>Hypochaeris radicata</i>	23	0.7	0.4	0.2	20.7				
	<i>Achillea millefolium</i>	22	0.5	0.4	0.1	12.0				
	<i>Bromus hordeaceus</i>	22	1.1	0.7	0.2	20.0				
	<i>Aira caryophylla</i>	21	0.9	0.8	0.2	44.0				
	<i>Avena</i> spp.	20	2.1	1.1	0.2	55.0				
	<i>Anagallis arvensis</i>	20	0.8	0.3	0.2	35.0				

## ***Baccharis pilularis* Association**

**Common Name:** Coyotebrush Shrubland Shrubland

**Alliance:** *Baccharis pilularis* Shrubland Alliance

### **Local Vegetation Description**

The Coyotebrush Shrubland Association forms an intermittent to continuous shrub layer. The emergent tree layer is typically absent, and the herbaceous layer is sparse to intermittent. Dominant and characteristic shrubs include *Baccharis pilularis*, and those that are often present include *Diplacus aurantiacus*, *Rubus ursinus*, and *Toxicodendron diversilobum*. The herbaceous layer often includes *Holcus lanatus*, and herbs that are sometimes present include *Aira caryophyllea*, *Anagallis arvensis*, *Avena* spp., *Briza maxima*, *Chlorogalum pomeridianum*, *Clinopodium douglasii*, *Elymus glaucus*, *Juncus patens*, *Phalaris aquatica*, *Plantago lanceolata*, *Pteridium aquilinum*, and *Stachys ajugoides*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.3	0 – 3	3.5	2 – 5
Hardwood	0.6	0 – 6	8.3	5 – 15
Regenerating or Shrubby Tree	0.4	0 – 5.0	2.1	0.5 – 5
Shrub	73.6	40 – 99	1.9	0.5 – 5
Herb	23.7	0.2 – 65	0.5	0 – 5

### **Local Environmental Description**

**Elevation:** Mean 160 m, Range 9 – 473 m

**Aspect:** NE (3), NW (3), SE (3), SW (2), Flat (1)

**Slope:** Mean 15 degrees, Range 0 – 28 degrees

**Macro Topography:** Middle 1/3 of slope (4), Upper 1/3 of slope (3), Ridge top (1), Upper 1/3 of slope to Ridgetop (1), Bottom (1), Lower 1/3 of slope (1), Not recorded (1)

**Large Rock:** Mean 0.0%, Range 0.0 – 0.2%

**Small Rock:** Mean 1.5%, Range 0.0 – 6.0%

**Fines Cover:** Mean 20.0%, Range 1.0 – 65.0%

**Litter Cover:** Mean 57.0%, Range 0.0 – 94%

**Soil Texture (field assessed):** Moderately fine clay loam (3), Clay, (class unknown) (2), Not recorded (1), Moderately fine silty clay loam (1), Fine silty clay (1), Coarse, loamy sand (1), Fine clay (1), Medium loam (1)

**Geology (field or map data):** Sandstone and other sedimentary (9), Franciscan melange (5), Granitic (3), Blueschist and semi-schist (2), Volcanic and metavolcanic rocks (1), Mixed alluvium (1)

**Marin County Watersheds:** Point Reyes (7), Bolinas (5), Lagunitas Creek (3), Novato (2), San Rafael (2), Inverness (1), Walker Creek (1)

### **Site Impacts**

This association has low non-native plant cover (average 13.5%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*, *Anagallis arvensis*, *Avena* spp., *Briza maxima*, *Holcus lanatus*, *Phalaris aquatica*, and *Plantago lanceolata*.

### **Classification Comments**

None.

**References:** Borchert et al. 2004, Buck-Diaz et al. 2012, Keeler-Wolf and Evens 2006, Kittel et al. 2012, Rodriguez et al. 2017, Verdone and Evens 2010



Global Rarity Rank: G4

State Rarity Rank: SNR

State Rare: N

**Surveys Used for Description**

**Total: N=23; Marin County (n=23):** MARIN245, MARINSP14, MMWD0256, MMWD0367, MOSD0046, MOSD0088, MOSD0206, MOSD0242, MOSD0384, PGA1366, PGA1556, PGA1724, PGA323, PGA3296, PGA3590, PGA36, PGA3957, PGA4456, PGA5553, PGA6248, PORE094, WRBL030, WRBL087

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>	<i>Baccharis pilularis</i>	100	88.9	65.4	35.0	99.0	X	X		X
	<i>Toxicodendron diversilobum</i>	65	2.4	1.9	0.2	9.0				X
	<i>Rubus ursinus</i>	65	2.5	1.9	0.2	10.0				X
	<i>Diplacus aurantiacus</i>	52	2.2	1.5	0.2	7.0				X
<b>Herb</b>	<i>Holcus lanatus</i>	57	20.2	6.0	0.2	37.5				X
	<i>Pteridium aquilinum</i>	43	8.7	1.7	0.2	10.0				
	<i>Clinopodium douglasii</i>	30	2.7	0.3	0.2	2.4				
	<i>Elymus glaucus</i>	30	2.0	0.2	0.2	2.0				
	<i>Stachys ajugoides</i>	30	1.1	0.1	0.1	1.0				
	<i>Anagallis arvensis</i>	26	0.9	0.1	0.2	1.0				
	<i>Plantago lanceolata</i>	22	3.5	1.2	0.2	20.0				
	<i>Juncus patens</i>	22	1.5	0.6	0.1	7.0				
	<i>Phalaris aquatica</i>	22	2.1	0.5	0.2	10.0				
	<i>Avena</i> spp.	22	2.2	0.5	0.2	10.0				
	<i>Chlorogalum pomeridianum</i>	22	4.1	0.3	0.2	5.0				
	<i>Aira caryophyllea</i>	22	1.3	0.3	0.2	5.0				
	<i>Briza maxima</i>	22	2.2	0.3	0.2	5.0				



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

**Common Name:** Coyote brush – coffeeberry – berry bramble Shrubland

**Alliance:** *Baccharis pilularis* Shrubland Alliance

**Local Vegetation Description**

The Coyote brush – coffeeberry – berry bramble Association forms an open to continuous shrub layer. The emergent tree layer is typically absent, and the herbaceous layer is sparse to continuous. Dominant and characteristic shrubs include *Baccharis pilularis* and *Rubus ursinus*, and those that are often present include *Toxicodendron diversilobum*. The herbaceous layer typically includes *Holcus lanatus*, and herbs that are sometimes present include *Cirsium vulgare*, *Clinopodium douglasii*, *Heracleum maximum*, *Iris douglasiana*, *Plantago lanceolata*, *Polystichum munitum*, and *Pteridium aquilinum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	1.6	0 – 15	3.9	0.5 – 15
Hardwood	0.9	0 – 14	4.3	2 – 15
Regenerating or Shrubby Tree	0.8	0 – 32.0	no data	
Shrub	59.4	11 – 99	1.1	0 – 5
Herb	46.3	1 – 97	0.5	0 – 5

**Local Environmental Description**

**Elevation:** Mean 107 m, Range 6 – 406 m

**Aspect:** SW (5), NE (4), SE (2), Flat (1), NW (1)

**Slope:** Mean 15 degrees, Range 0 – 35 degrees

**Macro Topography:** Upper 1/3 of slope (4), Lower 1/3 of slope (3), Middle 1/3 of slope (1), Not recorded (1), Other (1), Ridge top (1)

**Large Rock:** Mean 0.0%, Range 0.0 – 0.0%

**Small Rock:** Mean 1.3%, Range 0.0 – 10.0%

**Fines Cover:** Mean 21.7%, Range 6.0 – 47.0%

**Litter Cover:** Mean 62.1%, Range 27.0 – 95%

**Soil Texture (field assessed):** Not recorded (3), Moderately coarse, sandy loam (2), Moderately fine silty clay loam (1), Medium to very fine, sandy loam (1), Medium to very fine, loamy sand (1), Medium sand (1), Fine clay (1), Moderately fine sandy clay loam (1)

**Geology (field or map data):** Sandstone and other sedimentary (57), Granitic (25), Granitic (generic) (3), Alluvium (2), Franciscan melange (1), Shale (1), Siltstone (1)

**Marin County Watersheds:** Point Reyes (64), Bolinas (14), Inverness (9), Lagunitas Creek (3), Walker Creek (1)

**Site Impacts**

This association has moderate non-native plant cover (average 26.3%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Cirsium vulgare*, *Holcus lanatus*, and *Plantago lanceolata*.

**Classification Comments**

None.

**References:** Buck-Diaz et al. 2019, Keeler-Wolf et al. 2003a, Klein et al. 2015

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** N

**Surveys Used for Description**

**Total: N=101; Marin County (n=101):** HEAD0305, MARINSP12, MMWD0241, PGA1097, PGA1245, PGA1267, PGA1322, PGA1331, PGA1367, PGA1409, PGA1488, PGA1509, PGA1582, PGA170, PGA173, PGA195, PGA2222, PGA2303, PGA232, PGA24, PGA242, PGA2481, PGA292, PGA299, PGA3017, PGA302, PGA305, PGA3455, PGA3672, PGA376A, PGA3770, PGA3846, PGA3872, PGA3896, PGA3914, PGA3928, PGA406, PGA4076, PGA4095, PGA4157, PGA419, PGA42, PGA4289, PGA4291, PGA43, PGA4368, PGA4426, PGA448, PGA463, PGA4672, PGA4699, PGA4704, PGA4853, PGA4862, PGA4874, PGA4918, PGA4918A, PGA494, PGA4973, PGA5019, PGA5039, PGA5101, PGA5108, PGA5213, PGA5288, PGA5357, PGA5409, PGA5424, PGA5616, PGA5778, PGA5914, PGA6033, PGA6079, PGA6123, PGA6240, PGA6264, PGA6267, PGA6370, PGA6520, PGA6665, PGA70, PGA71, PGA7389, PGA7604, PGA8128, PGA8282, PGA8387, PGA84, PGA92, PORE018, PORE065, PORE098, PORE156, PORE182, PRGT023H, SFANF07, SFANS02, TEVA015c, WRBL013, WRBL018, WRBL024

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	100	58.6	39.1	3.0	87.5	X	X		X
	<i>Rubus ursinus</i>	97	21.1	13.8	0.2	55.0	X			X
	<i>Toxicodendron diversilobum</i>	60	6.1	5.0	0.2	25.0				X
	<i>Frangula californica</i>	41	4.7	4.2	0.2	38.0				
	<i>Diplacus aurantiacus</i>	33	2.1	1.8	0.2	25.5				
<b>Herb</b>										
	<i>Holcus lanatus</i>	78	37.7	20.8	0.2	75.0	X		X	X
	<i>Pteridium aquilinum</i>	48	9.5	3.2	0.2	37.5				
	<i>Iris douglasiana</i>	33	1.5	0.9	0.2	20.0				
	<i>Plantago lanceolata</i>	28	2.2	1.4	0.2	30.0				
	<i>Heracleum maximum</i>	26	2.9	0.8	0.2	25.0				
	<i>Cirsium vulgare</i>	26	0.5	0.3	0.2	8.0				
	<i>Polystichum munitum</i>	25	3.1	1.1	0.2	38.0				
	<i>Clinopodium douglasii</i>	22	2.9	0.4	0.2	8.0				

***Baccharis pilularis* – *Artemisia californica* Association**

**Common Name:** Coyote Brush – California Sagebrush Shrubland

**Alliance:** *Baccharis pilularis* Shrubland Alliance

**Local Vegetation Description**

The Coyote Brush – California Sagebrush Association forms an open to continuous shrub layer. The emergent tree layer is typically absent, and the herbaceous layer is sparse to intermittent. Dominant and characteristic shrubs include *Baccharis pilularis*, *Artemisia californica*, *Diplacus aurantiacus*, and *Toxicodendron diversilobum*. The herbaceous layer sometimes includes *Anagallis arvensis*, *Avena* spp., *Clinopodium douglasii*, *Eriophyllum stoechadifolium*, *Nassella pulchra*, *Pteridium aquilinum*, *Scrophularia californica*, and *Stachys ajugoides*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.2	0 – 6	3.5	2 – 5
Hardwood	1.0	0 – 10	5.7	2 – 15
Regenerating or Shrubby Tree	0.2	0 – 5.2	4.8	2 – 10
Shrub	72.1	17 – 98	1.0	0 – 2
Herb	21.5	0.2 – 50	0.3	0 – 1

**Local Environmental Description**

**Elevation:** Mean 117 m, Range 25 – 288 m

**Aspect:** SW (10), SE (7), NW (1), W (1)

**Slope:** Mean 30 degrees, Range 20 – 65 degrees

**Macro Topography:** Upper 1/3 of slope (7), Middle 1/3 of slope (4), Bench (1), Bottom (1), Lower to Middle 1/3 of slope (1)

**Large Rock:** Mean 2.4%, Range 0.0 – 26.0%

**Small Rock:** Mean 8.9%, Range 0.0 – 45.0%

**Fines Cover:** Mean 24.1%, Range 2.0 – 46.0%

**Litter Cover:** Mean 51.2%, Range 0.2 – 90%

**Soil Texture (field assessed):** Moderately fine sandy clay loam (4), Moderately fine clay loam (3), Clay, (class unknown) (2), Medium to very fine, sandy loam (2), Fine clay (1), Not recorded (1), Fine sandy clay (1), Medium silt loam (1)

**Geology (field or map data):** Sandstone and other sedimentary (24), Franciscan melange (14), Large landslides (3), Volcanic and metavolcanic rocks (1), Granitic (1), Sedimentary (type unknown) (1), Sandstone (1)

**Marin County Watersheds:** Bolinas (31), San Rafael (6), Point Reyes (3), Novato (2), Walker Creek (2), Lagunitas Creek (1)

**Site Impacts**

This association has low non-native plant cover (average 8.5%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Anagallis arvensis* and *Avena* spp.

**Classification Comments**

This association was called the *Baccharis pilularis* – *Artemisia californica* – *Toxicodendron diversilobum* / *Monardella villosa* Association in earlier Marin County classifications, but is no longer being distinguished from the more widespread association.

**References:** AECOM 2013, Buck-Diaz and Evens 2015, Evens and Kentner 2006, Evens and San 2004, Keeler-Wolf and Evens 2006, Keeler-Wolf et al. 2003a, Kirkpatrick and Hutchinson 1977, Rodriguez et al. 2017, Stillwater Sciences and URS 2007, Verdone and Evens 2010

**Global Rarity Rank:** G5

**State Rarity Rank:** S5

**State Rare:** N

**Surveys Used for Description**

**Total: N=47; Marin County (n=47):** GGNRA288, GGNRA303, MARIN002, MMWD0386, MMWD0394, MOSD0054, MOSD0055, MOSD0197, MOSD0240, MOSD0246, MOSD0357, MOSD0391, PGA10629, PGA10647, PGA1296, PGA1310, PGA1328, PGA1344, PGA1359, PGA1363A, PGA1498, PGA1500, PGA1532, PGA1603, PGA1688, PGA1691, PGA1693, PGA1735, PGA1737, PGA511A, PGA5367, PGA544, PGA554, PGA585, PGA587, PGA6557, PGA8503, PGA8997, PGA9293, PGA9297, PORE099, SFANS05, SFANS06, SFANS15, SFANS16, WRBL020, WRBL029

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>	<i>Baccharis pilularis</i>	100	43.2	35.6	7.0	65.0	X		X	X
	<i>Artemisia californica</i>	100	29.8	24.8	5.0	57.6	X			X
	<i>Toxicodendron diversilobum</i>	94	11.6	10.9	1.0	42.0	X			X
	<i>Diplacus aurantiacus</i>	91	8.2	6.4	0.2	35.0	X			X
	<i>Rubus ursinus</i>	43	2.8	2.7	0.2	20.0				
	<i>Frangula californica</i>	26	1.3	1.3	0.2	15.0				
<b>Herb</b>	<i>Eriophyllum stoechadifolium</i>	32	5.6	1.3	0.2	33.3				
	<i>Pteridium aquilinum</i>	28	11.5	2.2	0.2	36.0				
	<i>Nassella pulchra</i>	28	4.7	1.2	0.2	20.0				
	<i>Avena</i> spp.	26	4.6	1.4	0.2	35.0				
	<i>Anagallis arvensis</i>	26	3.0	0.2	0.2	4.9				
	<i>Clinopodium douglasii</i>	23	3.2	0.9	0.2	9.0				
	<i>Scrophularia californica</i>	21	5.4	0.8	0.2	12.0				
	<i>Stachys ajugoides</i>	21	1.5	0.2	0.2	5.0				

## ***Baccharis pilularis* – *Ceanothus thyrsiflorus* Association**

**Common Name:** Coyote Brush – Blueblossom Shrubland

**Alliance:** *Baccharis pilularis* Shrubland Alliance

### **Local Vegetation Description**

The Coyote Brush – Blueblossom Association forms an intermittent to continuous shrub layer. The emergent tree layer is typically sparse, and the herbaceous layer is sparse to continuous. Dominant and characteristic shrubs include *Baccharis pilularis* and *Ceanothus thyrsiflorus*, and those that are often present include *Diplacus aurantiacus*, *Frangula californica*, *Rubus ursinus*, and *Toxicodendron diversilobum*. The herbaceous layer sometimes includes *Cirsium vulgare*, *Clinopodium douglasii*, *Conyza canadensis*, *Dryopteris arguta*, *Erechtites minimus*, *Holcus lanatus*, *Iris douglasiana*, *Polystichum munitum*, and *Pteridium aquilinum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.3	0 – 1		–
Hardwood	1.4	0 – 8	3.5	2 – 5
Regenerating or Shrubby Tree	0.8	0 – 3.0		–
Shrub	78.6	50 – 98	3.5	2 – 5
Herb	16.6	0.2 – 50	0.3	0 – 0.5

### **Local Environmental Description**

**Elevation:** Mean 172 m, Range 11 – 483 m

**Aspect:** SE (1)

**Slope:** 23 degrees

**Macro Topography:** Upper 1/3 of slope (1)

**Large Rock:** 0.2%

**Small Rock:** 25.0%

**Fines Cover:** no data

**Litter Cover:** 45.0%

**Soil Texture (field assessed):** Medium to very fine, sandy loam (1)

**Geology (field or map data):** Granitic (3), Sandstone and other sedimentary (2), Franciscan melange (2), Volcanic and metavolcanic rocks (1)

**Marin County Watersheds:** Point Reyes (4), Bolinas (3), Inverness (1)

### **Site Impacts**

This association has low non-native plant cover (average 5.2%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Cirsium vulgare*, *Erechtites minimus*, and *Holcus lanatus*.

### **Classification Comments**

None.

**References:** Evens and Kentner 2006, Keeler-Wolf et al. 2003a

**Global Rarity Rank:** G3

**State Rarity Rank:** S3?

**State Rare:** Y

### **Surveys Used for Description**

**Total: N=9; Marin County (n=9):** GGNRA297, PGA1063, PGA1349, PGA1698, PGA4098, PGA4125, PGA5016, PGA6397, PGA9755

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Regenerating or Shrubby Trees</b>										
	<i>Pinus muricata</i>	22	16.7	0.2	1.0	1.0				
<b>Shrub</b>										
	<b><i>Baccharis pilularis</i></b>	<b>100</b>	<b>59.6</b>	<b>52.2</b>	<b>20.0</b>	<b>85.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<b><i>Ceanothus thyrsiflorus</i></b>	<b>100</b>	<b>19.9</b>	<b>17.4</b>	<b>4.0</b>	<b>40.0</b>	<b>X</b>			<b>X</b>
	<i>Diplacus aurantiacus</i>	67	4.7	2.6	0.2	10.0				<b>X</b>
	<i>Rubus ursinus</i>	67	2.6	2.3	0.2	10.0				<b>X</b>
	<i>Toxicodendron diversilobum</i>	67	2.1	1.9	0.2	8.0				<b>X</b>
	<i>Frangula californica</i>	56	4.1	3.2	0.2	12.0				<b>X</b>
	<i>Heteromeles arbutifolia</i>	22	1.8	1.4	0.2	12.0				
	<i>Artemisia californica</i>	22	0.9	0.9	0.2	8.0				
	<i>Morella californica</i>	22	0.5	0.3	1.0	2.0				
<b>Herb</b>										
	<i>Polystichum munitum</i>	33	10.6	3.3	2.0	23.0				
	<i>Holcus lanatus</i>	22	20.8	4.8	3.0	40.0				
	<i>Pteridium aquilinum</i>	22	6.4	0.6	1.0	4.0				
	<i>Conyza canadensis</i>	22	0.9	0.4	0.2	3.0				
	<i>Iris douglasiana</i>	22	2.7	0.4	0.2	3.0				
	<i>Dryopteris arguta</i>	22	4.3	0.2	0.2	2.0				
	<i>Erechtites minimus</i>	22	1.0	0.2	1.0	1.0				
	<i>Clinopodium douglasii</i>	22	4.1	0.1	0.2	1.0				
	<i>Cirsium vulgare</i>	22	1.9	0.0	0.2	0.2				

***Baccharis pilularis* – *Toxicodendron diversilobum* Association**

**Common Name:** Coyote Brush – Poison Oak Shrubland

**Alliance:** *Baccharis pilularis* Shrubland Alliance

**Local Vegetation Description**

The Coyote Brush – Poison Oak Association forms an open to continuous shrub layer. The emergent tree layer is typically absent, and the herbaceous layer is sparse to continuous. Dominant and characteristic shrubs include *Baccharis pilularis* and *Toxicodendron diversilobum*, and those that are often present include *Diplacus aurantiacus* and *Rubus ursinus*. The herbaceous layer often includes *Heracleum maximum*, and herbs that are sometimes present include *Anaphalis margaritacea*, *Cirsium vulgare*, *Clinopodium douglasii*, *Elymus glaucus*, *Holcus lanatus*, *Iris douglasiana*, *Marah fabaceus*, *Polystichum munitum*, *Pteridium aquilinum*, and *Stachys ajugoides*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.1	0 – 2	10.0	5 – 15
Hardwood	1.7	0 – 11	8.4	2 – 15
Regenerating or Shrubby Tree	0.2	0 – 7	4.0	1 – 10
Shrub	73.4	25 – 95	2.3	0.5 – 5
Herb	20.9	0 – 95	0.5	0 – 5

**Local Environmental Description**

**Elevation:** Mean 110 m, Range 13 – 397 m

**Aspect:** NE (5), SW (5), SE (5), NW (5)

**Slope:** Mean 25 degrees, Range 3 – 65 degrees

**Macro Topography:** Middle 1/3 of slope (7), Upper 1/3 of slope (6), Ridge top (3), Lower 1/3 of slope (2), Entire slope (1), Toeslope (1)

**Large Rock:** Mean 0.1%, Range 0.0 – 1.0%

**Small Rock:** Mean 7.2%, Range 0.0 – 85.0%

**Fines Cover:** Mean 33.0%, Range 10.0 – 64.0%

**Litter Cover:** Mean 43.5%, Range 0.0 – 88%

**Soil Texture (field assessed):** Medium to very fine, sandy loam (5), Moderately fine sandy clay loam (3), Loam, (class unknown) (2), Moderately fine silty clay loam (2), Coarse, loamy sand (2), Moderately fine clay loam (1), Fine silty clay (1), Fine clay (1), Not recorded (1), Unknown (1), Medium loam (1)

**Geology (field or map data):** Sandstone and other sedimentary (13), Granitic (9), Franciscan melange (7), Granitic (generic) (4), Siltstone (2), Blueschist and semi-schist (1), Alluvium (1), Ultramafic rocks, mostly serpentine (1), Volcanic and metavolcanic rocks (1), Shale (1)

**Marin County Watersheds:** Inverness (12), Point Reyes (11), Bolinas (9), Lagunitas Creek (3), San Rafael (3), Novato (1), Walker Creek (1)

**Site Impacts**

This association has low non-native plant cover (average 6.3%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Cirsium vulgare* and *Holcus lanatus*.

**Classification Comments**

None.

**References:** Belsher 1999, Evens and Kentner 2006, Keeler-Wolf et al. 2003a, Klein et al. 2015, McBride and Stone 1976, O'Neil and Egan 2004

**Global Rarity Rank:** G5

**State Rarity Rank:** S5?

**State Rare:** N

**Surveys Used for Description**

**Total: N=43; Marin County (n=43):** GGNRA270, MMWD0072, MMWD0078, MMWD0384, MOSD0013, MOSD0108, MOSD0189, MOSD0209, PGA100, PGA103, PGA1060, PGA110, PGA1345, PGA136, PGA1364, PGA1411, PGA1565, PGA159, PGA2359, PGA314, PGA3402, PGA39, PGA421, PGA4766, PGA4822, PGA514, PGA539A, PGA577, PGA73, PGA76, PGA8301, PORE010, PORE021, PORE025, PORE053, PORE063, PORE109, PORE154, PORE155, PORE170, WRBL008, WRBL010, WRBL022

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>	<i>Baccharis pilularis</i>	100	56.7	44.3	9.0	80.0	X	X		X
	<i>Toxicodendron diversilobum</i>	100	24.9	21.7	1.0	70.0	X			X
	<i>Rubus ursinus</i>	58	5.9	4.9	0.2	25.0				X
	<i>Diplacus aurantiacus</i>	51	3.8	2.4	0.2	20.0				X
	<i>Frangula californica</i>	37	1.5	1.3	0.2	18.0				
	<i>Artemisia californica</i>	21	1.0	0.9	0.2	15.2				
<b>Herb</b>	<i>Heracleum maximum</i>	53	10.3	2.4	0.2	25.0				X
	<i>Pteridium aquilinum</i>	47	13.6	3.1	0.2	35.0				
	<i>Polystichum munitum</i>	44	11.7	3.5	0.2	35.0				
	<i>Holcus lanatus</i>	44	10.3	2.4	0.2	20.0				
	<i>Clinopodium douglasii</i>	28	2.2	0.6	0.2	10.0				
	<i>Anaphalis margaritacea</i>	26	1.2	0.3	0.2	3.0				
	<i>Iris douglasiana</i>	23	1.3	0.5	0.2	8.0				
	<i>Cirsium vulgare</i>	23	0.7	0.1	0.2	3.0				
	<i>Marah fabaceus</i>	21	2.7	0.7	0.2	15.0				
	<i>Stachys ajugoides</i>	21	0.7	0.3	0.2	6.0				
<i>Elymus glaucus</i>	21	0.4	0.2	0.2	4.0					



***Baccharis pilularis* / (*Nassella pulchra* – *Elymus glaucus* – *Bromus carinatus*)  
Association**

**Common Name:** *Baccharis pilularis* / mixed native grassland Shrubland

**Alliance:** *Baccharis pilularis* Shrubland Alliance

**Local Vegetation Description**

The *Baccharis pilularis* / mixed native grassland Association forms an open to continuous shrub layer. The emergent tree layer is typically absent, and the herbaceous layer is open to continuous. Dominant and characteristic shrubs include *Baccharis pilularis*. The herbaceous layer typically includes *Nassella pulchra* and *Plantago lanceolata*, and herbs that are often present include *Elymus glaucus*, and herbs that are sometimes present include *Achillea millefolium*, *Aira caryophyllea*, *Anagallis arvensis*, *Avena*, *Briza maxima*, *Bromus carinatus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Chlorogalum pomeridianum*, *Cynosurus echinatus*, *Danthonia californica*, *Eschscholzia californica*, *Festuca rubra*, *Holcus lanatus*, *Hypochaeris glabra*, *Hypochaeris radicata*, *Koeleria macrantha*, *Linum bienne*, *Lolium perenne*, *Pteridium aquilinum*, *Rumex acetosella*, *Sisyrinchium bellum*, *Stachys ajugoides*, and *Vulpia* spp..

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.2	0 – 4	3.5	2 – 5
Hardwood	0.1	0 – 4	7.5	5 – 10
Regenerating or Shrubby Tree	0.2	0 – 4.0	5.5	2 – 10
Shrub	36.1	12.0 – 75	0.9	0 – 2
Herb	70.1	13 – 98	0.3	0 – 2

**Local Environmental Description**

**Elevation:** Mean 149 m, Range 11 – 419 m

**Aspect:** NW (9), NE (6), SE (5), SW (4), Flat (1)

**Slope:** Mean 17 degrees, Range 0 – 45 degrees

**Macro Topography:** Middle 1/3 of slope (8), Upper 1/3 of slope (8), Lower 1/3 of slope (4), Ridge top (2), Bottom (1), Middle to Upper 1/3 of slope (1), Not recorded (1)

**Large Rock:** Mean 0.4%, Range 0.0 – 2.5%

**Small Rock:** Mean 1.4%, Range 0.0 – 13.3%

**Fines Cover:** Mean 26.9%, Range 1.0 – 75.0%

**Litter Cover:** Mean 45.7%, Range 0.2 – 95%

**Soil Texture (field assessed):** Not recorded (6), Moderately fine clay loam (4), Moderately fine silty clay loam (4), Fine silty clay (4), Moderately fine sandy clay loam (2), Medium to very fine, sandy loam (1), Medium loam (1), Fine sandy clay (1), Fine clay (1), Moderately coarse, sandy loam (1)

**Geology (field or map data):** Sandstone and other sedimentary (27), Franciscan melange (22), Volcanic and metavolcanic rocks (5), Siltstone (1), Shale (1), Granitic (generic) (1), Chert (1), Blueschist and semi-schist (1), Alluvium (1), Sandstone (1)

**Marin County Watersheds:** Bolinas (26), Point Reyes (15), San Rafael (8), Lagunitas Creek (4), Walker Creek (4), Novato (3), Inverness (1)

**Site Impacts**

This association has moderate non-native plant cover (average 30.7%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*, *Anagallis arvensis*, *Avena* spp., *Briza maxima*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Cynosurus*

*echinatus*, *Holcus lanatus*, *Hypochaeris glabra*, *Hypochaeris radicata*, *Linum bienne*, *Lolium perenne*, *Plantago lanceolata*, and *Rumex acetosella*.

**Classification Comments**

None.

**References:** Evens and Kentner 2006, Keeler-Wolf et al. 2003a, Klein et al. 2015, Rodriguez et al. 2017

**Global Rarity Rank:** G3

**State Rarity Rank:** S3

**State Rare:** Y

**Surveys Used for Description**

**Total: N=67; Marin County (n=67):** GGNRA300, GGNRA302, HEAD0310, MARIN279, MARIN288, MMWD0005, MMWD0008, MMWD0239, MMWD0377, MMWD0382, MOSD0082, MOSD0148, MOSD0198, MOSD0202, MOSD0208, MOSD0387, MOSD0395, PGA1505, PGA1624, PGA171, PGA1714, PGA1717, PGA1721, PGA185, PGA4179, PGA4486, PGA4673, PGA4799, PGA48, PGA5018, PGA511, PGA513, PGA5132, PGA518, PGA524, PGA525, PGA527, PGA535, PGA536, PGA540, PGA560, PGA566, PGA567, PGA570, PGA572, PGA574, PGA576, PGA578, PGA581, PGA586, PGA6043, PGA6173, PGA6214, PGA6317, PGA6604, PGA8187, PGA8451, PGA8518, PGA9762, PORE011, PORE124, PORE164, PORE200, TAMG003C, TAMG006C, TAMG016N, TAMG018C

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	100	77.9	28.0	6.0	65.0	X	X		X
	<i>Toxicodendron diversilobum</i>	43	4.5	1.7	0.2	20.2				
	<i>Rubus ursinus</i>	43	4.3	1.6	0.2	15.0				
	<i>Diplacus aurantiacus</i>	36	2.8	1.2	0.2	15.0				
	<i>Artemisia californica</i>	34	7.8	3.6	0.2	35.0				
<b>Herb</b>										
	<i>Plantago lanceolata</i>	78	9.4	7.3	0.2	30.0	X			X
	<i>Nassella pulchra</i>	76	17.2	12.9	0.2	45.0	X			X
	<i>Elymus glaucus</i>	66	6.5	4.1	0.2	25.0				X
	<i>Bromus carinatus</i>	46	4.9	3.3	0.2	35.0				
	<i>Avena</i> spp.	46	3.7	2.8	0.2	35.0				
	<i>Bromus hordeaceus</i>	46	1.8	1.3	0.2	20.0				
	<i>Hypochaeris radicata</i>	45	1.3	1.0	0.2	12.0				
	<i>Danthonia californica</i>	40	2.4	1.8	0.2	15.0				
	<i>Pteridium aquilinum</i>	39	2.9	1.8	0.2	20.0				
	<i>Achillea millefolium</i>	37	0.6	0.4	0.2	10.0				
	<i>Rumex acetosella</i>	34	1.0	0.8	0.2	15.0				
	<i>Aira caryophyllea</i>	34	0.7	0.5	0.2	7.0				
	<i>Chlorogalum pomeridianum</i>	34	0.6	0.4	0.2	5.0				
	<i>Holcus lanatus</i>	33	6.0	4.3	0.2	38.0				
	<i>Briza maxima</i>	33	4.8	3.4	0.2	35.0				
	<i>Lolium perenne</i>	33	1.3	1.1	0.2	40.0				
	<i>Cynosurus echinatus</i>	31	3.1	2.3	0.2	30.0				
	<i>Anagallis arvensis</i>	31	1.1	1.0	0.2	35.0				

*Baccharis pilularis* / (*Nassella pulchra* – *Elymus glaucus* – *Bromus carinatus*) Association  
*Baccharis pilularis* Shrubland Alliance

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<i>Festuca rubra</i>	27	3.3	2.4	0.2	30.0				
	<i>Koeleria macrantha</i>	27	1.0	0.7	0.2	20.0				
	<i>Carduus pycnocephalus</i>	25	0.5	0.4	0.2	7.0				
	<i>Linum bienne</i>	24	1.1	1.3	0.2	50.0				
	<i>Sisyrinchium bellum</i>	24	0.1	0.1	0.2	0.3				
	<i>Vulpia</i> spp.	22	1.8	1.6	0.2	30.0				
	<i>Eschscholzia californica</i>	22	0.3	0.3	0.2	10.0				
	<i>Hypochaeris glabra</i>	21	0.5	0.4	0.2	10.0				
	<i>Stachys ajugoides</i>	21	0.2	0.1	0.2	3.0				

***Baccharis pilularis* / Annual grass – herb Association**

**Common Name:** Coyote Brush / Annual Grass-Herb Shrubland

**Alliance:** *Baccharis pilularis* Shrubland Alliance

**Local Vegetation Description**

The Coyote Brush / Annual Grass-Herb Association forms an open to continuous shrub layer. The emergent tree layer is typically absent, and the herbaceous layer is open to continuous. Dominant and characteristic shrubs include *Baccharis pilularis*. The herbaceous layer often includes *Avena* spp., *Lolium perenne*, and *Plantago lanceolata*, and herbs that are sometimes present include *Achillea millefolium*, *Aira caryophylla*, *Anagallis arvensis*, *Briza maxima*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Cynosurus echinatus*, *Hypochaeris radicata*, and *Rumex acetosella*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.1	0 – 3	3.5	2 – 5
Regenerating or Shrubby Tree	0.0	0 – 1.0	no data	
Shrub	32.7	10.0 – 75	1.7	0 – 10
Herb	65.7	30 – 98	0.3	0 – 2

**Local Environmental Description**

**Elevation:** Mean 146 m, Range 22 – 297 m

**Aspect:** SW (7), NE (1), NW (1)

**Slope:** Mean 19 degrees, Range 5 – 37 degrees

**Macro Topography:** Upper 1/3 of slope (6), Middle 1/3 of slope (2), Ridge top (1)

**Large Rock:** Mean 0.4%, Range 0.0 – 1.0%

**Small Rock:** Mean 1.9%, Range 0.0 – 6.0%

**Fines Cover:** Mean 12.5%, Range 2.0 – 50.0%

**Litter Cover:** Mean 73.1%, Range 3.0 – 96%

**Soil Texture (field assessed):** Medium to very fine, sandy loam (2), Fine silty clay (1), Not recorded (1), Moderately fine sandy clay loam (1), Medium loam (1), Fine clay (1), Fine sandy clay (1), Medium silt (1)

**Geology (field or map data):** Franciscan melange (11), Sandstone and other sedimentary (5), Granitic (4), Blueschist and semi-schist (2)

**Marin County Watersheds:** San Rafael (7), Bolinas (6), Point Reyes (6), Lagunitas Creek (2), Inverness (1)

**Site Impacts**

This association has moderate non-native plant cover (average 45.3%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Aira caryophylla*, *Anagallis arvensis*, *Avena* spp., *Briza maxima*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Cynosurus echinatus*, *Hypochaeris radicata*, *Lolium perenne*, *Plantago lanceolata*, and *Rumex acetosella*.

**Classification Comments**

None.

**References:** AECOM 2013, Evens and San 2004, Evens and San 2005, HDR 2014b, Keeler-Wolf and Evens 2006, Keeler-Wolf and Vaghti 2000, Keeler-Wolf et al. 2003a, Kittel et al. 2012, Klein et al. 2015, Rodriguez et al. 2017, Sproul et al. 2011

**Global Rarity Rank:** G5

**State Rarity Rank:** S5

**State Rare:** N

**Surveys Used for Description**

**Total: N=25; Marin County (n=25):** MARIN276, MARINSP21, MMWD0011, MOSD0052, MOSD0065, MOSD0091, MOSD0196, MOSD0294, MOSD0402, PGA115, PGA1280, PGA153, PGA1686, PGA2361, PGA284, PGA495A, PGA516, PGA522, PGA532, PGA533, PGA540A, PGA66, PGA6709, PGA8405, PRGT020H

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>	<i>Baccharis pilularis</i>	100	89.1	29.4	7.0	75.0	X	X		X
	<i>Toxicodendron diversilobum</i>	32	3.2	0.6	0.2	7.0				
<b>Herb</b>	<i>Lolium perenne</i>	72	12.9	10.9	0.2	40.0				X
	<i>Plantago lanceolata</i>	60	10.8	6.1	0.2	30.0				X
	<i>Avena</i> spp.	52	7.8	6.2	0.2	55.0				X
	<i>Bromus diandrus</i>	44	6.4	4.0	0.2	20.0				
	<i>Bromus hordeaceus</i>	40	3.0	2.4	0.2	20.0				
	<i>Carduus pycnocephalus</i>	36	4.8	1.3	0.2	20.0				
	<i>Cynosurus echinatus</i>	32	1.6	0.9	0.2	10.0				
	<i>Anagallis arvensis</i>	32	0.8	0.1	0.2	0.8				
	<i>Briza maxima</i>	28	4.9	2.3	0.2	20.0				
	<i>Aira caryophyllea</i>	28	2.0	1.8	0.2	25.0				
	<i>Rumex acetosella</i>	28	1.2	0.9	0.2	9.0				
	<i>Hypochaeris radicata</i>	28	0.9	0.3	0.2	4.0				
	<i>Achillea millefolium</i>	24	0.3	0.4	0.2	8.0				

***Baccharis pilularis* / *Carex obnupta* – *Juncus patens* Provisional Association**

**Common Name:** Coyote Brush / Slough Sedge – Common Rush Shrubland

**Alliance:** *Baccharis pilularis* Shrubland Alliance

**Local Vegetation Description**

The Coyote Brush / Slough Sedge – Common Rush Association forms an open to continuous shrub layer. The emergent tree layer is typically absent, and the herbaceous layer is open to continuous. Dominant and characteristic shrubs include *Baccharis pilularis* and *Rubus ursinus*. The herbaceous layer typically includes *Holcus lanatus*, and herbs that are often present include *Carex obnupta* and *Juncus patens*, and herbs that are sometimes present include *Carex*, *Cirsium vulgare*, *Conium maculatum*, *Iris douglasiana*, *Juncus effusus*, *Lolium perenne*, *Plantago lanceolata*, *Pteridium aquilinum*, and *Stachys ajugoides*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.1	0 – 3	3.5	2 – 5
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	38.7	15 – 75	1.1	0 – 5
Herb	71.8	25 – 92	0.4	0 – 2

**Local Environmental Description**

**Elevation:** Mean 53 m, Range 3 – 217 m

**Aspect:** Flat (1), NE (1), SW (1)

**Slope:** Mean 5 degrees, Range 0 – 14 degrees

**Macro Topography:** Middle 1/3 of slope (1), Lower 1/3 of slope (1), Bottom (1)

**Large Rock:** Mean 0.1%, Range 0.0 – 0.2%

**Small Rock:** Mean 0.7%, Range 0.0 – 2.5%

**Fines Cover:** 0.2%

**Litter Cover:** Mean 50.8%, Range 0.0 – 80%

**Soil Texture (field assessed):** Moderately fine clay loam (1), Moderately fine silty clay loam (1), Fine silty clay (1)

**Geology (field or map data):** Sandstone and other sedimentary (24), Granitic (4), Franciscan melange (2), Shale (1), Siltstone (1), Alluvium (1)

**Marin County Watersheds:** Point Reyes (23), Bolinas (5), Inverness (3), San Rafael (1), Walker Creek (1)

**Site Impacts**

This association has moderate non-native plant cover (average 25.9%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Cirsium vulgare*, *Conium maculatum*, *Holcus lanatus*, *Lolium perenne*, and *Plantago lanceolata*.

**Classification Comments**

This association is considered provisional since it is under-sampled in its expected range.

**References:** Keeler-Wolf et al. 2003a

**Global Rarity Rank:** G3

**State Rarity Rank:** S3?

**State Rare:** Y

**Surveys Used for Description**

**Total: N=36; Marin County (n=36):** GGNRA390, MOSD0067, PGA1066, PGA1711, PGA191, PGA192, PGA2196, PGA230, PGA2405, PGA2510, PGA2718, PGA276, PGA315, PGA3699, PGA383, PGA3912, PGA409, PGA4229, PGA433, PGA451, PGA4511, PGA4939, PGA5141, PGA52, PGA5221, PGA5228, PGA5343, PGA545, PGA5458, PGA5542, PGA5786, PGA5874, PORE012, PORE039, TEVA013c, TEVA019c

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	100	75.6	31.8	5.0	75.0	X	X		X
	<i>Rubus ursinus</i>	83	18.1	8.3	0.2	30.0	X			X
	<i>Toxicodendron diversilobum</i>	33	4.0	1.7	0.2	12.0				
<b>Herb</b>										
	<i>Holcus lanatus</i>	81	23.5	18.9	0.2	55.0	X			X
	<i>Juncus patens</i>	72	12.7	10.0	0.2	40.0				X
	<i>Carex obnupta</i>	64	15.1	10.2	0.2	51.0				X
	<i>Conium maculatum</i>	42	4.4	3.8	0.2	37.5				
	<i>Juncus effusus</i>	39	5.8	3.6	0.2	20.0				
	<i>Iris douglasiana</i>	39	3.3	2.7	0.2	15.0				
	<i>Carex</i> spp.	36	4.5	3.1	0.2	20.0				
	<i>Lolium perenne</i>	36	3.4	2.6	0.2	20.0				
	<i>Cirsium vulgare</i>	36	0.8	0.7	0.2	8.0				
	<i>Plantago lanceolata</i>	25	1.5	1.2	0.2	18.0				
	<i>Pteridium aquilinum</i>	22	0.9	0.8	0.2	12.0				
	<i>Stachys ajugoides</i>	22	0.1	0.1	0.2	2.0				

## ***Baccharis pilularis* / *Danthonia californica* Association**

**Common Name:** Coyote Brush / California Oatgrass Shrubland

**Alliance:** *Baccharis pilularis* Shrubland Alliance

### **Local Vegetation Description**

The Coyote Brush / California Oatgrass Association forms an open to intermittent shrub layer. The emergent tree layer is typically absent, and the herbaceous layer is intermittent to continuous. Dominant and characteristic shrubs include *Baccharis pilularis*, and those that are often present include *Rubus ursinus*. The herbaceous layer typically includes *Danthonia californica* and *Plantago lanceolata*, and herbs that are often present include *Achillea millefolium*, *Aira caryophylla*, *Bromus hordeaceus*, *Elymus glaucus*, *Hypochaeris radicata*, *Lolium perenne*, *Nassella pulchra*, and *Pteridium aquilinum*, and herbs that are sometimes present include *Anagallis arvensis*, *Avena* spp., *Brachypodium distachyon*, *Briza maxima*, *Briza minor*, *Bromus carinatus*, *Bromus diandrus*, *Bromus maritimus*, *Carex* spp., *Chlorogalum pomeridianum*, *Cirsium quercetorum*, *Cynosurus echinatus*, *Eriogonum latifolium*, *Festuca idahoensis*, *Festuca rubra*, *Holcus lanatus*, *Iris douglasiana*, *Koeleria macrantha*, *Linum bienne*, *Madia* spp., *Plantago erecta*, *Rumex acetosella*, *Silene gallica*, *Sisyrinchium bellum*, *Stachys ajugoides*, *Vicia sativa*, *Vulpia* spp., *Vulpia bromoides*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.9	0 – 8	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	37.9	15.0 – 65	0.5	0 – 2
Herb	63.4	40 – 98	0.3	0 – 0.5

### **Local Environmental Description**

**Elevation:** Mean 113 m, Range 10 – 315 m

**Aspect:** SW (6), NW (4), NE (3), SE (1)

**Slope:** Mean 15 degrees, Range 0 – 45 degrees

**Macro Topography:** Middle 1/3 of slope (5), Upper 1/3 of slope (3), Ridge top (2), Bottom (1), Dune/sandfield (1), Other (1)

**Large Rock:** Mean 0.7%, Range 0.0 – 9.0%

**Small Rock:** Mean 1.1%, Range 0.0 – 7.3%

**Fines Cover:** Mean 31.8%, Range 2.0 – 82.0%

**Litter Cover:** Mean 33.1%, Range 10.0 – 85%

**Soil Texture (field assessed):** Moderately fine clay loam (4), Medium loam (2), Medium sand (2), Medium to very fine, sandy loam (2), Not recorded (2), Moderately coarse, sandy loam (1)

**Geology (field or map data):** Sandstone and other sedimentary (10), Franciscan melange (8), Siltstone (4), Shale (2), Granitic (1), Chert (1), Volcanic and metavolcanic rocks (1), Sandstone (1)

**Marin County Watersheds:** Point Reyes (14), Bolinas (8), Lagunitas Creek (4), Inverness (1), San Rafael (1)

### **Site Impacts**

This association has moderate non-native plant cover (average 30.8%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Aira caryophylla*, *Anagallis arvensis*, *Avena* spp., *Brachypodium distachyon*, *Briza maxima*, *Briza minor*, *Bromus diandrus*, *Bromus*



*hordeaceus*, *Cynosurus echinatus*, *Holcus lanatus*, *Hypochaeris radicata*, *Linum bienne*, *Lolium perenne*, *Plantago lanceolata*, *Rumex acetosella*, *Silene gallica*, *Vicia sativa*, and *Vulpia bromoides*.

**Classification Comments**

None.

**References:** Keeler-Wolf et al. 2003a, Klein et al. 2015

**Global Rarity Rank:** G2

**State Rarity Rank:** S2

**State Rare:** Y

**Surveys Used for Description**

**Total: N=29; Marin County (n=29):** HEAD0027, HEAD0028, HMRA010, MMWD0019, MMWD0082, PGA1380, PGA158, PGA212, PGA331, PGA4270, PGA553, PGA5614, PGA568, PGA580, PGA6430, PGA6671, PGA6937, PORE002, PORE003, PORE008, PORE013, PORE019, PORE045, PORE197, PRGT011H, PRGT024I, SFANT04B, TAMG014C, TAMG019N

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Shrub	<i>Baccharis pilularis</i>	100	76.4	25.8	3.0	55.0	X	X		X
	<i>Rubus ursinus</i>	59	4.6	1.6	0.2	15.0				X
	<i>Toxicodendron diversilobum</i>	41	4.7	1.7	0.2	18.0				
	<i>Lupinus arboreus</i>	21	8.1	2.5	0.2	25.0				
	<i>Diplacus aurantiacus</i>	21	0.9	0.4	0.1	7.0				
Herb	<i>Danthonia californica</i>	93	21.1	18.2	1.0	55.0	X			X
	<i>Plantago lanceolata</i>	76	6.5	7.4	0.2	50.7	X			X
	<i>Aira caryophyllea</i>	66	4.2	5.3	0.2	44.0				X
	<i>Hypochaeris radicata</i>	62	1.5	1.5	0.2	12.0				X
	<i>Pteridium aquilinum</i>	59	5.4	5.3	0.2	35.0				X
	<i>Bromus hordeaceus</i>	59	3.1	2.7	0.2	20.0				X
	<i>Elymus glaucus</i>	55	2.0	1.6	0.2	10.0				X
	<i>Achillea millefolium</i>	55	0.9	1.0	0.2	10.0				X
	<i>Nassella pulchra</i>	52	4.5	3.6	0.2	20.0				X
	<i>Lolium perenne</i>	52	2.7	2.2	0.2	10.0				X
	<i>Holcus lanatus</i>	48	6.9	5.4	0.2	50.0				
	<i>Rumex acetosella</i>	48	2.2	2.9	0.2	50.0				
	<i>Carex</i> spp.	48	1.4	1.4	0.2	12.0				
	<i>Cynosurus echinatus</i>	48	1.9	1.3	0.2	12.0				
	<i>Bromus carinatus</i>	41	1.7	1.3	0.2	15.0				
	<i>Chlorogalum pomeridianum</i>	41	1.1	0.9	0.2	20.0				
	<i>Avena</i> spp.	41	0.8	0.7	0.2	10.0				
	<i>Plantago erecta</i>	41	0.7	0.5	0.2	10.0				
	<i>Koeleria macrantha</i>	34	0.7	0.5	0.2	5.0				
	<i>Sisyrinchium bellum</i>	34	0.2	0.2	0.2	2.0				
<i>Vulpia bromoides</i>	31	3.7	3.7	0.2	46.7					

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<i>Bromus diandrus</i>	31	0.3	0.3	0.2	3.0				
	<i>Vulpia</i> spp.	28	1.9	2.0	0.2	13.0				
	<i>Anagallis arvensis</i>	28	0.4	0.4	0.2	5.0				
	<i>Linum bienne</i>	28	0.3	0.3	0.2	5.8				
	<i>Cirsium quercetorum</i>	28	0.1	0.1	0.2	1.3				
	<i>Iris douglasiana</i>	24	3.0	2.5	1.8	20.0				
	<i>Festuca rubra</i>	24	0.8	0.5	0.2	10.0				
	<i>Silene gallica</i>	24	0.1	0.1	0.2	0.4				
	<i>Stachys ajugoides</i>	24	0.1	0.1	0.2	0.3				
	<i>Briza maxima</i>	21	2.2	3.2	0.2	47.3				
	<i>Festuca idahoensis</i>	21	3.0	1.6	3.0	10.0				
	<i>Eriogonum latifolium</i>	21	0.6	1.1	0.2	15.0				
	<i>Brachypodium distachyon</i>	21	1.2	1.0	0.2	18.0				
	<i>Bromus maritimus</i>	21	0.4	0.5	0.2	10.0				
	<i>Briza minor</i>	21	0.2	0.2	0.2	2.2				
	<i>Madia</i> spp.	21	0.1	0.1	0.2	3.0				
	<i>Vicia sativa</i>	21	0.1	0.1	0.1	1.5				

***Baccharis pilularis* / *Deschampsia cespitosa* Association**

**Common Name:** Coyote Brush / Tufted Hairgrass Shrubland

**Alliance:** *Baccharis pilularis* Shrubland Alliance

**Local Vegetation Description**

The Coyote Brush / Tufted Hairgrass Association forms an open to intermittent shrub layer. The emergent tree layer is typically absent, and the herbaceous layer is intermittent to continuous. Dominant and characteristic shrubs include *Baccharis pilularis*, and those that are often present include *Rubus ursinus*. The herbaceous layer typically includes *Deschampsia cespitosa* and *Holcus lanatus*, and herbs that are often present include *Aira caryophyllea*, *Elymus glaucus*, *Hypochaeris radicata*, *Iris douglasiana*, and *Plantago lanceolata*, and herbs that are sometimes present include *Achillea millefolium*, *Agrostis*, *Anagallis arvensis*, *Bromus carinatus*, *Calamagrostis nutkaensis*, *Carex* spp., *Danthonia californica*, *Gamochaeta ustulata*, *Grindelia hirsutula*, *Juncus patens*, *Lolium perenne*, *Plantago*, *Pteridium aquilinum*, and *Rumex acetosella*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.8	0 – 8	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	28.4	12 – 60	0.5	0 – 2
Herb	75.5	40 – 95	0.3	0 – 0.5

**Local Environmental Description**

**Elevation:** Mean 60 m, Range 24 – 156 m

**Aspect:** NW (2), SE (1), SW (1)

**Slope:** Mean 9 degrees, Range 5 – 11 degrees

**Macro Topography:** Lower 1/3 of slope (1), Ridge top (1)

**Large Rock:** Mean 0.1%, Range 0.0 – 0.2%

**Small Rock:** Mean 2.6%, Range 0.0 – 5.2%

**Fines Cover:** Mean 6.4%, Range 1.3 – 15.0%

**Litter Cover:** Mean 40.1%, Range 0.2 – 60%

**Soil Texture (field assessed):** Coarse, loamy sand (1), Moderately coarse, sandy loam (1)

**Geology (field or map data):** Sandstone and other sedimentary (9), Franciscan melange (1), Sand dunes (1)

**Marin County Watersheds:** Point Reyes (10), Walker Creek (1)

**Site Impacts**

This association has moderate non-native plant cover (average 31.0%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*, *Anagallis arvensis*, *Holcus lanatus*, *Hypochaeris radicata*, *Lolium perenne*, *Plantago lanceolata*, and *Rumex acetosella*.

**Classification Comments**

None.

**References:** Elliott and Wehausen 1974, Klein et al. 2015

**Global Rarity Rank:** G2

**State Rarity Rank:** S1

**State Rare:** Y



**Surveys Used for Description**

**Total: N=13; Marin County (n=13):** CPRAIR02, HEAD0317, PGA312, PGA363, PGA372, PGA3732, PGA402, PGA4070, PGA467, PGA5730, PGA6122, PORE048, SFANT12B

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	92	76.4	22.0	7.6	60.0	X	X		X
	<i>Rubus ursinus</i>	69	13.1	4.7	0.2	20.0				X
<b>Herb</b>										
	<i>Deschampsia cespitosa</i>	100	25.0	24.2	7.0	65.0	X			X
	<i>Holcus lanatus</i>	92	21.8	18.4	0.2	60.0	X			X
	<i>Iris douglasiana</i>	69	3.5	3.3	0.2	10.0				X
	<i>Plantago lanceolata</i>	54	3.4	5.5	0.2	38.7				X
	<i>Aira caryophyllea</i>	54	3.6	4.9	0.2	20.0				X
	<i>Hypochaeris radicata</i>	54	1.1	2.2	0.2	20.7				X
	<i>Elymus glaucus</i>	54	2.7	2.0	0.2	12.0				X
	<i>Bromus carinatus</i>	46	0.8	1.1	0.2	6.7				
	<i>Pteridium aquilinum</i>	38	4.1	3.5	2.0	18.0				
	<i>Rumex acetosella</i>	38	0.3	0.4	0.2	3.0				
	<i>Gamochoeta ustulata</i>	38	0.1	0.1	0.2	0.2				
	<i>Danthonia californica</i>	31	3.7	3.6	1.5	20.0				
	<i>Lolium perenne</i>	31	3.4	2.9	0.2	20.0				
	<i>Calamagrostis nutkaensis</i>	31	2.3	2.6	0.2	18.0				
	<i>Carex</i> spp.	31	1.0	1.1	0.2	8.0				
	<i>Achillea millefolium</i>	31	0.5	0.5	0.2	3.0				
	<i>Grindelia hirsutula</i>	31	0.1	0.1	0.2	0.2				
	<i>Agrostis</i> spp.	23	2.9	3.0	0.2	35.0				
	<i>Juncus patens</i>	23	1.6	1.4	5.0	8.0				
	<i>Plantago</i> spp.	23	1.6	1.4	1.0	12.0				
	<i>Anagallis arvensis</i>	23	0.1	0.1	0.2	0.9				

***Baccharis pilularis* / *Eriophyllum staechadifolium* Association**

**Common Name:** Coyote Brush / Seaside Woolly-sunflower Shrubland

**Alliance:** *Baccharis pilularis* Shrubland Alliance

**Local Vegetation Description**

The Coyote Brush / Seaside Woolly-sunflower Association forms an open to continuous shrub layer. The emergent tree layer is typically absent, and the herbaceous layer is open to continuous. Dominant and characteristic shrubs include *Baccharis pilularis*, and those that are often present include *Rubus ursinus*. The herbaceous layer typically includes *Eriophyllum staechadifolium* and *Achillea millefolium*, and herbs that are often present include *Dudleya farinosa*, *Erigeron glaucus*, *Eriogonum latifolium*, *Fragaria chiloensis*, and *Scrophularia californica*, and herbs that are sometimes present include *Anagallis arvensis*, *Angelica hendersonii*, *Armeria maritima*, *Bromus diandrus*, *Bromus hordeaceus*, *Bromus maritimus*, *Carpobrotus edulis*, *Castilleja affinis*, *Chlorogalum pomeridianum*, *Clinopodium douglasii*, *Daucus pusillus*, *Galium aparine*, *Gamochaeta ustulata*, *Geranium dissectum*, *Grindelia stricta*, *Hypochaeris radicata*, *Iris douglasiana*, *Lotus wrangelianus*, *Plantago coronopus*, *Plantago lanceolata*, *Pteridium aquilinum*, *Pterostegia drymarioides*, *Rumex acetosella*, *Symphyotrichum chilense*, and *Vulpia bromoides*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	59.6	20 – 95	0.6	0 – 2
Herb	33.2	5 – 70	0.3	0 – 1

**Local Environmental Description**

**Elevation:** Mean 52 m, Range 7 – 367 m

**Aspect:** SW (8), NE (3), Variable (3), SE (2), Flat (1), NW (1)

**Slope:** Mean 15 degrees, Range 0 – 38 degrees

**Macro Topography:** Bench (4), Upper 1/3 of slope (4), Middle 1/3 of slope (3), Lower 1/3 of slope (2), Terrace (former shoreline or floodplain) (2), Bottom to Lower 1/3 of slope (1), Lower to Middle 1/3 of slope (1), Ridge top (1)

**Large Rock:** Mean 1.0%, Range 0.0 – 6.0%

**Small Rock:** Mean 3.3%, Range 0.0 – 20.0%

**Fines Cover:** Mean 53.6%, Range 8.0 – 92.0%

**Litter Cover:** Mean 33.8%, Range 0.0 – 90%

**Soil Texture (field assessed):** Loam, (class unknown) (4), Sand, (class unknown) (3), Not recorded (3), Medium to very fine, sandy loam (2), Fine clay (1), Moderately fine clay loam (1), Moderately fine sandy clay loam (1), Coarse, loamy sand (1), Clay, (class unknown) (1), Medium sand (1)

**Geology (field or map data):** Sandstone and other sedimentary (7), Sandstone (3), Alluvium (2), Volcanic and metavolcanic rocks (1), Granitic (generic) (1), Conglomerate (1), Calcareous sandstone (1), Sand dunes (1)

**Marin County Watersheds:** Bolinas (1), Point Reyes (1)

**Other Watersheds, San Francisco Co.:** San Francisco Coastal (1); **San Mateo Co.:** San Mateo Coastal (8), Ano Nuevo (3), Pescadero Creek (3), San Francisco Coastal (1); **Sonoma Co.:** Salmon Creek (1)

## Site Impacts

This association has low non-native plant cover (average 6.0%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Anagallis arvensis*, *Bromus diandrus*, *Bromus hordeaceus*, *Carpobrotus edulis*, *Geranium dissectum*, *Hypochaeris radicata*, *Plantago coronopus*, *Plantago lanceolata*, *Rumex acetosella*, and *Vulpia bromoides*.

## Classification Comments

Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** Baxter 1992, Belsher 1999, Keeler-Wolf et al. 2003a

**Global Rarity Rank:** G3

**State Rarity Rank:** S3

**State Rare:** Y

## Surveys Used for Description

**Total: N=22; Marin County (n=2):** PORE194, WRBL004

San Francisco County (n=1): SMAT0228

San Mateo County (n=18): GGNRA259, GGNRA260, PGA12048, PGA1786, PGA1848, PWNCS01, SMAT0015, SMAT0041, SMAT0104, SMAT0120, SMAT0660, SMAT0665, WRBL002, WRBL041, WRBL048, WRBL067, WRBL070, WRBL118

Sonoma County (n=1): WRBL057

## Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Shrub	<i>Baccharis pilularis</i>	100	81.2	33.2	16.0	55.0	X	X		X
	<i>Rubus ursinus</i>	55	4.3	2.0	0.2	20.0				X
	<i>Artemisia californica</i>	36	4.6	2.0	0.2	20.0				
	<i>Toxicodendron diversilobum</i>	36	1.5	0.8	0.2	10.0				
	<i>Lupinus versicolor</i>	36	0.6	0.3	0.2	3.0				
	<i>Diplacus aurantiacus</i>	32	1.7	0.9	0.2	10.0				
	<i>Lupinus arboreus</i>	27	3.5	2.0	0.2	35.0				
Herb	<i>Eriophyllum stoechadifolium</i>	100	33.5	15.6	0.2	38.0	X		X	X
	<i>Achillea millefolium</i>	82	3.2	1.7	0.2	10.0	X			X
	<i>Erigeron glaucus</i>	59	1.5	0.8	0.2	4.1				X
	<i>Eriogonum latifolium</i>	55	2.6	1.3	0.2	10.0				X
	<i>Fragaria chiloensis</i>	50	9.4	6.4	0.2	55.0				X
	<i>Scrophularia californica</i>	50	3.0	1.9	0.2	30.0				X
	<i>Dudleya farinosa</i>	50	1.3	0.6	0.2	5.0				X
	<i>Symphotrichum chilense</i>	45	2.0	1.3	0.5	10.0				
	<i>Anagallis arvensis</i>	45	0.3	0.2	0.2	1.0				
	<i>Angelica hendersonii</i>	41	1.8	1.1	0.2	7.0				
	<i>Carpobrotus edulis</i>	41	1.9	0.9	0.5	10.0				
	<i>Castilleja affinis</i>	41	0.7	0.6	0.2	7.0				
	<i>Chlorogalum pomeridianum</i>	36	1.9	1.3	0.2	15.0				

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<i>Gamochaeta ustulata</i>	36	0.2	0.1	0.2	0.5				
	<i>Pteridium aquilinum</i>	32	1.7	1.4	0.2	20.0				
	<i>Bromus maritimus</i>	32	0.7	0.3	0.2	3.0				
	<i>Plantago lanceolata</i>	32	0.3	0.2	0.2	3.0				
	<i>Daucus pusillus</i>	32	0.2	0.1	0.2	0.5				
	<i>Clinopodium douglasii</i>	27	1.6	1.5	0.2	25.0				
	<i>Vulpia bromoides</i>	27	1.1	0.5	0.2	5.0				
	<i>Grindelia stricta</i>	27	0.4	0.1	0.2	1.0				
	<i>Geranium dissectum</i>	27	0.2	0.1	0.2	0.5				
	<i>Bromus diandrus</i>	27	0.2	0.1	0.2	0.5				
	<i>Armeria maritima</i>	23	1.6	1.9	0.2	40.0				
	<i>Iris douglasiana</i>	23	0.6	0.3	0.2	3.0				
	<i>Hypochaeris radicata</i>	23	0.4	0.3	0.2	5.0				
	<i>Rumex acetosella</i>	23	0.3	0.2	0.2	3.4				
	<i>Bromus hordeaceus</i>	23	0.4	0.2	0.2	2.0				
	<i>Plantago coronopus</i>	23	0.2	0.2	0.2	2.0				
	<i>Pterostegia drymarioides</i>	23	0.3	0.1	0.2	1.0				
	<i>Galium aparine</i>	23	0.1	0.1	0.2	1.1				
	<i>Lotus wrangelianus</i>	23	0.1	0.1	0.2	0.5				



***Frangula californica* ssp. *californica* – *Baccharis pilularis* / *Scrophularia californica* Association**

**Common Name:** Coffeeberry – Coyote Brush / California Figwort Shrubland

**Alliance:** *Baccharis pilularis* Shrubland Alliance

**Local Vegetation Description**

The Coffeeberry – Coyote Brush / California Figwort Association forms an intermittent to continuous shrub layer. The emergent tree layer is typically absent, and the herbaceous layer is open to intermittent. Dominant and characteristic shrubs include *Frangula californica*, *Baccharis pilularis*, *Diplacus aurantiacus*, *Rubus ursinus*, and *Toxicodendron diversilobum*. The herbaceous layer often includes *Pteridium aquilinum*, and herbs that are sometimes present include *Anaphalis margaritacea*, *Elymus glaucus*, *Erechtites minimus*, *Eriophyllum stoechadifolium*, *Heracleum maximum*, *Holcus lanatus*, *Marah fabaceus*, *Polystichum munitum*, and *Scrophularia californica*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	3.0	0 – 10	7.0	2 – 15
Hardwood	0.9	0 – 6	3.5	2 – 5
Regenerating or Shrubby Tree	0.6	0 – 6.0	no data	
Shrub	83.8	60.0 – 95	3.2	0.5 – 5
Herb	19.8	2 – 50	0.7	0 – 2

**Local Environmental Description**

**Elevation:** Mean 146 m, Range 49 – 376 m

**Aspect:** SW (4), NW (2), NE (1)

**Slope:** Mean 27 degrees, Range 12 – 35 degrees

**Macro Topography:** Upper 1/3 of slope (4), Lower 1/3 of slope (2), Middle 1/3 of slope (1)

**Large Rock:** 0.0%

**Small Rock:** Mean 0.6%, Range 0.0 – 3.0%

**Fines Cover:** 82.0%

**Litter Cover:** Mean 47.5%, Range 0.0 – 95%

**Soil Texture (field assessed):** Moderately coarse, sandy loam (2), Not recorded (2), Coarse, loamy sand (1), Medium silt loam (1), Medium to very fine, sandy loam (1)

**Geology (field or map data):** Sandstone and other sedimentary (7), Shale (2), Sandstone (2), Granitic (1), Volcanic and metavolcanic rocks (1)

**Marin County Watersheds:** Bolinas (9), Point Reyes (4)

**Site Impacts**

This association has low non-native plant cover (average 2.6%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Erechtites minimus* and *Holcus lanatus*.

**Classification Comments**

None.

**References:** Keeler-Wolf et al. 2003a

**Global Rarity Rank:** G4

**State Rarity Rank:** S4

**State Rare:** N

**Surveys Used for Description**

**Total: N=14; Marin County (n=14):** MARIN079, PGA1265, PGA1297, PGA1726, PGA3932, PGA6393, PGA6462, PGA8109, PORE074, PORE119, PORE167, PORE206, WRBL012, WRBL019

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>	<i>Frangula californica</i>	100	58.3	57.4	20.0	92.0	X	X		X
	<i>Baccharis pilularis</i>	100	14.4	13.9	3.0	41.0	X			X
	<i>Toxicodendron diversilobum</i>	86	11.3	11.4	3.0	30.0	X			X
	<i>Rubus ursinus</i>	79	7.0	6.5	0.2	20.0	X			X
	<i>Diplacus aurantiacus</i>	79	4.5	3.9	0.2	17.0	X			X
	<i>Artemisia californica</i>	43	3.6	3.2	0.2	14.0				
<b>Herb</b>	<i>Pteridium aquilinum</i>	50	8.0	1.1	0.2	10.0				X
	<i>Polystichum munitum</i>	43	13.4	1.7	0.4	10.0				
	<i>Holcus lanatus</i>	43	11.6	1.7	0.2	10.0				
	<i>Heracleum maximum</i>	43	9.0	0.4	0.2	2.0				
	<i>Anaphalis margaritacea</i>	36	2.8	0.4	0.2	3.0				
	<i>Elymus glaucus</i>	29	1.3	0.3	0.2	3.0				
	<i>Marah fabaceus</i>	29	2.4	0.1	0.2	1.2				
	<i>Eriophyllum stoechadifolium</i>	21	5.6	0.4	0.2	3.0				
	<i>Erechtites minimus</i>	21	1.8	0.2	0.2	3.0				
	<i>Scrophularia californica</i>	21	2.7	0.2	0.2	2.2				

## ***Garrya elliptica* Provisional Association**

**Common Name:** Coast silk tassel Shrubland

**Alliance:** *Baccharis pilularis* Shrubland Alliance

### **Local Vegetation Description**

The Coast silk tassel Association forms an intermittent to continuous shrub layer. The emergent tree layer is typically absent, and the herbaceous layer is open to intermittent. Dominant and characteristic shrubs include *Garrya elliptica*, *Baccharis pilularis*, and *Toxicodendron diversilobum*, and those that are often present include *Artemisia californica*, *Frangula californica*, and *Holodiscus discolor*. The herbaceous layer typically includes *Polystichum munitum* and *Pteridium aquilinum*, and herbs that are sometimes present include *Monardella villosa*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	1.0	0 – 5	12.5	10 – 15
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	70.0	55.0 – 85	3.5	2 – 5
Herb	18.0	5 – 45	0.3	0 – 0.5

### **Local Environmental Description**

**Elevation:** Mean 177 m, Range 18 – 543 m

**Aspect:** SE (1), NW (1)

**Slope:** Mean 33 degrees, Range 30 – 35 degrees

**Macro Topography:** Upper 1/3 of slope (1), Middle to Upper 1/3 of slope (1)

**Large Rock:** Mean 3.1%, Range 1.2 – 5.0%

**Small Rock:** Mean 9.1%, Range 8.0 – 10.2%

**Fines Cover:** Mean 38.5%, Range 10.0 – 67.0%

**Litter Cover:** Mean 47.5%, Range 15.0 – 80%

**Soil Texture (field assessed):** Coarse, loamy sand (1), Medium sand (1)

**Geology (field or map data):** Granitic (3), Granitic (generic) (2)

**Marin County Watersheds:** Inverness (3)

**Other Watersheds, San Mateo Co.:** San Mateo Coastal (2)

### **Site Impacts**

This association has very low non-native plant cover (average 0.2%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Anagallis arvensis*, *Hypochaeris radicata*, and *Plantago lanceolata*.

### **Classification Comments**

This association is considered provisional since it is under-sampled in its expected range. Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** Buck-Diaz et al. 2019

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

### **Surveys Used for Description**

**Total: N=5; Marin County (n=3):** PGA41, PGA51A, PGA98

San Mateo County (n=2): SMAT0017, SMAT0073

### **Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

<b>Layer</b>	<b>Taxon</b>	<b>Con</b>	<b>Rel</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>	<b>Ch</b>	<b>D</b>	<b>cD</b>	<b>Oft</b>
<b>Shrub</b>										
	<i>Garrya elliptica</i>	100	56.3	40.6	15.0	70.0	X	X		X
	<i>Baccharis pilularis</i>	100	17.6	11.6	0.2	22.0	X			X
	<i>Toxicodendron diversilobum</i>	100	6.4	4.9	0.2	15.0	X			X
	<i>Frangula californica</i>	60	3.4	2.4	0.2	7.0				X
	<i>Artemisia californica</i>	60	2.9	2.0	0.2	5.0				X
	<i>Holodiscus discolor</i>	60	2.1	1.2	0.2	4.0				X
	<i>Rubus parviflorus</i>	40	7.2	4.8	9.0	15.0				
	<i>Diplacus aurantiacus</i>	40	0.4	0.2	0.2	1.0				
<b>Herb</b>										
	<i>Polystichum munitum</i>	80	36.1	5.6	2.0	12.0	X		X	X
	<i>Pteridium aquilinum</i>	80	25.9	5.0	0.2	12.0	X			X
	<i>Monardella villosa</i>	40	1.9	0.1	0.2	0.2				

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## ***Ceanothus cuneatus* Shrubland Alliance**

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**Common Name:** Wedge leaf ceanothus chaparral, Buck brush chaparral

**NVC Alliance Code:** A3869. *Ceanothus cuneatus* Chaparral Alliance

### **Statewide Description**

*Ceanothus cuneatus* is dominant or co-dominant in the shrub canopy with *Adenostoma fasciculatum*, *Arctostaphylos glauca*, *Arctostaphylos manzanita*, *Arctostaphylos patula*, *Arctostaphylos tomentosa*, *Ceanothus integerrimus*, *Cercocarpus montanus*, *Eriogonum fasciculatum*, *Garrya fremontii*, *Hesperoyucca whipplei*, *Heteromeles arbutifolia*, *Quercus berberidifolia*, *Quercus john-tuckeri*, *Rhus ovata*, and *Salvia mellifera*. Emergent trees may be present at low cover, including *Calocedrus decurrens*, *Juniperus californica*, *Pinus jeffreyi*, *Pinus ponderosa*, *Pinus sabiniana*, *Quercus douglasii*, or *Quercus wislizeni*.

*Ceanothus cuneatus* occurs as an understory shrub in various forest and woodland types in northern California, and it is present as a secondary species in many chaparral alliances in California. Self-perpetuating stands are typically restricted to rocky, harsh exposures or substrates. Many stands establish after fire, and they form an important part of the chaparral in northern and central California. *Ceanothus cuneatus* stands are often dense, with interlocking crowns that may contain abundant deadwood. *Ceanothus cuneatus* may also form open stands with much bare ground.

Mixed stands with co-dominant *Adenostoma fasciculatum* are common in the central coast and inner North Coast Ranges, and occur more sporadically in the Sierra Nevada and in southern California. These mixed stands occur on a variety of exposures along steep lower to upper slopes. Substrates are usually sedimentary and metamorphic. Because of ecological overlap between mixed and pure *Ceanothus cuneatus* stands, the former practice of segregating them into separate series or alliances has been

discontinued. There are five varieties of *Ceanothus cuneatus* (Fross and Wilken 2006); *Ceanothus cuneatus* var. *cuneatus* and *C. cuneatus* var. *ramulosus* are included in this alliance.

### **Local Vegetation Description**

The Wedge leaf ceanothus chaparral, Buck brush chaparral Alliance forms an open to continuous shrub layer. The emergent tree layer is typically sparse to open, and the herbaceous layer is sparse to intermittent. Dominant and characteristic shrubs include *Adenostoma fasciculatum*, *Ceanothus cuneatus*, *Baccharis pilularis* and *Diplacus aurantiacus*, and those that are often present include *Toxicodendron diversilobum*. The herbs that are sometimes present include *Anagallis arvensis*, *Avena* spp., *Carduus pycnocephalus*, *Chlorogalum pomeridianum*, *Cynosurus echinatus*, *Eschscholzia californica*, *Galium porrigens*, *Melica torreyana*, *Pentagramma triangularis* and *Zigadenus fremontii*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.6	0 – 5	No data	
Hardwood	1.3	0 – 10	No data	
Regenerating or Shrubby Tree	0.4	0 – 2.0	3.5	2 – 5
Shrub	58.6	10.0 – 90.0	1.6	0 – 5
Herb	9.3	0.2 – 50	0.3	0 – 0.5

### **Local Membership Rule**

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

### **Local Environmental Description**

**Elevation:** Mean 286 m, Range 182 – 432 m

**Aspect:** SW (3), SE (2), NW (1), Flat (1)

**Slope:** Mean 24 degrees, Range 0 – 46 degrees

**Macro Topography:** Upper 1/3 of slope (3), Middle 1/3 of slope (2), Lower 1/3 of slope (1), Ridge top (1)

**Large Rock:** Mean 0.5%, Range 0.0 – 2.0%

**Small Rock:** Mean 27.2%, Range 3.0 – 71%

**Fines Cover:** Mean 40.7%, Range 16 – 70%

**Litter Cover:** Mean 20.7%, Range 5.0 – 54%

**Soil Texture (field assessed):** Moderately coarse, sandy loam (2), Moderately fine sandy clay loam (2), Moderately fine clay loam (1), Coarse, loamy sand (1), Fine clay (1)

**Geology (field or map data):** Franciscan melange (6), Blueschist and semi-schist (1), Sandstone and other sedimentary (1)

**Marin County Watersheds:** San Rafael (4), Lagunitas Creek (3), Bolinas (1)

### **Site Impacts**

This alliance has low non-native plant cover (average 2.8%) relative to native cover. Non-native species with highest frequency and abundance include *Anagallis arvensis*, *Carduus pycnocephalus*, *Cynosurus echinatus*.

### **Associations in Marin County**

*Ceanothus cuneatus*

*Ceanothus cuneatus* – *Adenostoma fasciculatum*

### **Classification Comments**

None.

**References:** Borchert et al. 2004, Buck and Evens 2010, Buck-Diaz and Evens 2011b, Buck-Diaz et al. 2012, Evens et al. 2004, Gordon and White 1994, Keeler-Wolf et al. 2003b, Kittel et al. 2012, Klein

and Evens 2005, Klein et al. 2007, Klein et al. 2015, Reyes et al. 2020a, Taylor and Teare 1979a, VegCAMP 2015a

**Global Rarity Rank:** G4

**State Rarity Rank:** S4

**Surveys Used for Description**

**Total: N=8; Marin County (n=8):** MMWD0240, MMWD0325, MMWD0365, MOSD0025, MOSD0032, MOSD0053, MOSD0086, PGA1357

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Regenerating or Shrubby Trees</b>										
	<i>Quercus wislizeni</i>	25	25.0	0.2	0.2	1.0				
<b>Shrub</b>										
	<b><i>Ceanothus cuneatus</i></b>	<b>100</b>	<b>40.4</b>	<b>17.8</b>	<b>10.0</b>	<b>25.0</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<i>Adenostoma fasciculatum</i>	88	30.0	18.0	0.2	45.0	<b>X</b>		<b>X</b>	<b>X</b>
	<i>Diplacus aurantiacus</i>	88	13.5	9.0	2.0	35.0	<b>X</b>			<b>X</b>
	<i>Baccharis pilularis</i>	75	8.4	5.4	0.2	20.0	<b>X</b>			<b>X</b>
	<i>Toxicodendron diversilobum</i>	63	1.0	0.8	0.2	3.0				<b>X</b>
	<i>Heteromeles arbutifolia</i>	38	0.5	0.4	0.2	2.0				
	<i>Artemisia californica</i>	25	4.4	2.9	0.2	23.0				
	<i>Lepechinia calycina</i>	25	0.1	0.1	0.2	0.2				
	<i>Lonicera hispidula</i>	25	0.1	0.1	0.2	0.2				
<b>Herb</b>										
	<i>Cynosurus echinatus</i>	38	5.7	0.2	0.2	1.0				
	<i>Anagallis arvensis</i>	38	2.8	0.1	0.2	0.2				
	<i>Galium porrigens</i>	38	2.8	0.1	0.2	0.2				
	<i>Zigadenus fremontii</i>	38	10.2	0.1	0.2	0.2				
	<i>Pentagramma triangularis</i>	38	8.2	0.1	0.2	0.2				
	<i>Chlorogalum pomeridianum</i>	38	16.5	0.1	0.2	0.2				
	<i>Carduus pycnocephalus</i>	25	4.9	0.2	0.2	1.0				
	<i>Melica torreyana</i>	25	2.0	0.1	0.2	0.2				
	<i>Avena</i> spp.	25	1.6	0.1	0.2	0.2				
	<i>Eschscholzia californica</i>	25	1.6	0.1	0.2	0.2				

## Ceanothus cuneatus Association

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**Common Name:** Wedgeleaf Ceanothus Shrubland

**Alliance:** *Ceanothus cuneatus* Shrubland Alliance

### Local Vegetation Description

The Wedgeleaf Ceanothus Association forms an open. The emergent tree layer is typically absent, and the herbaceous layer is intermittent. Dominant and characteristic shrubs include *Ceanothus cuneatus*. The herbaceous layer typically includes *Vulpia bromoides*, *Aira caryophyllea*, *Anagallis arvensis*, *Briza maxima*, *Cynosurus echinatus*, *Dichelostemma* spp., *Lithophragma affine*, *Lolium perenne*, *Lupinus*, *Nassella pulchra*, *Plantago erecta*, and *Sanicula bipinnatifida*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	NA	no data	
Hardwood	0.0	NA	no data	
Regenerating or Shrubby Tree	0.0	NA	no data	
Shrub	10.0	NA	0.3	0 – 0.5
Herb	50.0	NA	0.3	0 – 0.5

### Local Environmental Description

**Elevation:** 208 m

**Aspect:** NW (1)

**Slope:** 20 degrees

**Macro Topography:** Upper 1/3 of slope (1)

**Large Rock:** 0.2%

**Small Rock:** 16.0%

**Fines Cover:** 68.0%

**Litter Cover:** 5%

**Soil Texture (field assessed):** Moderately fine clay loam (1)

**Geology (field or map data):** Franciscan melange (1)

**Marin County Watersheds:** San Rafael (1)

### Site Impacts

This association has low non-native plant cover (average 15.2%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*, *Anagallis arvensis*, *Briza maxima*, *Cynosurus echinatus*, *Lolium perenne*, and *Vulpia bromoides*.

### Classification Comments

None.

**References:** Borchert et al. 2004, Buck-Diaz et al. 2012, Evens et al. 2004, Keeler-Wolf et al. 2003b, Kittel et al. 2012, Klein and Evens 2005, Klein et al. 2007, Reyes et al. 2020a, Taylor and Teare 1979a, VegCAMP 2015a

**Global Rarity Rank:** G4?

**State Rarity Rank:** SNR

**State Rare:** N

### Surveys Used for Description

**Total: N=1; Marin County (n=1):** MOSD0053



### **Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

<b>Layer</b>	<b>Taxon</b>	<b>Con</b>	<b>Rel</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>	<b>Ch</b>	<b>D</b>	<b>cD</b>	<b>Oft</b>
<b>Shrub</b>	<i>Ceanothus cuneatus</i>	100	100.0	10.0	10.0	10.0	X	X		X
<b>Herb</b>	<i>Vulpia bromoides</i>	100	31.2	1.0	1.0	1.0	X		X	X
	<i>Aira caryophyllea</i>	100	6.3	0.2	0.2	0.2	X			X
	<i>Anagallis arvensis</i>	100	6.3	0.2	0.2	0.2	X			X
	<i>Briza maxima</i>	100	6.3	0.2	0.2	0.2	X			X
	<i>Cynosurus echinatus</i>	100	6.3	0.2	0.2	0.2	X			X
	<i>Dichelostemma</i> spp.	100	6.3	0.2	0.2	0.2	X			X
	<i>Lithophragma affine</i>	100	6.3	0.2	0.2	0.2	X			X
	<i>Lolium perenne</i>	100	6.3	0.2	0.2	0.2	X			X
	<i>Lupinus</i> spp.	100	6.3	0.2	0.2	0.2	X			X
	<i>Nassella pulchra</i>	100	6.3	0.2	0.2	0.2	X			X
	<i>Plantago erecta</i>	100	6.3	0.2	0.2	0.2	X			X
	<i>Sanicula bipinnatifida</i>	100	6.3	0.2	0.2	0.2	X			X

***Ceanothus cuneatus* – *Adenostoma fasciculatum* Association**

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**Common Name:** Wedgeleaf Ceanothus – Chamise Shrubland

**Alliance:** *Ceanothus cuneatus* Shrubland Alliance

**Local Vegetation Description**

The Wedgeleaf Ceanothus – Chamise Association forms an open to continuous shrub layer. The emergent tree layer is typically absent, and the herbaceous layer is sparse to open. Dominant and characteristic shrubs include *Adenostoma fasciculatum*, *Ceanothus cuneatus*, *Baccharis pilularis*, *Diplacus aurantiacus*, and *Toxicodendron diversilobum*, and those that are often present include *Heteromeles arbutifolia*. The herbaceous layer sometimes includes *Chlorogalum pomeridianum*, *Pentagramma triangularis*, and *Zigadenus fremontii*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	1.0	0 – 5	no data	
Hardwood	2.0	0 – 10	no data	
Regenerating or Shrubby Tree	0.4	0 – 2.0	3.5	2 – 5
Shrub	70.6	25.0 – 90	2.0	1 – 5
Herb	1.5	0.2 – 4	0.3	0 – 0.5

**Local Environmental Description**

**Elevation:** Mean 279 m, Range 182 – 430 m

**Aspect:** SE (2), SW (1), Flat (1)

**Slope:** Mean 22 degrees, Range 0 – 44 degrees

**Macro Topography:** Upper 1/3 of slope (2), Middle 1/3 of slope (1), Ridge top (1)

**Large Rock:** Mean 0.2%, Range 0.0 – 0.2%

**Small Rock:** Mean 19.0%, Range 3.0 – 45.0%

**Fines Cover:** Mean 40.0%, Range 25.0 – 70.0%

**Litter Cover:** Mean 28.5%, Range 10.0 – 54%

**Soil Texture (field assessed):** Moderately fine sandy clay loam (2), Moderately coarse, sandy loam (1), Coarse, loamy sand (1)

**Geology (field or map data):** Franciscan melange (3), Blueschist and semi-schist (1), Sandstone and other sedimentary (1)

**Marin County Watersheds:** San Rafael (3), Bolinas (1), Lagunitas Creek (1)

**Site Impacts**

This association has very low non-native plant cover (average 0.2%) relative to native cover.

**Classification Comments**

None.

**References:** Borchert et al. 2004, Buck and Evens 2010, Buck-Diaz and Evens 2011b, Buck-Diaz et al. 2012, Gordon and White 1994, Keeler-Wolf et al. 2003b, Kittel et al. 2012, Klein et al. 2007, Klein et al. 2015

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** N

**Surveys Used for Description**

**Total: N=5; Marin County (n=5):** MMWD0325, MOSD0025, MOSD0032, MOSD0086, PGA1357

### **Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

<b>Layer</b>	<b>Taxon</b>	<b>Con</b>	<b>Rel</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>	<b>Ch</b>	<b>D</b>	<b>cD</b>	<b>Oft</b>
<b>Shrub</b>										
	<i>Adenostoma fasciculatum</i>	100	46.1	28.0	15.0	45.0	X		X	X
	<i>Ceanothus cuneatus</i>	100	31.4	19.0	10.0	25.0	X		X	X
	<i>Diplacus aurantiacus</i>	100	12.7	9.6	2.0	35.0	X			X
	<i>Baccharis pilularis</i>	80	5.4	5.1	0.2	20.0	X			X
	<i>Toxicodendron diversilobum</i>	80	1.5	1.3	0.2	3.0	X			X
	<i>Heteromeles arbutifolia</i>	60	0.8	0.6	0.2	2.0				X
	<i>Lepechinia calycina</i>	40	0.1	0.1	0.2	0.2				
	<i>Lonicera hispidula</i>	40	0.2	0.1	0.2	0.2				
<b>Herb</b>										
	<i>Chlorogalum pomeridianum</i>	40	25.0	0.1	0.2	0.2				
	<i>Pentagramma triangularis</i>	40	12.0	0.1	0.2	0.2				
	<i>Zigadenus fremontii</i>	40	15.0	0.1	0.2	0.2				

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## ***Ceanothus thyrsiflorus* Shrubland Alliance**

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**Common Name:** Blue blossom chaparral

**NVC Alliance Code:** A0741. *Ceanothus thyrsiflorus* Scrub Alliance

### **Statewide Description**

*Ceanothus thyrsiflorus* is dominant or co-dominant in the shrub canopy with *Adenostoma fasciculatum*, *Arctostaphylos manzanita*, *Baccharis pilularis*, *Ceanothus incanus*, *Ceanothus integerrimus*, *Ceanothus velutinus*, *Gaultheria shallon*, *Heteromeles arbutifolia*, *Lupinus arboreus*, *Quercus berberidifolia*, *Rubus ursinus*, *Toxicodendron diversilobum*, and *Vaccinium ovatum*. Emergent conifer trees may be present at low cover.

The most extensive *Ceanothus thyrsiflorus* stands establish after logging or burning in the outer Coast Ranges of central and northern California. These stands persist for a few decades and are seral to stands of the *Pinus muricata*, *Pseudotsuga menziesii* – *Notholithocarpus densiflorus*, and *Sequoia sempervirens* Alliances. Stands on exposed coastal headlands persist for long periods and are frequently associated with *Baccharis pilularis* and *Lupinus arboreus* Alliance shrublands.

### **Local Vegetation Description**

The Blue blossom chaparral Alliance forms an intermittent to continuous shrub layer. The emergent tree layer is typically sparse to open, and the herbaceous layer is sparse to intermittent. Dominant and characteristic shrubs include *Ceanothus thyrsiflorus* and *Rubus ursinus*, and those that are often present include *Baccharis pilularis* and *Diplacus aurantiacus*. Commonly associated emergent trees at sparse cover include *Pinus muricata*, *Pseudotsuga menziesii* and *Umbellularia californica*. The herbs that are often present include *Polystichum munitum* and *Pteridium aquilinum*, and herbs that are sometimes present include *Holcus lanatus*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	3.3	0 – 15	8.2	2 – 35
Hardwood	2.6	0 – 10	5.3	2 – 15
Regenerating or Shrubby Tree	2.1	0 – 17.0	0.8	0.5 – 1
Shrub	76.9	26.0 – 98.0	4.2	2– 15
Herb	11.5	0 – 60	0.3	0 – 1

### **Local Membership Rule**

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

### **Local Environmental Description**

**Elevation:** Mean 165 m, Range 50 – 422 m

**Aspect:** NW (6), NE (3), SW (2), SE (1)

**Slope:** Mean 17 degrees, Range 6 – 31 degrees

**Macro Topography:** Upper 1/3 of slope (5), Middle 1/3 of slope (3), Lower 1/3 of slope (2), Bottom (1), Ridge top (1)

**Large Rock:** Mean 0.4%, Range 0.0 – 2.0%

**Small Rock:** Mean 5.7%, Range 0.0 – 30.0%

**Fines Cover:** Mean 16.1%, Range 0.0 – 71%

**Litter Cover:** Mean 64.8%, Range 4.0 – 99%

**Soil Texture (field assessed):** Moderately fine sandy clay loam (4), Moderately coarse, sandy loam (2), Moderately fine clay loam (2), Medium to very fine, sandy loam (2), Coarse, loamy sand (1), Fine sandy clay (1)

**Geology (field or map data):** Sandstone and other sedimentary (16), Granitic (13), Franciscan melange (7), Granitic (generic) (3), Siltstone (1), Volcanic and metavolcanic rocks (1)

**Marin County Watersheds:** Point Reyes (28), Lagunitas Creek (5), Inverness (4), Bolinas (2), Walker Creek (2)

### **Site Impacts**

This alliance has low non-native plant cover (average 4.4%) relative to native cover. Non-native species with highest frequency and abundance include *Holcus lanatus*.

### **Associations in Marin County**

*Ceanothus thyrsiflorus* – (*Rubus ursinus*)

*Ceanothus thyrsiflorus* – *Baccharis pilularis* – *Toxicodendron diversilobum*

*Ceanothus thyrsiflorus* – *Vaccinium ovatum* – *Rubus parviflorus*

### **Classification Comments**

None.

**References:** Evens and Kentner 2006, Keeler-Wolf et al. 2003a

**Global Rarity Rank:** G4

**State Rarity Rank:** S4

### **Surveys Used for Description**

**Total: N=41; Marin County (n=41):** MARIN064, MARIN128, MARIN166, MMWD0234, MMWD0254, MMWD0366, MMWD0381, MMWD0395, PGA10072, PGA1462, PGA3835, PGA3869, PGA3963, PGA3992, PGA4282, PGA4460, PGA4477, PGA4528, PGA4567, PGA4618, PGA4631, PGA4646, PGA4649, PGA4798,

PGA4827, PGA5105, PGA5177, PGA5365, PGA5457, PGA5524, PGA5563, PGA5726, PGA5841, PGA5898,  
PGA5974, PGA6360, PGA9681, PORE057, PORE070, PORE078, PORE176

### **Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

<b>Layer</b>	<b>Taxon</b>	<b>Con</b>	<b>Rel</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>	<b>Ch</b>	<b>D</b>	<b>cD</b>	<b>Oft</b>
<b>Tree</b>										
	<i>Umbellularia californica</i>	27	14.4	1.1	0.2	10.0				
	<i>Pinus muricata</i>	24	15.9	0.9	0.2	15.0				
	<i>Pseudotsuga menziesii</i>	22	14.1	1.1	1.0	12.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Umbellularia californica</i> *	22	13.5	0.9	0.2	10.0				
	<i>Pinus muricata</i> *	22	10.6	0.8	0.2	12.0				
<b>Shrub</b>										
	<b><i>Ceanothus thyrsiflorus</i></b>	<b>100</b>	<b>66.1</b>	<b>54.3</b>	<b>10.0</b>	<b>98.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Rubus ursinus</i>	78	13.6	11.8	0.2	50.0	<b>X</b>			<b>X</b>
	<i>Baccharis pilularis</i>	61	6.7	5.8	0.2	40.0				<b>X</b>
	<i>Diplacus aurantiacus</i>	54	1.8	1.4	0.2	8.0				<b>X</b>
	<i>Toxicodendron diversilobum</i>	44	3.6	2.9	0.2	25.0				
	<i>Frangula californica</i>	44	2.5	2.0	0.2	20.0				
	<i>Rubus parviflorus</i>	27	1.0	0.9	0.2	15.0				
<b>Herb</b>										
	<i>Pteridium aquilinum</i>	68	24.0	2.2	0.2	10.0				<b>X</b>
	<i>Polystichum munitum</i>	51	13.0	1.5	0.2	12.0				<b>X</b>
	<i>Holcus lanatus</i>	39	16.0	2.6	0.2	55.0				

**Ceanothus thyrsiflorus – Baccharis pilularis – Toxicodendron diversilobum Association**

**Common Name:** Blue Blossom Ceanothus – Coyote Brush – Poison Oak Shrubland

**Alliance:** *Ceanothus thyrsiflorus* Shrubland Alliance

**Local Vegetation Description**

The Blue Blossom Ceanothus – Coyote Brush – Poison Oak Association forms an intermittent to continuous shrub layer. The emergent tree layer is typically sparse to open, and the herbaceous layer is sparse to intermittent. Dominant and characteristic shrubs include *Ceanothus thyrsiflorus* and *Baccharis pilularis*, and those that are often present include *Diplacus aurantiacus*, *Rubus ursinus*, and *Toxicodendron diversilobum*. The herbaceous layer often includes *Holcus lanatus*, and herbs that are sometimes present include *Agrostis*, *Anaphalis margaritacea*, *Clinopodium douglasii*, *Iris douglasiana*, *Polystichum munitum*, and *Pteridium aquilinum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	1.7	0 – 11	8.2	2 – 20
Hardwood	2.0	0 – 10	8.0	2 – 15
Regenerating or Shrubby Tree	2.5	0 – 17	no data	
Shrub	75.6	45 – 98	3.5	2 – 5
Herb	13.4	0 – 60	0.3	0 – 0.5

**Local Environmental Description**

**Elevation:** Mean 103 m, Range 68 – 168 m

**Aspect:** NW (2), NE (2)

**Slope:** Mean 20 degrees, Range 15 – 31 degrees

**Macro Topography:** Middle 1/3 of slope (2), Ridge top (1), Upper 1/3 of slope (1)

**Large Rock:** Mean 0.8%, Range 0.0 – 2.0%

**Small Rock:** Mean 4.0%, Range 0.0 – 12.0%

**Fines Cover:** Mean 43.0%, Range 15.0 – 71.0%

**Litter Cover:** Mean 41.0%, Range 20.0 – 69%

**Soil Texture (field assessed):** Medium to very fine, sandy loam (2), Fine sandy clay (1), Moderately fine sandy clay loam (1)

**Geology (field or map data):** Sandstone and other sedimentary (6), Franciscan melange (3), Granitic (2), Granitic (generic) (1), Siltstone (1)

**Marin County Watersheds:** Point Reyes (9), Bolinas (1), Inverness (1), Lagunitas Creek (1), Walker Creek (1)

**Site Impacts**

This association has low non-native plant cover (average 9.1%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Holcus lanatus*.

**Classification Comments**

None.

**References:** Keeler-Wolf et al. 2003a

**Global Rarity Rank:** G4?

**State Rarity Rank:** SNR

**State Rare:** N

**Surveys Used for Description**

**Total: N=13; Marin County (n=13):** MMWD0254, MMWD0395, PGA3992, PGA4477, PGA4567, PGA4646, PGA4649, PGA4798, PGA5457, PGA5898, PGA9681, PORE070, PORE078

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Regenerating or Shrubby Trees</b>										
	<i>Umbellularia californica</i>	23	18.2	1.7	3.0	10.0				
	<i>Pinus muricata</i>	23	11.7	0.7	1.0	6.0				
<b>Shrub</b>										
	<b><i>Ceanothus thyrsiflorus</i></b>	<b>100</b>	<b>56.0</b>	<b>47.5</b>	<b>20.0</b>	<b>98.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<b><i>Baccharis pilularis</i></b>	<b>100</b>	<b>17.7</b>	<b>14.9</b>	<b>0.2</b>	<b>40.0</b>	<b>X</b>			<b>X</b>
	<b><i>Toxicodendron diversilobum</i></b>	<b>69</b>	<b>5.8</b>	<b>5.1</b>	<b>0.2</b>	<b>15.0</b>				<b>X</b>
	<i>Rubus ursinus</i>	54	5.5	4.6	5.0	15.0				<b>X</b>
	<i>Diplacus aurantiacus</i>	54	3.6	3.0	3.0	8.0				<b>X</b>
	<i>Frangula californica</i>	38	3.8	3.3	0.4	17.0				
	<i>Holodiscus discolor</i>	23	0.6	0.6	0.2	5.0				
<b>Herb</b>										
	<i>Holcus lanatus</i>	54	20.2	5.9	0.2	55.0				<b>X</b>
	<i>Pteridium aquilinum</i>	46	7.2	1.6	2.0	6.0				
	<i>Polystichum munitum</i>	46	6.2	1.4	0.2	12.0				
	<i>Anaphalis margaritacea</i>	31	3.1	0.4	0.2	3.0				
	<i>Agrostis</i> spp.	23	2.8	0.5	2.0	2.0				
	<i>Iris douglasiana</i>	23	1.5	0.2	0.2	1.0				
	<i>Clinopodium douglasii</i>	23	1.3	0.1	0.2	1.0				



## ***Ceanothus thyrsiflorus* – (*Rubus ursinus*) Association**

**Common Name:** Blue Blossom – (California blackberry) Shrubland

**Alliance:** *Ceanothus thyrsiflorus* Shrubland Alliance

### **Local Vegetation Description**

The Blue Blossom – (California blackberry) Association forms an open to continuous shrub layer. The emergent tree layer is typically sparse to open, and the herbaceous layer is sparse to intermittent. Dominant and characteristic shrubs include *Ceanothus thyrsiflorus* and *Rubus ursinus*, and those that are often present include *Diplacus aurantiacus* and *Frangula californica*. Commonly associated emergent trees at sparse cover include *Pinus muricata*, *Pseudotsuga menziesii*, and *Umbellularia californica*. The herbaceous layer typically includes *Pteridium aquilinum*, and herbs that are often present include *Polystichum munitum*, and herbs that are sometimes present include *Conium maculatum* and *Holcus lanatus*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	4.4	0 – 15	8.3	2 – 35
Hardwood	2.7	0 – 10	5.0	2 – 10
Regenerating or Shrubby Tree	1.6	0 – 15	0.8	0.5 – 1
Shrub	78.7	26 – 98	4.4	2 – 15
Herb	10.9	0 – 60	0.3	0 – 1

### **Local Environmental Description**

**Elevation:** Mean 190 m, Range 50 – 341 m

**Aspect:** NW (3), SW (2), SE (1)

**Slope:** Mean 14 degrees, Range 6 – 30 degrees

**Macro Topography:** Upper 1/3 of slope (4), Bottom (1), Middle 1/3 of slope (1)

**Large Rock:** Mean 0.0%, Range 0.0 – 0.2%

**Small Rock:** Mean 3.4%, Range 0.0 – 12.0%

**Fines Cover:** Mean 4.6%, Range 0.0 – 10.0%

**Litter Cover:** Mean 89.3%, Range 75.0 – 99%

**Soil Texture (field assessed):** Moderately fine sandy clay loam (3), Moderately coarse, sandy loam (2), Moderately fine clay loam (1)

**Geology (field or map data):** Granitic (11), Sandstone and other sedimentary (10), Franciscan melange (3), Granitic (generic) (1), Volcanic and metavolcanic rocks (1)

**Marin County Watersheds:** Point Reyes (19), Lagunitas Creek (3), Inverness (2), Bolinas (1), Walker Creek (1)

### **Site Impacts**

This association has low non-native plant cover (average 1.9%) relative to native cover. The non-native species that occurs with highest frequency and abundance is *Holcus lanatus*.

### **Classification Comments**

This association name has been updated from *Ceanothus thyrsiflorus* – *Rubus ursinus* Association to include stands that are primarily *Ceanothus thyrsiflorus*.

**References:** Evens and Kentner 2006

**Global Rarity Rank:** G3

**State Rarity Rank:** S3?

**State Rare:** Y

**Surveys Used for Description**

**Total: N=26; Marin County (n=26):** MARIN064, MARIN128, MARIN166, MMWD0234, MMWD0381, PGA10072, PGA1462, PGA3835, PGA3869, PGA3963, PGA4282, PGA4460, PGA4528, PGA4618, PGA4631, PGA4827, PGA5105, PGA5177, PGA5365, PGA5524, PGA5563, PGA5726, PGA5841, PGA5974, PGA6360, PORE176

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Umbellularia californica</i>	38	21.5	1.6	0.2	10.0				
	<i>Pinus muricata</i>	35	21.2	1.4	0.2	15.0				
	<i>Pseudotsuga menziesii</i>	31	20.9	1.7	1.0	12.0				
<b>Shrub</b>										
	<b><i>Ceanothus thyrsiflorus</i></b>	100	69.8	58.9	10.0	97.0	X	X		X
	<b><i>Rubus ursinus</i></b>	92	18.6	16.2	0.2	50.0	X			X
	<i>Diplacus aurantiacus</i>	54	0.8	0.7	0.2	4.0				X
	<i>Frangula californica</i>	50	2.0	1.6	0.2	20.0				X
	<i>Baccharis pilularis</i>	42	1.7	1.6	0.2	18.0				
	<i>Toxicodendron diversilobum</i>	31	2.6	1.9	1.0	25.0				
	<i>Sambucus racemosa</i>	31	0.9	0.7	0.2	7.0				
	<i>Rubus parviflorus</i>	31	0.7	0.6	0.2	10.0				
	<i>Corylus cornuta</i>	23	0.6	0.5	0.2	8.0				
<b>Herb</b>										
	<i>Pteridium aquilinum</i>	77	30.8	2.4	0.2	10.0	X		X	X
	<i>Polystichum munitum</i>	54	17.3	1.6	0.2	8.0				X
	<i>Holcus lanatus</i>	35	15.2	1.2	0.2	7.0				

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

**Common Name:** Blue Blossom – California huckleberry – Thimbleberry Shrubland

**Alliance:** *Ceanothus thyrsiflorus* Shrubland Alliance

**Local Vegetation Description**

The Blue Blossom – California huckleberry – Thimbleberry Association forms an intermittent shrub layer. The emergent tree layer is typically sparse, and the herbaceous layer is open. Dominant and characteristic shrubs include *Ceanothus thyrsiflorus* and *Vaccinium ovatum*, and those that are often present include *Arctostaphylos glandulosa*, *Baccharis pilularis*, *Diplacus aurantiacus*, *Gaultheria shallon*, *Lonicera hispidula*, *Rosa californica*, *Rubus parviflorus*, *Rubus ursinus*, and *Toxicodendron diversilobum*. Regenerating or shrubby trees often includes *Arbutus menziesii*, *Chrysolepis chrysophylla* var. *minor*, *Pinus muricata*, *Quercus wislizeni*, and *Umbellularia californica*. The herbaceous layer typically includes *Pteridium aquilinum*, and herbs that are often present include *Carduus pycnocephalus*, *Cirsium vulgare*, *Cynosurus echinatus*, *Erechtites minimus*, *Galium porrigens*, *Koeleria macrantha*, *Lotus junceus*, *Polystichum munitum*, *Stachys ajugoides*, and *Zigadenus fremontii*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.1	0 – 0.2	no data	
Hardwood	6.2	4.2 – 8.2	3.5	2 – 5
Regenerating or Shrubby Tree	6.3	4.4 – 8.2	no data	
Shrub	45.7	33.6 – 57.8	no data	
Herb	14	6 – 22	0.3	0 – 0.5

**Local Environmental Description**

**Elevation:** Mean 307 m, Range 192 – 422 m

**Aspect:** NE (1), NW (1)

**Slope:** Mean 21 degrees, Range 10 – 31 degrees

**Macro Topography:** Lower 1/3 of slope (2)

**Large Rock:** Mean 1.0%, Range 0.0 – 2.0%

**Small Rock:** Mean 16.0%, Range 2.0 – 30.0%

**Fines Cover:** 20.0%

**Litter Cover:** Mean 39.0%, Range 4.0 – 74%

**Soil Texture (field assessed):** Coarse, loamy sand (1), Moderately fine clay loam (1)

**Geology (field or map data):** Franciscan melange (1), Granitic (generic) (1)

**Marin County Watersheds:** Inverness (1), Lagunitas Creek (1)

**Site Impacts**

This association has low non-native plant cover (average 7.7%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Carduus pycnocephalus*, *Cirsium vulgare*, *Cynosurus echinatus*, and *Erechtites minimus*.

**Classification Comments**

Due to hybridization and morphological similarity between the species, plants identified as *Quercus wislizeni* may be *Quercus parvula*, which has been found to be the most widespread genotype in Marin County (Dodd and Afzul-Rafii 2004, Hauser et al. 2017).

**References:** Evens and Kentner 2006, Keeler-Wolf et al. 2003a

**Global Rarity Rank:** G3

**State Rarity Rank:** S3?

**State Rare:** Y

**Surveys Used for Description**

Total: N=2; Marin County (n=2): MMWD0366, PORE057

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Regenerating or Shrubby Trees</b>										
	<i>Quercus wislizeni</i>	50	48.8	4.0	8.0	8.0				X
	<i>Chrysolepis chrysophylla</i> var. <i>minor</i>	50	45.5	2.0	4.0	4.0				X
	<i>Arbutus menziesii</i>	50	1.2	0.1	0.2	0.2				X
	<i>Pinus muricata</i>	50	2.3	0.1	0.2	0.2				X
	<i>Umbellularia californica</i>	50	2.3	0.1	0.2	0.2				X
<b>Shrub</b>										
	<b><i>Ceanothus thyrsiflorus</i></b>	<b>100</b>	<b>84.8</b>	<b>40.0</b>	<b>25.0</b>	<b>55.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<b><i>Vaccinium ovatum</i></b>	<b>100</b>	<b>5.5</b>	<b>2.1</b>	<b>1.2</b>	<b>3.0</b>	<b>X</b>			<b>X</b>
	<i>Diplacus aurantiacus</i>	50	3.0	1.0	2.0	2.0				X
	<i>Toxicodendron diversilobum</i>	50	3.0	1.0	2.0	2.0				X
	<i>Gaultheria shallon</i>	50	0.9	0.5	1.0	1.0				X
	<i>Lonicera hispidula</i>	50	1.5	0.5	1.0	1.0				X
	<i>Arctostaphylos glandulosa</i>	50	0.3	0.2	0.4	0.4				X
	<i>Baccharis pilularis</i>	50	0.3	0.1	0.2	0.2				X
	<i>Rosa californica</i>	50	0.3	0.1	0.2	0.2				X
	<b><i>Rubus parviflorus</i></b>	<b>50</b>	<b>0.2</b>	<b>0.1</b>	<b>0.2</b>	<b>0.2</b>				<b>X</b>
	<i>Rubus ursinus</i>	50	0.3	0.1	0.2	0.2				X
<b>Herb</b>										
	<i>Pteridium aquilinum</i>	100	45.2	4.0	3.0	5.0	<b>X</b>		<b>X</b>	<b>X</b>
	<i>Erechtites minimus</i>	50	27.0	6.1	12.2	12.2				X
	<i>Lotus junceus</i>	50	11.1	2.5	5.0	5.0				X
	<i>Carduus pycnocephalus</i>	50	2.3	0.1	0.2	0.2				X
	<i>Cirsium vulgare</i>	50	0.4	0.1	0.2	0.2				X
	<i>Cynosurus echinatus</i>	50	2.3	0.1	0.2	0.2				X
	<i>Galium porrigens</i>	50	2.3	0.1	0.2	0.2				X
	<i>Koeleria macrantha</i>	50	2.3	0.1	0.2	0.2				X
	<i>Polystichum munitum</i>	50	0.4	0.1	0.2	0.2				X
	<i>Stachys ajugoides</i>	50	2.3	0.1	0.2	0.2				X
	<i>Zigadenus fremontii</i>	50	2.3	0.1	0.2	0.2				X

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## **Cornus sericea Shrubland Alliance**

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**Common Name:** Red osier thickets

**NVC Alliance Code:** A3834. *Cornus sericea* Pacific Slope Shrub Swamp Alliance

### **Statewide Description**

*Cornus sericea* is dominant or co-dominant in the shrub canopy with *Cephalanthus occidentalis*, *Rubus armeniacus*, *Rubus parviflorus*, *Salix exigua* and *Salix lasiolepis*. Emergent trees may be present at low cover, including *Alnus rhombifolia* or *Quercus lobata*.

Hickson and Keeler-Wolf (2007) and Buck-Diaz et al. (2012) recognized two associations in the Central Valley; *S. lasiolepis* occurred as the more common association, and the other appeared to be rarer or was undersampled. Other stands with *Cornus sericea* exist closer to the coast, but more sampling and analysis is needed to determine their relationships. Other stands in the foothills and montane Sierra Nevada to eastern California with *Cornus sericea* are now placed in a separate mixed riparian alliance with *Rosa woodsii* and other shrubs.

### **Local Vegetation Description**

The Red osier thickets Alliance forms an intermittent to continuous shrub layer. The emergent tree layer is typically sparse to open, and the herbaceous layer is sparse to open. Dominant and characteristic shrubs include *Cornus sericea* and *Rubus ursinus*, and those that are often present include *Baccharis pilularis*, *Salix lasiolepis*, *Sambucus racemosa* and *Toxicodendron diversilobum*. Commonly associated emergent trees at sparse cover include *Acer macrophyllum* and *Alnus rubra*. The herbaceous layer typically includes *Scrophularia californica*, and herbs that are often present include *Heracleum maximum*, *Marah fabaceus*, *Myosotis latifolia*, *Polystichum munitum*, *Stachys bullata* and *Urtica dioica*, and herbs that are sometimes present include *Conium maculatum*, *Holcus lanatus*, *Oenanthe sarmentosa* and *Rumex crispus*. Commonly associated non-vascular plants include Moss.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	5.0	0 – 25	9.5	1 – 20
Hardwood	0.2	0 – 1	8.0	2 – 15
Regenerating or Shrubby Tree	0.5	0 – 2.7	2.1	0.5 – 5
Shrub	78.6	60.0 – 90.0	3.1	1 – 5
Herb	4.1	0.2 – 10	0.3	0 – 0.5

### **Local Membership Rule**

*Cornus sericea* is dominant in the shrub layer. Emergent riparian trees and shrubs such as *Rubus ursinus* and *Toxicodendron diversilobum* are often present.

### **Local Environmental Description**

**Elevation:** Mean 170 m, Range 70 – 496 m

**Aspect:** Flat (2), SW (2), NE (1)

**Slope:** Mean 12 degrees, Range 0 – 33 degrees

**Macro Topography:** Bottom (2), Lower to Middle 1/3 of slope (2), Middle 1/3 of slope (1)

**Large Rock:** Mean 0.0%, Range 0.0 – 0.0%

**Small Rock:** Mean 0.0%, Range 0.0 – 0.2%

**Fines Cover:** Mean 13.6%, Range 5.0 – 40%

**Litter Cover:** Mean 82.6%, Range 52 – 92%

**Soil Texture (field assessed):** Fine silty clay (1), Moderately fine clay loam (1), Moderately fine sandy clay loam (1), Muck (1), Unknown (1)

**Geology (field or map data):** Sandstone and other sedimentary (2), Franciscan melange (1), Mixed alluvium (1), Mixed sedimentary (1), Sandstone (1)

**Marin County Watersheds:** None

**Other Watersheds, San Mateo Co.:** Tunitas Creek (2), Ano Nuevo (1), Half Moon Bay (1), Pescadero Creek (1), San Mateo Bayside (1)

### **Site Impacts**

This alliance has low non-native plant cover (average 1.2%) relative to native cover. Non-native species with highest frequency and abundance include *Conium maculatum*, *Holcus lanatus*, *Myosotis latifolia* and *Rumex crispus*.

### **Associations in Marin County**

*Cornus sericea* – *Salix (lasiolepis, exigua)*\*

### **Classification Comments**

Though no samples were surveyed in Marin County, this alliance is known from nearby counties and is likely to occur here.

**References:** Buck-Diaz et al. 2012

**Global Rarity Rank:** G4

**State Rarity Rank:** S3?

### **Surveys Used for Description**

**Total: N=6; Marin County (n=0)**

San Mateo County (n=6): PWAWF01A, SMAT0040, SMAT0080, SMAT0183, SMAT0212, SMAT0295

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Alnus rubra</i>	33	17.3	0.3	0.5	1.0				
	<i>Acer macrophyllum</i>	33	16.8	0.1	0.2	0.2				
<b>Regenerating or Shrubby Trees</b>										
	<i>Acer macrophyllum*</i>	33	22.8	0.2	0.2	1.0				
<b>Shrub</b>										
	<b><i>Cornus sericea</i></b>	<b>100</b>	<b>84.4</b>	<b>73.8</b>	<b>60.0</b>	<b>90.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Rubus ursinus</i>	100	2.9	2.6	0.2	8.0	<b>X</b>			<b>X</b>
	<i>Toxicodendron diversilobum</i>	67	2.0	1.7	0.2	5.0				<b>X</b>
	<i>Salix lasiolepis</i>	50	4.7	4.0	2.0	12.0				<b>X</b>
	<i>Sambucus racemosa</i>	50	2.0	1.7	0.2	10.0				<b>X</b>
	<i>Baccharis pilularis</i>	50	0.5	0.4	0.2	2.0				<b>X</b>
	<i>Lonicera involucrata</i>	33	1.0	0.8	2.0	3.0				
<b>Herb</b>										
	<i>Scrophularia californica</i>	83	7.7	0.5	0.2	2.0	<b>X</b>			<b>X</b>
	<i>Urtica dioica</i>	67	11.6	0.9	0.2	3.0				<b>X</b>
	<i>Polystichum munitum</i>	67	4.7	0.1	0.2	0.2				<b>X</b>
	<i>Marah fabaceus</i>	50	12.1	1.2	0.2	5.0				<b>X</b>
	<i>Stachys bullata</i>	50	4.8	0.6	0.2	3.0				<b>X</b>
	<i>Myosotis latifolia</i>	50	2.8	0.2	0.2	1.0				<b>X</b>
	<i>Heracleum maximum</i>	50	2.0	0.1	0.2	0.2				<b>X</b>
	<i>Holcus lanatus</i>	33	5.0	0.5	1.0	2.0				
	<i>Oenanthe sarmentosa</i>	33	5.4	0.2	0.2	1.0				
	<i>Rumex crispus</i>	33	3.0	0.1	0.2	0.2				
	<i>Conium maculatum</i>	33	0.8	0.1	0.2	0.2				
<b>Non-vascular</b>										
	Moss	33	25.0	0.4	0.2	2.0				

***Cornus sericea* – *Salix (lasiolepis, exigua)* Association**

**Common Name:** Red Osier – Willow Shrubland

**Alliance:** *Cornus sericea* Shrubland Alliance

**Classification Comments**

The association circumscription is the same as that of the alliance. See above for detailed description. This association is newly merged from the previous *Cornus sericea* – *Salix lasiolepis* and *Cornus sericea* – *Salix exigua* Associations. Though it was not sampled in Marin County it is expected to occur here.

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y



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## ***Corylus cornuta* var. *californica* Shrubland Alliance**

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**Common Name:** Hazelnut scrub

**NVC Alliance Code:** A4089. *Corylus cornuta* var. *californica* Scrub Alliance

### **Statewide Description**

*Corylus cornuta* is dominant in the shrub canopy with *Holodiscus discolor*, *Marah fabaceus*, *Ribes sanguineum*, *R. parviflorus*, *R. ursinus*, *Toxicodendron diversilobum* and *Vaccinium ovatum*.

*Corylus cornuta* is a common understory shrub in many forest types because of its extensive range in the United States. The western form, var. *californica*, grows along the Pacific coast; the eastern form, var. *cornuta*, occurs in and east of the Rocky Mountains. NatureServe (2007a) suggests very different environmental conditions for the eastern form, so we include only the western subspecies in this alliance. The western form sprouts only from the root crown and not from lateral root suckers, as in var. *cornuta* (Zimmerman 1991b). Plants grow in moist, well-drained soils and cool, shaded sites on north-facing slopes; along stream banks; in moist, wooded canyons and slopes; and as understory species in woodlands and forests. They also are abundant on stony soils of slopes, on dry and rocky islands, and along stream banks (Zimmerman 1991b). Shrubland stands occur in the coastal fog zone adjacent to stands of the *Pseudotsuga menziesii* and *Pseudotsuga menziesii*-*Notholithocarpus densiflorus* alliances. The range of the plant is more extensive than is the alliance.

### **Local Vegetation Description**

The Hazelnut scrub Alliance forms an open to continuous shrub layer. The emergent tree layer is typically sparse to open, and the herbaceous layer is open to continuous. Dominant and characteristic shrubs include *Corylus cornuta*, *Baccharis pilularis* and *Rubus ursinus*, and those that are often present include *Toxicodendron diversilobum*. Commonly associated emergent trees at sparse cover include,



*Umbellularia californica*. The herbaceous layer typically includes *Polystichum munitum*, and herbs that are often present include *Pteridium aquilinum*, and herbs that are sometimes present include *Bromus carinatus*, *Heracleum maximum*, *Holcus lanatus*, *Iris douglasiana* and *Stachys ajugoides*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.8	0 – 5	3.5	2 – 5
Hardwood	2.9	0 – 15	3.5	2 – 5
Regenerating or Shrubby Tree	0.4	0 – 7	No data	
Shrub	78.1	20 – 95	2.0	0 – 5
Herb	34.3	2 – 90	0.4	0 – 2

### **Local Membership Rule**

*Corylus cornuta* dominates or co-dominates with *Baccharis pilularis* and other shrubs as a medium-tall scrub on steep concave slopes with northern to eastern exposures surrounded by *Pseudotsuga menziesii*. Other shrubs may include *Baccharis pilularis*, *Frangula californica*, *Rubus ursinus*, *Vaccinium ovatum*, and *Toxicodendron diversilobum*. Stands occur in the southern portion of Inverness Ridge.

### **Local Environmental Description**

**Elevation:** Mean 157 m, Range 46 – 379 m

**Aspect:** NE (3), NW (2)

**Slope:** Mean 20 deg., Range 15 – 23 deg.

**Macro Topography:** Middle 1/3 of slope (4), Upper 1/3 of slope (1)

**Large Rock:** Mean 0.0%, Range 0.0 – 0.0%

**Small Rock:** Mean 0.0%, Range 0.0 – 0.0%

**Fines Cover:** Mean 35.0%, Range 10 – 80%

**Litter Cover:** Mean 62.0%, Range 18 – 95%

**Soil Texture (field assessed):** Medium loam (1), Medium to very fine, sandy loam (1), mefl (1), Moderately coarse, sandy loam (1)

**Geology (field or map data):** Sandstone and other sedimentary (8), Granitic (5), Shale (2), Franciscan melange (1), Ultramafic (type unknown) (1)

**Marin County Watersheds:** Inverness (5), Point Reyes (4), Bolinas (2), Estero Americano (2), Lagunitas Creek (2), San Rafael (1), Walker Creek (1)

### **Site Impacts**

This alliance has low non-native plant cover (average 3.7%) relative to native cover. Non-native species with highest frequency and abundance include *Holcus lanatus*.

### **Associations in Marin County**

*Corylus cornuta* / *Polystichum munitum*

### **Classification Comments**

None.

**References:** Keeler-Wolf et al. 2003a, Klein et al. 2015

**Global Rarity Rank:** G3

**State Rarity Rank:** S2?

### **Surveys Used for Description**

**Total: N=18; Marin County (n=18):** HEAD0404, HEAD0405, MARIN223, PGA1255, PGA1269, PGA128, PGA1416, PGA1418, PGA148, PGA155, PGA3906, PGA4995, PGA515, PGA6078, PGA75, PGA91, PORE137, PORE138

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Umbellularia californica</i>	22	20.8	1.7	0.2	15.0				
<b>Shrub</b>										
	<b><i>Corylus cornuta</i></b>	<b>100</b>	<b>50.4</b>	<b>39.4</b>	<b>13.0</b>	<b>90.2</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Rubus ursinus</i>	83	8.6	7.1	0.2	18.0	<b>X</b>			<b>X</b>
	<i>Baccharis pilularis</i>	78	22.2	18.2	3.0	40.0	<b>X</b>			<b>X</b>
	<i>Toxicodendron diversilobum</i>	50	4.1	3.8	3.2	15.0				<b>X</b>
	<i>Frangula californica</i>	33	4.0	3.5	0.2	19.0				
	<i>Diplacus aurantiacus</i>	28	1.5	0.9	0.2	8.0				
	<i>Holodiscus discolor</i>	22	1.7	1.5	1.0	10.0				
	<i>Ceanothus thyrsiflorus</i>	22	1.3	1.1	0.2	10.0				
<b>Herb</b>										
	<i>Polystichum munitum</i>	100	40.3	8.6	0.2	30.0	<b>X</b>		<b>X</b>	<b>X</b>
	<i>Pteridium aquilinum</i>	61	9.9	2.3	0.2	10.0				<b>X</b>
	<i>Holcus lanatus</i>	33	6.8	2.6	0.2	17.0				
	<i>Heracleum maximum</i>	22	5.1	1.6	2.0	18.0				
	<i>Bromus carinatus</i>	22	1.3	0.5	0.2	6.0				
	<i>Stachys ajugoides</i>	22	1.2	0.3	0.2	4.0				
	<i>Iris douglasiana</i>	22	0.8	0.2	0.2	3.0				

***Corylus cornuta* / *Polystichum munitum* Association**

**Common Name:** Hazel / Western Sword Fern Shrubland

**Alliance:** *Corylus cornuta* var. *californica* Shrubland Alliance

**Classification Comments**

The association circumscription is the same as that of the alliance for the county. See above for detailed description.

**Global Rarity Rank:** G2

**State Rarity Rank:** S2?

**State Rare:** Y

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***Cytisus scoparius* – *Genista monspessulana* – *Cotoneaster* spp. Shrubland Semi-Natural Alliance**

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**Common Name:** Broom patches

**NVC Alliance Code:** A2062. *Cytisus scoparius* - *Ulex europaeus* Coastal Ruderal Scrub Alliance

**Statewide Description**

*Cytisus scoparius*, *Genista monspessulana*, *Spartium junceum*, *Ulex europaeus* or other broom species are dominant in the shrub canopy. Additionally, stands of *Cotoneaster lacteus*, *Cotoneaster pannosus*, *Pyracantha*, or other Mediterranean shrubs may be dominant and are also placed in this alliance. Emergent trees may be present at low cover.

*Cytisus scoparius*, Scotch broom, has a Cal-IPC rank of High and a CDFA list of C. It has 5-angled stems, few leaves, and bright yellow to maroon flowers. Stands occur throughout northern cismontane California. The typical variety with yellow flowers (var. *scoparius*) is joined along the Northern California Coast (263A) with var. *andreas*, with brownish-red wing petals and yellow standard (DiTomaso and Healy 2007).

*Genista monspessulana*, French broom, has a Cal-IPC rank of High and a CDFA list of C. It has 8-10-ridged stems, leafy branches, and small clusters of yellow flowers. Stands occur throughout cismontane California. Many stands on the Central California Coast (261A) are hybrids with *G. canariensis* or *G. stenopetala* (DiTomaso and Healy 2007).

### Local Vegetation Description

The Broom patches Alliance forms an open to continuous shrub layer. The emergent tree layer is typically sparse to continuous, and the herbaceous layer is sparse to continuous. Shrubs that are often present include *Baccharis pilularis*. Commonly associated emergent trees at sparse cover include *Quercus agrifolia*. The herbs that are sometimes present include *Briza maxima*, *Bromus diandrus*, *Carduus pycnocephalus*, *Chlorogalum pomeridianum*, *Cirsium vulgare*, *Cynosurus echinatus*, *Holcus lanatus*, *Nassella pulchra* and *Plantago lanceolata*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.3	0 – 4	4.8	2 – 10
Hardwood	1.0	0 – 15	5.1	2 – 10
Regenerating or Shrubby Tree	0.2	0 – 1.2	1.5	1 – 2
Shrub	57.0	10.0 – 98.0	2.2	0 – 5
Herb	31.1	0 – 90	0.3	0 – 2

### Local Membership Rule

*Cistus* spp., *Cotoneaster* spp., *Cytisus scoparius*, *Genista monspessulana*, *Ulex europaeus*, or other broom plants dominate in the shrub overstory. Fire promotes invasions in woodland settings; however, broom or other non-native Mediterranean scrub may invade coastal grasslands without fire.

### Local Environmental Description

**Elevation:** Mean 100 m, Range 0 – 212 m

**Aspect:** NE (4), SW (4), SE (3), NW (1)

**Slope:** Mean 18 degrees, Range 1 – 52 degrees

**Macro Topography:** Lower 1/3 of slope (3), Middle 1/3 of slope (3), Ridge top (2), Upper 1/3 of slope (2), Bottom (1)

**Large Rock:** Mean 1.0%, Range 0.0 – 7.0%

**Small Rock:** Mean 4.6%, Range 0.0 – 18.0%

**Fines Cover:** Mean 22.3%, Range 0.7 – 71%

**Litter Cover:** Mean 47.4%, Range 10 – 91%

**Soil Texture (field assessed):** Moderately coarse, sandy loam (3), Moderately fine sandy clay loam (2), Medium silt (2), Fine sandy clay (1), Moderately fine silty clay loam (1), Fine clay (1), Medium to very fine, sandy loam (1)

**Geology (field or map data):** Franciscan melange (13), Sandstone and other sedimentary (4), Volcanic and metavolcanic rocks (2)

**Marin County Watersheds:** San Rafael (10), Walker Creek (5), Lagunitas Creek (4), Bolinas (1)

### Site Impacts

This alliance has greater cover of exotics than natives, with high non-native plant cover (average 76.8%) relative to native cover. Non-native species with highest frequency and abundance include *Briza maxima*, *Bromus diandrus*, *Carduus pycnocephalus*, *Cirsium vulgare*, *Cynosurus echinatus*, *Cytisus scoparius*, *Genista monspessulana*, *Holcus lanatus*, *Plantago lanceolata* and *Ulex europaeus*.

### Associations in Marin County

*Cotoneaster (lacteus, pannosus)*

*Cytisus scoparius*

*Genista monspessulana*

*Ulex europaeus*

### Classification Comments

None.

**References:** Evens and Kentner 2006

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

**Surveys Used for Description**

**Total: N=24; Marin County (n=24):** GGNRA273, MMWD0151A, MMWD0253, MMWD0272, MMWD0396, MOSD0016, MOSD0045, MOSD0090, MOSD0331, PGA10, PGA1506, PGA1558, PGA1684, PGA1685, PGA1720, PGA1725, PGA1728, PGA19, PGA7242, PGA7743, PGA8, PORE059, PORE061, SFANO12

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Quercus agrifolia</i>	25	15.8	0.7	0.2	8.0				
<b>Shrub</b>										
	<b><i>Genista monspessulana</i></b>	<b>75</b>	<b>56.3</b>	<b>33.5</b>	<b>6.0</b>	<b>95.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Baccharis pilularis</i>	71	10.4	5.9	0.2	20.0				<b>X</b>
	<i>Toxicodendron diversilobum</i>	42	1.1	0.5	0.2	3.5				
	<i>Rubus ursinus</i>	38	5.0	3.0	0.2	20.0				
	<i>Ulex europaeus</i>	21	17.6	13.6	39.0	99.0				
	<b><i>Cytisus scoparius</i></b>	<b>21</b>	<b>5.5</b>	<b>4.3</b>	<b>0.2</b>	<b>84.0</b>				
	<i>Heteromeles arbutifolia</i>	21	1.8	0.8	0.2	19.4				
<b>Herb</b>										
	<i>Briza maxima</i>	38	7.9	3.2	0.2	50.0				
	<i>Holcus lanatus</i>	38	7.3	1.9	0.2	14.0				
	<i>Cirsium vulgare</i>	29	1.5	0.6	0.2	10.0				
	<i>Cynosurus echinatus</i>	29	3.0	0.4	0.2	5.0				
	<i>Plantago lanceolata</i>	21	2.3	0.5	0.2	10.0				
	<i>Carduus pycnocephalus</i>	21	3.5	0.3	0.2	3.0				
	<i>Nassella pulchra</i>	21	0.4	0.1	0.2	1.0				
	<i>Bromus diandrus</i>	21	0.6	0.0	0.2	0.2				
	<i>Chlorogalum pomeridianum</i>	21	2.9	0.0	0.2	0.2				

***Cotoneaster (lacteus, pannosus) Provisional Semi-natural Association***

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**Common Name:** Cotoneaster Ruderal Shrubland

**Alliance:** *Cytisus scoparius* – *Genista monspessulana* – *Cotoneaster* spp. Shrubland Semi-Natural Alliance

**Local Vegetation Description**

The Cotoneaster Ruderal Shrubland Association forms an open shrub layer in the single sample available. The emergent tree layer is typically sparse, and the herbaceous layer is continuous. Dominant and characteristic shrubs include *Rosa eglanteria* and *Cotoneaster pannosus*. Other shrubs present include *Artemisia californica*, *Diplacus aurantiacus*, *Gutierrezia californica*, and *Toxicodendron diversilobum*. Commonly associated emergent trees at sparse cover include *Pinus radiata*. The herbaceous layer includes *Achillea millefolium*, *Aira caryophyllea*, *Avena* spp., *Briza maxima*, *Bromus diandrus*, *Bromus hordeaceus*, *Chlorogalum pomeridianum*, *Elymus glaucus*, *Eriogonum latifolium*, *Eriophyllum stoechadifolium*, *Festuca rubra*, *Hypochaeris glabra*, *Hypochaeris radicata*, *Logfia gallica*, *Lupinus bicolor*, *Melica californica*, *Plantago erecta*, *Pteridium aquilinum*, *Rumex acetosella*, *Silene gallica*, and *Vulpia bromoides*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	NA	no data	
Hardwood	0.0	NA	no data	
Regenerating or Shrubby Tree	1.2	NA	no data	
Shrub	23.4	NA	no data	
Herb	95	NA	no data	

**Local Environmental Description**

**Elevation:** 98 m

**Aspect:** SW (1)

**Slope:** 20 degrees

**Macro Topography:** Lower 1/3 of slope (1)

**Large Rock:** 5.2%

**Small Rock:** 3.0%

**Fines Cover:** no data

**Litter Cover:** 0.2%

**Soil Texture (field assessed):** Fine sandy clay (1)

**Geology (field or map data):** Franciscan mélange (1)

**Marin County Watersheds:** Bolinas (1)

**Site Impacts**

This association has moderate non-native plant cover (average 49.3%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*, *Avena* spp., *Briza maxima*, *Bromus diandrus*, *Cotoneaster pannosus*, *Hypochaeris glabra*, *Hypochaeris radicata*, *Logfia gallica*, *Melica californica*, *Pinus radiata*, *Rosa eglanteria*, *Rumex acetosella*, *Silene gallica*, and *Vulpia bromoides*.

**Classification Comments**

This association is newly described here and considered provisional since it is under-sampled in its expected range.

**References:** none

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

**State Rare:** N

**Surveys Used for Description**

**Total: N=1; Marin County (n=1):** GGNRA306

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Regenerating or Shrubby Trees</b>										
	<i>Pinus radiata</i>	100	100	1.2	1.2	1.2	X	X		X
<b>Shrub</b>										
	<i>Rosa eglanteria</i>	100	59.8	14.0	14.0	14.0	X	X		X
	<b>Cotoneaster pannosus</b>	<b>100</b>	<b>17.1</b>	<b>4.0</b>	<b>4.0</b>	<b>4.0</b>	<b>X</b>			<b>X</b>
	<i>Artemisia californica</i>	100	8.5	2.0	2.0	2.0	X			X
	<i>Toxicodendron diversilobum</i>	100	5.1	1.2	1.2	1.2	X			X
	<i>Diplacus aurantiacus</i>	100	4.3	1.0	1.0	1.0	X			X
	<i>Gutierrezia californica</i>	100	4.3	1.0	1.0	1.0	X			X
	<i>Genista monspessulana</i>	100	0.9	0.2	0.2	0.2	X			X
<b>Herb</b>										
	<i>Lupinus bicolor</i>	100	13.5	25.0	25.0	25.0	X			X
	<i>Pteridium aquilinum</i>	100	13.5	25.0	25.0	25.0	X			X
	<i>Avena</i> spp.	100	11.4	21.0	21.0	21.0	X			X
	<i>Rumex acetosella</i>	100	10.8	20.0	20.0	20.0	X			X
	<i>Silene gallica</i>	100	9.2	17.0	17.0	17.0	X			X
	<i>Eriophyllum stoechadifolium</i>	100	8.1	15.0	15.0	15.0	X			X
	<i>Hypochaeris radicata</i>	100	5.4	10.0	10.0	10.0	X			X
	<i>Plantago erecta</i>	100	5.4	10.0	10.0	10.0	X			X
	<i>Chlorogalum pomeridianum</i>	100	4.3	8.0	8.0	8.0	X			X
	<i>Eriogonum latifolium</i>	100	3.8	7.0	7.0	7.0	X			X
	<i>Logfia gallica</i>	100	3.3	6.0	6.0	6.0	X			X
	<i>Vulpia bromoides</i>	100	3.3	6.0	6.0	6.0	X			X
	<i>Elymus glaucus</i>	100	1.6	3.0	3.0	3.0	X			X
	<i>Festuca rubra</i>	100	1.6	3.0	3.0	3.0	X			X
	<i>Briza maxima</i>	100	1.1	2.0	2.0	2.0	X			X
	<i>Achillea millefolium</i>	100	0.5	1.0	1.0	1.0	X			X
	<i>Aira caryophyllea</i>	100	0.5	1.0	1.0	1.0	X			X
	<i>Bromus diandrus</i>	100	0.5	1.0	1.0	1.0	X			X
	<i>Hypochaeris glabra</i>	100	0.5	1.0	1.0	1.0	X			X
	<i>Melica californica</i>	100	0.5	1.0	1.0	1.0	X			X
	<i>Bromus carinatus</i>	100	0.1	0.2	0.2	0.2	X			X
	<i>Eschscholzia californica</i>	100	0.1	0.2	0.2	0.2	X			X
	<i>Koeleria macrantha</i>	100	0.1	0.2	0.2	0.2	X			X
	<i>Nassella pulchra</i>	100	0.1	0.2	0.2	0.2	X			X
	<i>Poa secunda</i>	100	0.1	0.2	0.2	0.2	X			X
	<i>Pseudognaphalium californicum</i>	100	0.1	0.2	0.2	0.2	X			X
	<i>Sedum spathulifolium</i>	100	0.1	0.2	0.2	0.2	X			X
	<i>Stachys ajugoides</i>	100	0.1	0.2	0.2	0.2	X			X

***Cytisus scoparius* Provisional Semi-natural Association**

**Common Name:** Scotch Broom Ruderal Shrubland

**Alliance:** *Cytisus scoparius* – *Genista monspessulana* – *Cotoneaster* spp. Shrubland Semi-Natural Alliance

**Local Vegetation Description**

The Scotch Broom Ruderal Shrubland Association forms a continuous shrub layer in the single survey available. The emergent tree layer is typically absent, and the herbaceous layer is open. Dominant and characteristic shrubs include *Cytisus scoparius*, *Baccharis pilularis*, *Lupinus chamissonis*, and *Rubus ursinus*. The herbaceous layer typically includes *Agrostis* spp., *Aira caryophyllea*, *Anagallis arvensis*, *Briza maxima*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Cirsium quercetorum*, *Cirsium vulgare*, *Cynosurus echinatus*, *Elymus glaucus*, *Erechtites* spp., *Eriophyllum stoechadifolium*, *Eschscholzia californica*, *Festuca arundinacea*, *Gnaphalium* spp., *Lolium perenne*, *Marah fabaceus*, *Nassella pulchra*, *Oxalis* spp., *Plantago* spp., and *Rumex acetosella*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	NA	no data	
Hardwood	0.0	NA	no data	
Regenerating or Shrubby Tree	0.0	NA	no data	
Shrub	90.2	NA	no data	
Herb	12.6	NA	no data	

**Local Environmental Description**

**Elevation:** no data

**Aspect:** SE (1)

**Slope:** 4 degrees

**Macro Topography:** Ridge top (1)

**Large Rock:** 0.0%

**Small Rock:** 1.0%

**Fines Cover:** no data

**Litter Cover:** 65%

**Soil Texture (field assessed):** Moderately coarse, sandy loam (1)

**Geology (field or map data):** no data

**Marin County Watersheds:** Novato (1)

**Site Impacts**

This association has greater cover of exotics (average 92.0%) than natives. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*, *Anagallis arvensis*, *Briza maxima*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Cirsium vulgare*, *Cynosurus echinatus*, *Cytisus scoparius*, *Erechtites* spp., *Festuca arundinacea*, *Lolium perenne*, *Rumex acetosella*.

**Classification Comments**

This association is considered provisional since it is under-sampled in its expected range.

**References:** Keeler-Wolf et al. 2003a

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

**State Rare:** N



**Surveys Used for Description**

Total: N=1; Marin County (n=1): GGNRA273

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Cytisus scoparius</i>	100	93.1	84.0	84.0	84.0	X	X		X
	<i>Baccharis pilularis</i>	100	3.3	3.0	3.0	3.0	X			X
	<i>Rubus ursinus</i>	100	3.3	3.0	3.0	3.0	X			X
	<i>Lupinus chamissonis</i>	100	0.2	0.2	0.2	0.2	X			X
<b>Herb</b>										
	<i>Aira caryophylla</i>	100	23.8	3.0	3.0	3.0	X			X
	<i>Carduus pycnocephalus</i>	100	15.9	2.0	2.0	2.0	X			X
	<i>Erechtites</i> spp.	100	15.9	2.0	2.0	2.0	X			X
	<i>Rumex acetosella</i>	100	15.9	2.0	2.0	2.0	X			X
	<i>Agrostis</i> spp.	100	1.6	0.2	0.2	0.2	X			X
	<i>Anagallis arvensis</i>	100	1.6	0.2	0.2	0.2	X			X
	<i>Briza maxima</i>	100	1.6	0.2	0.2	0.2	X			X
	<i>Bromus diandrus</i>	100	1.6	0.2	0.2	0.2	X			X
	<i>Bromus hordeaceus</i>	100	1.6	0.2	0.2	0.2	X			X
	<i>Cirsium quercetorum</i>	100	1.6	0.2	0.2	0.2	X			X
	<i>Cirsium vulgare</i>	100	1.6	0.2	0.2	0.2	X			X
	<i>Cynosurus echinatus</i>	100	1.6	0.2	0.2	0.2	X			X
	<i>Elymus glaucus</i>	100	1.6	0.2	0.2	0.2	X			X
	<i>Eriophyllum stoechadifolium</i>	100	1.6	0.2	0.2	0.2	X			X
	<i>Eschscholzia californica</i>	100	1.6	0.2	0.2	0.2	X			X
	<i>Festuca arundinacea</i>	100	1.6	0.2	0.2	0.2	X			X
	<i>Gnaphalium</i>	100	1.6	0.2	0.2	0.2	X			X
	<i>Lolium perenne</i>	100	1.6	0.2	0.2	0.2	X			X
	<i>Marah fabaceus</i>	100	1.6	0.2	0.2	0.2	X			X
	<i>Nassella pulchra</i>	100	1.6	0.2	0.2	0.2	X			X
	<i>Oxalis</i> spp.	100	1.6	0.2	0.2	0.2	X			X
	<i>Plantago</i> spp.	100	1.6	0.2	0.2	0.2	X			X

## ***Genista monspessulana* Semi-natural Association**

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**Common Name:** French Broom Shrubland

**Alliance:** *Cytisus scoparius* – *Genista monspessulana* – *Cotoneaster* spp. Shrubland Semi-Natural Alliance

### **Local Vegetation Description**

The French Broom Association forms an open to continuous shrub layer. The emergent tree layer is typically sparse to continuous, and the herbaceous layer is open to continuous. Dominant and characteristic shrubs include *Genista monspessulana*, and those that are often present include *Baccharis pilularis* and *Toxicodendron diversilobum*. Commonly associated emergent trees at sparse cover include *Quercus agrifolia* and *Umbellularia californica*. The herbaceous layer sometimes includes *Avena* spp., *Briza maxima*, *Bromus diandrus*, *Carduus pycnocephalus*, *Chlorogalum pomeridianum*, *Cirsium vulgare*, *Cynosurus echinatus*, and *Holcus lanatus*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.4	0 – 4	4.8	2 – 10
Hardwood	1.2	0 – 15	5.1	2 – 10
Regenerating or Shrubby Tree	0.2	0 – 1.2	1.5	1 – 2
Shrub	54.4	10 – 98	2.3	0 – 5
Herb	33.0	0 – 90	0.3	0 – 2

### **Local Environmental Description**

**Elevation:** Mean 121 m, Range 44 – 212 m

**Aspect:** NE (3), SW (3), NW (1), SE (1), Variable (1)

**Slope:** Mean 22 degrees, Range 1 – 52 degrees

**Macro Topography:** Middle 1/3 of slope (3), Lower 1/3 of slope (2), Bottom (1), Ridge top (1), Upper 1/3 of slope (1)

**Large Rock:** Mean 1.4%, Range 0.0 – 7.0%

**Small Rock:** Mean 6.5%, Range 0.0 – 18.0%

**Fines Cover:** Mean 22.3%, Range 0.7 – 71.0%

**Litter Cover:** Mean 52.7%, Range 10.0 – 91%

**Soil Texture (field assessed):** Medium silt (2), Moderately fine sandy clay loam (2), Moderately fine silty clay loam (1), Fine sandy clay (1), Fine clay (1), Medium to very fine, sandy loam (1)

**Geology (field or map data):** Franciscan melange (11), Sandstone and other sedimentary (3), Volcanic and metavolcanic rocks (2)

**Marin County Watersheds:** San Rafael (10), Lagunitas Creek (4), Bolinas (1), Walker Creek (1)

### **Site Impacts**

This association has greater cover of exotics (average 75.5%) than natives. Non-native species that occur with highest frequency and abundance include *Avena* spp., *Briza maxima*, *Bromus diandrus*, *Carduus pycnocephalus*, *Cirsium vulgare*, *Cynosurus echinatus*, *Cytisus scoparius*, *Genista monspessulana*, and *Holcus lanatus*.

### **Classification Comments**

None.

**References:** Evens and Kentner 2006

Global Rarity Rank: GNA

State Rarity Rank: SNA

State Rare: N

**Surveys Used for Description**

**Total: N=18; Marin County (n=18):** MMWD0151A, MMWD0253, MMWD0272, MMWD0396, MOSD0016, MOSD0045, MOSD0090, MOSD0331, PGA1506, PGA1558, PGA1684, PGA1685, PGA1720, PGA1725, PGA1728, PGA7242, PGA7743, SFANO12

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Quercus agrifolia</i>	33	21.1	1.0	0.2	8.0				
	<i>Umbellularia californica</i>	22	14.8	4.3	0.2	73.6				
<b>Shrub</b>										
	<b><i>Genista monspessulana</i></b>	<b>100</b>	<b>75.1</b>	<b>44.6</b>	<b>6.0</b>	<b>95.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Baccharis pilularis</i>	72	11.0	5.9	0.2	20.0				<b>X</b>
	<i>Toxicodendron diversilobum</i>	56	1.5	0.7	0.2	3.5				<b>X</b>
	<i>Rubus ursinus</i>	28	4.7	2.7	2.1	20.0				
	<i>Heteromeles arbutifolia</i>	28	2.4	1.1	0.2	19.4				
	<i>Cytisus scoparius</i>	22	2.2	1.1	0.2	10.0				
	<i>Lonicera hispidula</i>	22	0.4	0.2	0.2	1.7				
	<i>Diplacus aurantiacus</i>	22	0.6	0.1	0.2	1.0				
<b>Herb</b>										
	<i>Briza maxima</i>	39	9.6	4.0	0.2	50.0				
	<i>Holcus lanatus</i>	28	2.5	1.0	0.2	10.0				
	<i>Cirsium vulgare</i>	28	1.9	0.8	0.2	10.0				
	<i>Cynosurus echinatus</i>	28	3.4	0.4	0.2	5.0				
	<i>Avena</i> spp.	22	2.9	0.2	0.2	3.0				
	<i>Carduus pycnocephalus</i>	22	3.7	0.2	0.2	3.0				
	<i>Bromus diandrus</i>	22	0.7	0.0	0.2	0.2				
	<i>Chlorogalum pomeridianum</i>	22	2.9	0.0	0.2	0.2				

## ***Ulex europaeus* Provisional Semi-natural Association**

**Common Name:** Common Gorse Ruderal Shrubland

**Alliance:** *Cytisus scoparius* – *Genista monspessulana* – *Cotoneaster* spp. Shrubland Semi-Natural Alliance

### **Local Vegetation Description**

The Common Gorse Ruderal Shrubland Association forms an intermittent to continuous shrub layer. The emergent tree layer is typically absent, and the herbaceous layer is open. Dominant and characteristic shrubs include *Ulex europaeus*, and those that are often present include *Baccharis pilularis* and *Rubus ursinus*. The herbaceous layer typically includes *Holcus lanatus*, and herbs that are sometimes present include *Carex* spp., *Conium maculatum*, *Hypochaeris radicata*, *Juncus patens*, and *Plantago lanceolata*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	71.7	55 – 90	1.3	0.5 – 2
Herb	20.7	12 – 30	0.3	0 – 0.5

### **Local Environmental Description**

**Elevation:** Mean 15 m, Range 0 – 36 m

**Aspect:** SE (1), NE (1)

**Slope:** Mean 8 degrees, Range 5 – 11 degrees

**Macro Topography:** Lower 1/3 of slope (1), Upper 1/3 of slope (1)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** no data

**Litter Cover:** 20%

**Soil Texture (field assessed):** Moderately coarse, sandy loam (2)

**Geology (field or map data):** Franciscan melange (2), Sandstone and other sedimentary (1)

**Marin County Watersheds:** Walker Creek (4)

### **Site Impacts**

This association has greater cover of exotics (average 78.8%) than natives. Non-native species that occur with highest frequency and abundance include *Conium maculatum*, *Holcus lanatus*, *Hypochaeris radicata*, *Plantago lanceolata*, and *Ulex europaeus*.

### **Classification Comments**

This association is considered provisional since it is under-sampled in its expected range.

**References:** Keeler-Wolf et al. 2003a

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

**State Rare:** N

### **Surveys Used for Description**

**Total: N=5; Marin County (n=5):** PGA10, PGA19, PGA8, PORE059, PORE061

### **Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

<b>Layer</b>	<b>Taxon</b>	<b>Con</b>	<b>Rel</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>	<b>Ch</b>	<b>D</b>	<b>cD</b>	<b>Oft</b>
<b>Shrub</b>										
	<i>Ulex europaeus</i>	100	84.3	65.4	39.0	99.0	X	X		X
	<i>Baccharis pilularis</i>	60	9.4	6.4	3.0	20.0				X
	<i>Rubus ursinus</i>	60	6.3	4.0	0.2	11.0				X
<b>Herb</b>										
	<i>Holcus lanatus</i>	80	25.8	5.8	2.0	14.0	X			X
	<i>Conium maculatum</i>	40	9.8	2.6	6.0	7.0				
	<i>Juncus patens</i>	40	4.1	0.6	0.2	3.0				
	<i>Hypochaeris radicata</i>	40	4.6	0.4	0.2	2.0				
	<i>Carex</i> spp.	40	3.6	0.1	0.2	0.4				
	<i>Plantago lanceolata</i>	40	3.5	0.1	0.2	0.2				

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## ***Diplacus aurantiacus* Shrubland Alliance**

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**Common Name:** Bush monkeyflower scrub

**NVC Alliance Code:** A2672. *Dendromecon rigida* - *Diplacus aurantiacus* - *Eriodictyon californicum*  
Scrub Alliance

### **Statewide Description**

*Diplacus aurantiacus* or *Diplacus parviflorus* is dominant in the shrub canopy with *Artemisia californica*, *Baccharis pilularis*, *Ceanothus megacarpus*, *Ceanothus spinosus*, *Eriogonum cinereum*, *Heteromeles arbutifolia*, *Malosma laurina*, *Salvia leucophylla*, *Salvia mellifera*, *Sambucus nigra* and *Toxicodendron diversilobum*. Emergent trees may be present at low cover, including *Juglans californica*, *Platanus racemosa* or *Quercus agrifolia*.

*Diplacus aurantiacus* is a widespread plant in many coastal scrub, chaparral, and woodland alliances (Rundel 2007), but the presence of stands primarily dominated by this species leaves little doubt that this is a distinct type. The alliance appears on generally steep, often somewhat unstable slopes in relatively mesic settings within the general vicinity of recent burns and stands of *Artemisia californica*, *Quercus agrifolia*, or *Salvia leucophylla* alliances. In some cases, this type also appears to be associated with natural ground disturbances, such as rockslides (Keeler-Wolf and Evens 2006) and road cuts.

### **Local Vegetation Description**

The Bush monkeyflower scrub Alliance forms an intermittent shrub layer. The emergent tree layer is typically sparse to open, and the herbaceous layer is open to intermittent. Dominant and characteristic shrubs include *Diplacus aurantiacus* and *Baccharis pilularis*, and those that are often present include *Toxicodendron diversilobum*. Commonly associated emergent trees at sparse cover include *Pseudotsuga menziesii*. Herbs that are often present include *Anagallis arvensis*, *Logfia gallica*, *Pteridium*

*aquilinum* and *Vulpia myuros*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	5.0	5 – 5	12.5	10 – 15
Hardwood	0.0	0 – 0	No data	
Regenerating or Shrubby Tree	0.1	0 – 0.4	3.5	2 – 5
Shrub	52.5	45 – 60	0.9	0 – 2
Herb	34.0	10 – 62	0.3	0 – 0.5

### **Local Membership Rule**

*Diplacus aurantiacus* dominates often on steep slopes and ridgetops. Other coastal scrub may be present at lower cover. If *D. aurantiacus* is co-dominant with *Adenostoma fasciculatum* or *Artemisia californica*, see those respective alliances.

### **Local Environmental Description**

**Elevation:** Mean 246 m, Range 80 – 530 m

**Aspect:** SW (2), W (1)

**Slope:** Mean 17 degrees, Range 15 – 18 degrees

**Macro Topography:** Ridge top (2), Upper 1/3 of slope (1)

**Large Rock:** Mean 2.1%, Range 0.2 – 4.0%

**Small Rock:** Mean 35.5%, Range 1.0 – 70%

**Fines Cover:** Mean 10.0%, Range 10 – 10%

**Litter Cover:** Mean 46.0%, Range 6.0 – 86%

**Soil Texture (field assessed):** Coarse, loamy sand (1), Medium to very fine, sandy loam (1), Not recorded (1)

**Geology (field or map data):** Franciscan melange (1), Granitic (generic) (1), Sandstone and other sedimentary (1)

**Marin County Watersheds:** Bolinas (2)

**Other Watersheds, San Mateo Co.:** Pacifica (1)

### **Site Impacts**

This alliance has low non-native plant cover (average 4.1%) relative to native cover. Non-native species with highest frequency and abundance include *Anagallis arvensis*, *Brassica nigra*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Cortaderia jubata*, *Foeniculum vulgare*, *Holcus lanatus*, *Hypochaeris radicata*, *Logfia gallica*, *Plantago lanceolata*, *Rumex acetosella*, *Sonchus asper* and *Vulpia myuros*.

### **Associations in Marin County**

*Diplacus (aurantiacus, puniceus)*

### **Classification Comments**

Since the number of surveys of this alliance in Marin County are low, data from nearby counties were included.

**References:** Buck-Diaz et al. 2012, Keeler-Wolf and Evens 2006, Kittel et al. 2012

**Global Rarity Rank:** G3

**State Rarity Rank:** S3?

### **Surveys Used for Description**

**Total: N=3; Marin County (n=2):** MARINSP18, WRBL014

San Mateo County (n=1): SMAT0088

## Alliance Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Pseudotsuga menziesii</i>	33	33.3	1.7	5.0	5.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Pseudotsuga menziesii</i> *	33	16.7	0.1	0.2	0.2				
	<i>Quercus agrifolia</i>	33	16.7	0.1	0.2	0.2				
<b>Shrub</b>										
	<b><i>Diplacus aurantiacus</i></b>	<b>100</b>	<b>62.4</b>	<b>38.7</b>	<b>28.0</b>	<b>50.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Baccharis pilularis</i>	100	24.7	15.3	10.0	20.0	<b>X</b>			<b>X</b>
	<i>Toxicodendron diversilobum</i>	67	6.2	4.7	4.2	10.0				<b>X</b>
	<i>Frangula californica</i>	33	5.0	5.0	15.0	15.0				
	<i>Rubus ursinus</i>	33	1.7	1.7	5.0	5.0				
<b>Herb</b>										
	<i>Logfia gallica</i>	67	3.0	1.1	0.2	3.0				<b>X</b>
	<i>Pteridium aquilinum</i>	67	9.3	1.0	1.0	2.0				<b>X</b>
	<i>Vulpia myuros</i>	67	4.3	0.4	0.2	1.0				<b>X</b>
	<i>Anagallis arvensis</i>	67	0.9	0.1	0.2	0.2				<b>X</b>
	<i>Artemisia pycnocephala</i>	33	29.4	18.7	56.0	56.0				
	<i>Festuca idahoensis</i>	33	19.3	6.7	20.0	20.0				
	<i>Eriogonum latifolium</i>	33	2.9	1.0	3.0	3.0				
	<i>Dipsacus</i> spp.	33	1.6	1.0	3.0	3.0				
	<i>Agrostis hallii</i>	33	2.9	1.0	3.0	3.0				
	<i>Eriophyllum stoechadifolium</i>	33	2.9	1.0	3.0	3.0				
	<i>Scrophularia californica</i>	33	8.3	0.7	2.0	2.0				
	<i>Foeniculum vulgare</i>	33	0.6	0.4	1.2	1.2				
	<i>Bromus hordeaceus</i>	33	4.2	0.3	1.0	1.0				
	<i>Hypochaeris radicata</i>	33	0.5	0.2	0.5	0.5				
	<i>Dudleya farinosa</i>	33	0.5	0.2	0.5	0.5				
	<i>Eschscholzia californica</i>	33	0.5	0.2	0.5	0.5				
	<i>Holcus lanatus</i>	33	0.8	0.1	0.2	0.2				
	<i>Madia sativa</i>	33	0.1	0.1	0.2	0.2				
	<i>Anaphalis margaritacea</i>	33	0.8	0.1	0.2	0.2				
	<i>Carduus pycnocephalus</i>	33	0.1	0.1	0.2	0.2				
	<i>Clinopodium douglasii</i>	33	0.8	0.1	0.2	0.2				
	<i>Cortaderia jubata</i>	33	0.8	0.1	0.2	0.2				
	<i>Cortaderia</i> spp.	33	0.1	0.1	0.2	0.2				
	<i>Elymus glaucus</i>	33	0.1	0.1	0.2	0.2				
	<i>Grindelia stricta</i>	33	0.1	0.1	0.2	0.2				
	<i>Marah fabaceus</i>	33	0.8	0.1	0.2	0.2				
	<i>Festuca occidentalis</i>	33	0.1	0.1	0.2	0.2				
	<i>Phacelia californica</i>	33	0.8	0.1	0.2	0.2				
	<i>Cardamine oligosperma</i>	33	0.8	0.1	0.2	0.2				



Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<i>Melilotus</i> spp.	33	0.1	0.1	0.2	0.2				
	<i>Plantago lanceolata</i>	33	0.1	0.1	0.2	0.2				
	<i>Rumex acetosella</i>	33	0.8	0.1	0.2	0.2				
	<i>Sonchus asper</i>	33	0.1	0.1	0.2	0.2				
	<i>Stachys ajugoides</i>	33	0.1	0.1	0.2	0.2				
	<i>Lolium perenne</i>	33	0.1	0.1	0.2	0.2				
	<i>Viola</i> spp.	33	0.1	0.1	0.2	0.2				
	<i>Solanum umbelliferum</i>	33	0.8	0.1	0.2	0.2				
	<i>Brassica nigra</i>	33	0.1	0.1	0.2	0.2				

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### ***Diplacus (aurantiacus, puniceus) Association***

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**Common Name:** Bush Monkeyflower Shrubland

**Alliance:** *Diplacus aurantiacus* Shrubland Alliance

**Classification Comments**

The association circumscription is the same as that of the alliance. See above for detailed description. Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**Global Rarity Rank:** G3

**State Rarity Rank:** S3

**State Rare:** Y

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***Frangula californica* – *Rhododendron occidentale* – *Salix breweri* Shrubland Alliance**

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**Common Name:** California coffee berry – Western azalea – Brewer's willow scrub

**NVC Alliance Code:** N/A

**Statewide Description**

The nominate species of the alliance were given separate alliance status in Sawyer et al. (2009). Upon recent peer review of the NVC, they have been merged into a single alliance; the new convention is followed here. *Frangula californica*, *Rhododendron occidentale*, and/or *Salix breweri* dominates or co-dominates 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*, *Sambucus nigra*, and *Toxicodendron diversilobum*. Emergent trees may be present at low cover, including *Abies grandis*, *Alnus rubra*, *Picea sitchensis*, *Pseudotsuga menziesii*, *Quercus agrifolia*, *Q. 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. While upland stands of *Frangula californica* occur on both north- and south-facing slopes along the coast from Big Sur to Point Reyes (Ford and Hayes 2007), only those riparian stands are included in this alliance.

Similarly, *Rhododendron occidentale* is a common shrub along streams, seeps, and moist slopes at low to montane elevations throughout most of cismontane California. Those riparian and spring stands are included in this alliance. More narrowly distributed is *Salix breweri*, where it is restricted to streams and seeps. These three indicator species typically dominate or co-dominate on ultramafic (e.g., serpentine) substrates.

### Local Vegetation Description

The California coffee berry – Western azalea – Brewer's willow scrub Alliance forms an open shrub layer in the single survey available. The emergent tree layer is typically absent, and the herbaceous layer is intermittent. The herbaceous layer typically includes *Carex* spp., *Cirsium vulgare*, *Epilobium* spp. and *Juncus* spp.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	NA	No data	
Hardwood	0.0	NA	No data	
Regenerating or Shrubby Tree	0.0	NA	No data	
Shrub	27.0	NA	No data	
Herb	60.0	NA	0.8	0.5 –1

### Local Membership Rule

*Frangula californica* and/or *Rhododendron occidentale* dominate or co-dominate with *Rubus*. Stands are found along springs, seeps, and ravines in wetland and riparian settings, often on sedimentary and serpentine substrates that retain water much of the year. If *Frangula californica* is dominant in upland settings along with *Baccharis pilularis* or other upland plants, key to the *Baccharis* alliance.

### Local Environmental Description

**Elevation:** 605 m

**Aspect:** Flat

**Slope:** 0 degrees

**Macro Topography:** Bottom (1)

**Large Rock:** Mean 0.0%, Range 0.0 – 0.0%

**Small Rock:** Mean 0.0%, Range 0.0 – 0.0%

**Fines Cover:** Mean 5.0%, Range 5.0 – 5.0%

**Litter Cover:** Mean 6.0%, Range 6.0 – 6%

**Soil Texture (field assessed):** Muck (1)

**Geology (field or map data):** Franciscan melange (1)

**Marin County Watersheds:** Lagunitas Creek (1)

### Site Impacts

This alliance has very low non-native plant cover (average 0.2%) relative to native cover. Non-native species with highest frequency and abundance include *Cirsium vulgare*.

### Associations in Marin County

*Rhododendron occidentale* – *Frangula californica* ssp. *tomentella*

### Classification Comments

This sensitive alliance would benefit from more sampling along springs and seeps.

**References:** Klein et al. 2015

**Global Rarity Rank:** G3

**State Rarity Rank:** S3

### Surveys Used for Description

**Total: N=1; Marin County (n=1):** MMWD0109

### Alliance Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Rhododendron occidentale</i>	100	100.0	25.0	25.0	25.0	X	X		X
<b>Herb</b>										
	<i>Carex</i> spp.	100	97.7	60.0	60.0	60.0	X	X		X
	<i>Juncus</i> spp.	100	1.6	1.0	1.0	1.0	X			X
	<i>Cirsium vulgare</i>	100	0.3	0.2	0.2	0.2	X			X
	<i>Epilobium</i> spp.	100	0.3	0.2	0.2	0.2	X			X

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

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**Common Name:** Western Azalea – California Coffeeberry Shrubland

**Alliance:** *Frangula californica* – *Rhododendron occidentale* – *Salix breweri* Shrubland Provisional Alliance

**Local Vegetation Description**

The Western Azalea – California Coffeeberry Association forms an open to continuous shrub layer. The emergent tree layer is typically sparse to open, and the herbaceous layer is open to intermittent. Dominant and characteristic shrubs include *Rhododendron occidentale* and *Frangula californica*. Regenerating or shrubby trees that are often present include *Pseudotsuga menziesii*. Commonly associated emergent trees at sparse cover include *Hesperocyparis sargentii*, *Pseudotsuga menziesii*, and *Umbellularia californica*. The herbaceous layer often includes *Aquilegia eximia*, *Carex mendocinensis*, *Epipactis gigantea*, *Iris macrosiphon*, *Maianthemum racemosum*, *Parnassia palustris*, and *Polygala californica*, and herbs that are sometimes present include *Cypripedium californicum* and *Melica torreyana*. Commonly associated non-vascular plants include Moss.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	2.2	0 – 7	12.5	5 – 20
Hardwood	0.9	0 – 5	7.5	5 – 10
Regenerating or Shrubby Tree	1.4	0 – 5	3.0	1 – 5
Shrub	42.8	12 – 70	3.1	1 – 5
Herb	25.0	2 – 60	0.7	0 – 2

**Local Environmental Description**

**Elevation:** Mean 341 m, Range 204 – 605 m

**Aspect:** NW (2), SE (2), Flat (1), SW (1)

**Slope:** Mean 12 degrees, Range 0 – 45 degrees

**Macro Topography:** Bottom (3), Lower 1/3 of slope (2), Upper 1/3 of slope (1)

**Large Rock:** Mean 15.3%, Range 0.0 – 45.0%

**Small Rock:** Mean 22.0%, Range 0.0 – 63.0%

**Fines Cover:** Mean 11.2%, Range 4.0 – 23.0%

**Litter Cover:** Mean 30.8%, Range 2.0 – 85%

**Soil Texture (field assessed):** Muck (1), Fine silty clay (1)

**Geology (field or map data):** Serpentine (4), Franciscan melange (1), Mixed sedimentary (1)

**Marin County Watersheds:** Lagunitas Creek (1)

**Other Watersheds; Sonoma Co.:** Lower Russian River (4), Gualala River (1)

**Site Impacts**

This association has very low non-native plant cover (average 0.1%) relative to native cover.

**Classification Comments**

This association is considered provisional since it is under-sampled in its expected range. Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** Klein et al. 2015

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

Total: N=6; Marin County (n=1): MMWD0109

Sonoma County (n=5): SONO0269, SONO0287, SONO0466, SONO2215, SONO2218

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Hesperocyparis sargentii</i>	33	30.6	2.0	6.0	6.0				
	<i>Umbellularia californica</i>	33	13.3	0.7	0.2	4.0				
	<i>Pseudotsuga menziesii</i>	33	3.0	0.2	0.2	1.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Pseudotsuga menziesii</i> *	50	25.6	0.9	0.2	5.0				X
	<i>Hesperocyparis sargentii</i> *	33	25.0	0.2	0.4	1.0				
	<i>Umbellularia californica</i> *	33	16.1	0.2	0.2	1.0				
<b>Shrub</b>										
	<b><i>Rhododendron occidentale</i></b>	<b>100</b>	<b>68.9</b>	<b>27.7</b>	<b>8.0</b>	<b>50.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<b><i>Frangula californica</i></b>	<b>83</b>	<b>17.7</b>	<b>7.7</b>	<b>0.2</b>	<b>20.0</b>	<b>X</b>			<b>X</b>
	<i>Quercus durata</i>	33	3.2	2.0	0.2	12.0				
	<i>Salix breweri</i>	33	2.7	1.0	1.0	5.0				
	<i>Calycanthus occidentalis</i>	33	1.1	0.7	0.2	4.0				
	<i>Heteromeles arbutifolia</i>	33	0.7	0.4	0.2	2.0				
<b>Herb</b>										
	<i>Carex mendocinensis</i>	67	21.8	4.7	0.2	26.0				X
	<i>Aquilegia eximia</i>	67	7.4	0.6	0.2	2.0				X
	<i>Epipactis gigantea</i>	67	7.5	0.4	0.2	1.0				X
	<i>Parnassia palustris</i>	50	2.8	0.4	0.2	2.0				X
	<i>Iris macrosiphon</i>	50	3.3	0.4	0.2	1.0				X
	<i>Maianthemum racemosum</i>	50	0.7	0.1	0.2	0.2				X
	<i>Polygala californica</i>	50	0.7	0.1	0.2	0.2				X
	<i>Melica torreyana</i>	33	1.7	0.2	0.2	1.0				
	<i>Cypripedium californicum</i>	33	0.7	0.1	0.2	0.2				
<b>Non-vasc</b>										
	Moss	50	47.2	3.0	1.0	15.0				X



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## ***Gaultheria shallon* – *Rubus (ursinus)* Shrubland Alliance**

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**Common Name:** Salal – berry brambles

**NVC Alliance Code:** N/A

### **Statewide Description**

*Rubus parviflorus*, *Rubus ursinus*, *Holodiscus discolor*, or *Gaultheria shallon* dominates solely or co-dominates, 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*.

The nominate species of this alliance were segregated from the previous *Rubus* spp. Alliance in Sawyer et al. (2009) based on peer review of the NVC and interpretation of California data. The new convention is followed here: Stands, which were previously thought to be part of a mixed *Rubus* Alliance (Sawyer et al. 2009), have recently been reconsidered as two different alliances (*Morella californica* – *Rubus spectabilis* and *Gaultheria shallon* – *Rubus (ursinus)* Provisional Alliances). *Holodiscus discolor*, *Rubus ursinus* and *Gaultheria shallon* are widespread shrubs found in mesic woodlands and forests in the coastal areas of central and northern California. These species tend to emerge from forest or woodland cover on exposed coastal bluffs, mesic slopes, or in coastal grasslands.

### **Local Vegetation Description**

The Salal – berry brambles Alliance forms an open to continuous shrub layer. The emergent tree layer is typically sparse to open, and the herbaceous layer is sparse to continuous. Dominant and characteristic shrubs include *Rubus ursinus*, and those that are often present include *Baccharis pilularis*. Herbs are sometimes present including *Conium maculatum*, *Galium aparine*, *Heracleum maximum*, *Holcus lanatus*,

*Iris douglasiana*, *Marah fabaceus*, *Polystichum munitum*, *Pteridium aquilinum* and *Stachys ajugoides*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	1.0	0 – 12	27.5	20 – 35
Hardwood	2.6	0 – 10	9.5	2 – 15
Regenerating or Shrubby Tree	0.2	0 – 4.0	0.3	0 – 0.5
Shrub	64.2	15.0 – 100.0	1.6	0 – 5
Herb	35.3	1 – 95	0.6	0 – 1

### **Local Membership Rule**

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

### **Local Environmental Description**

**Elevation:** Mean 84 m, Range 6 – 297 m

**Aspect:** NW (4), NE (3), SW (2), SE (1)

**Slope:** Mean 15 degrees, Range 0 – 36 degrees

**Macro Topography:** Middle 1/3 of slope (4), Upper 1/3 of slope (3), Lower 1/3 of slope (1), Ridge top (1)

**Large Rock:** Mean 8.6%, Range 0.0 – 60.0%

**Small Rock:** Mean 3.2%, Range 0.0 – 20.0%

**Fines Cover:** Mean 23.0%, Range 0.0 – 86%

**Litter Cover:** Mean 54.4%, Range 3.0 – 97%

**Soil Texture (field assessed):** Not recorded (2), Moderately coarse, sandy loam (2), Fine silty clay (1), Medium to very fine, sandy loam (1), Moderately fine sandy clay loam (1), Sand, (class unknown) (1), Loam, (class unknown) (1)

**Geology (field or map data):** Sandstone and other sedimentary (13), Granitic (4), Alluvium (2), Sandstone, shale, and conglomerate (2), Franciscan melange (1), Siltstone (1), Sandstone (1)

**Marin County Watersheds:** Bolinas (11), Point Reyes (10), Inverness (2), Novato (1)

### **Site Impacts**

This alliance has low non-native plant cover (average 15.6%) relative to native cover. Those non-native species with highest frequency and abundance include *Conium maculatum* and *Holcus lanatus*.

### **Associations in Marin County**

*Gaultheria shallon* – *Vaccinium ovatum* / *Pteridium aquilinum*.

*Holodiscus discolor* – *Baccharis pilularis* – *Rubus ursinus*

*Rubus parviflorus*

*Rubus ursinus*

### **Classification Comments**

None.

**References:** Buck-Diaz et al. 2019, Duebendorfer 1989, Klein et al. 2015

**Global Rarity Rank:** GNR      **State Rarity Rank:** S4

### **Surveys Used for Description**

**Total: N=25; Marin County (n=25):** MARIN080, MARIN082, MARIN129, MARIN145, MARIN160, PGA1407, PGA1705, PGA1738, PGA181, PGA3064, PGA51, PGA5169, PGA60, PGA7666, PGA7842, PORE107, SFANF06, TEVA010c, TEVA017a, TEVA04b, TEVA07b, TEVA08c, WRBL016, WRBL017, WRBL049



### Alliance Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Rubus ursinus</i>	88	51.6	29.9	0.2	88.0	X	X		X
	<i>Baccharis pilularis</i>	60	13.2	9.2	0.2	40.0				X
	<i>Toxicodendron diversilobum</i>	32	4.4	3.8	3.0	20.0				
	<i>Rubus parviflorus</i>	20	5.9	4.8	0.2	63.0				
	<i>Holodiscus discolor</i>	20	6.0	4.6	15.0	35.0				
	<i>Sambucus racemosa</i>	20	0.7	0.5	1.0	3.0				
<b>Herb</b>										
	<i>Pteridium aquilinum</i>	40	7.5	1.8	0.2	23.0				
	<i>Conium maculatum</i>	36	6.9	3.0	0.2	20.0				
	<i>Holcus lanatus</i>	32	8.5	7.4	1.0	62.5				
	<i>Polystichum munitum</i>	32	13.0	2.4	0.5	20.0				
	<i>Heracleum maximum</i>	24	1.8	0.6	0.2	5.0				
	<i>Marah fabaceus</i>	20	3.8	0.9	0.2	10.0				
	<i>Galium aparine</i>	20	1.0	0.7	0.2	15.0				
	<i>Iris douglasiana</i>	20	1.0	0.7	0.2	10.0				
	<i>Stachys ajugoides</i>	20	0.3	0.1	0.2	1.0				

## **Gaultheria shallon – Vaccinium ovatum / Pteridium aquilinum Provisional Association**

**Common Name:** Salal – California huckleberry / bracken fern Shrubland

**Alliance:** *Gaultheria shallon* – *Rubus (ursinus)* Shrubland Alliance

### **Local Vegetation Description**

The Salal – California huckleberry / bracken fern Association forms an open to continuous shrub layer. The emergent tree layer is typically sparse to open, and the herbaceous layer is open to intermittent. Dominant and characteristic shrubs include *Gaultheria shallon* and *Vaccinium ovatum*, and those that are often present include *Baccharis pilularis* and *Rubus ursinus*. Commonly associated emergent trees at sparse cover include *Pinus muricata*. The herbaceous layer typically includes *Polystichum munitum* and *Pteridium aquilinum*, and herbs that are often present include *Calamagrostis nutkaensis*, and herbs that are sometimes present include *Achillea millefolium*, *Angelica hendersonii*, *Armeria maritima*, *Castilleja affinis*, *Dudleya farinosa*, *Erigeron glaucus*, *Eriophyllum stoechadifolium*, *Fragaria chiloensis*, *Hypochaeris radicata*, *Iris douglasiana*, *Polypodium scolieri*, *Prunella vulgaris*, *Stachys ajugoides*, and *Stellaria littoralis*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	3.3	0 – 12	14.5	1 – 35
Hardwood	1.8	0 – 7	12.5	10 – 15
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	49.2	15 – 80	1.3	0 – 5
Herb	21.8	6 – 50	0.6	0 – 1

### **Local Environmental Description**

**Elevation:** Mean 142 m, Range 50 – 297 m

**Aspect:** NE (2), NW (2), SW (1)

**Slope:** Mean 35 degrees, Range 20 – 54 degrees

**Macro Topography:** Upper 1/3 of slope (2), Middle 1/3 of slope (1), Lower 1/3 of slope (1), Ridge top (1)

**Large Rock:** Mean 15.8%, Range 0.0 – 60.0%

**Small Rock:** Mean 4.0%, Range 0.0 – 20.0%

**Fines Cover:** Mean 6.0%, Range 0.0 – 15.0%

**Litter Cover:** Mean 69.8%, Range 3.0 – 97%

**Soil Texture (field assessed):** Moderately fine clay loam (1), Moderately fine sandy clay loam (1), Moderately coarse, sandy loam (1), Loam, (class unknown) (1), Moderately fine silty clay loam (1)

**Geology (field or map data):** Sandstone, shale, and conglomerate (3), Granitic (1), Franciscan melange (1)

**Marin County Watersheds:** Point Reyes (3)

**Other Watersheds, Sonoma Co.:** Gualala River (2)

### **Site Impacts**

This association has low non-native plant cover (average 1.0%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Hypochaeris radicata*.

### **Classification Comments**

In earlier reports, this association was called *Gaultheria shallon* – *Rubus* spp. Provisional Association. It is now updated to match the name of the equivalent NVC association. Since the number of surveys of this association in Marin are low, data from nearby counties were included.

References: Buck-Diaz et al. 2019, Klein et al. 2015

Global Rarity Rank: GNR

State Rarity Rank: SNR

State Rare: Y

**Surveys Used for Description**

Total: N=5; Marin County (n=3): MARIN129, MARIN145, WRBL049

Sonoma County (n=2): SONO0039, SONO0444

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>	<i>Pinus muricata</i>	40	36.7	2.6	1.0	12.0				
<b>Shrub</b>	<b><i>Gaultheria shallon</i></b>	<b>100</b>	<b>72.6</b>	<b>35.8</b>	<b>15.0</b>	<b>77.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<b><i>Vaccinium ovatum</i></b>	<b>80</b>	<b>2.6</b>	<b>1.7</b>	<b>0.2</b>	<b>6.0</b>	<b>X</b>			<b>X</b>
	<i>Rubus ursinus</i>	60	4.6	2.1	1.0	6.0				<b>X</b>
	<i>Baccharis pilularis</i>	60	2.9	0.9	0.5	3.0				<b>X</b>
	<i>Rubus parviflorus</i>	40	8.0	3.8	3.0	16.0				
	<i>Morella californica</i>	40	2.4	1.8	2.0	7.0				
	<i>Lupinus arboreus</i>	40	1.1	0.6	0.2	2.6				
<b>Herb</b>	<i>Polystichum munitum</i>	80	24.3	2.3	0.5	8.0	<b>X</b>			<b>X</b>
	<b><i>Pteridium aquilinum</i></b>	<b>80</b>	<b>18.6</b>	<b>1.9</b>	<b>0.2</b>	<b>5.0</b>	<b>X</b>			<b>X</b>
	<i>Calamagrostis nutkaensis</i>	60	30.1	9.8	12.0	24.1				<b>X</b>
	<i>Eriophyllum stoechadifolium</i>	40	3.8	2.6	0.2	12.7				
	<i>Iris douglasiana</i>	40	1.9	0.7	1.4	2.0				
	<i>Erigeron glaucus</i>	40	1.6	0.5	0.5	2.0				
	<i>Angelica hendersonii</i>	40	1.0	0.4	1.0	1.0				
	<i>Fragaria chiloensis</i>	40	0.9	0.3	0.5	1.0				
	<i>Achillea millefolium</i>	40	0.4	0.1	0.2	0.5				
	<i>Armeria maritima</i>	40	0.3	0.1	0.2	0.5				
	<i>Castilleja affinis</i>	40	0.4	0.1	0.2	0.5				
	<i>Dudleya farinosa</i>	40	0.3	0.1	0.2	0.5				
	<i>Hypochaeris radicata</i>	40	0.3	0.1	0.2	0.5				
	<i>Polypodium scolieri</i>	40	0.3	0.1	0.2	0.5				
	<i>Prunella vulgaris</i>	40	0.3	0.1	0.2	0.5				
	<i>Stachys ajugoides</i>	40	0.3	0.1	0.2	0.5				
	<i>Stellaria littoralis</i>	40	0.3	0.1	0.2	0.5				
<b>Non-vasc</b>	Lichen	40	40.0	0.2	0.2	1.0				

## ***Holodiscus discolor* – *Baccharis pilularis* – *Rubus ursinus* Association**

**Common Name:** Ocean Spray – Coyote Brush – California Blackberry Shrubland

**Alliance:** *Gaultheria shallon* – *Rubus (ursinus)* Shrubland Alliance

### **Local Vegetation Description**

The Ocean Spray – Coyote Brush – California Blackberry Association forms an open to continuous shrub layer. The emergent tree layer is typically absent, and the herbaceous layer is open to intermittent. Dominant and characteristic shrubs include *Baccharis pilularis*, *Holodiscus discolor*, and *Toxicodendron diversilobum*, and those that are often present include *Diplacus aurantiacus*, *Frangula californica*, *Lonicera hispidula*, and *Rubus ursinus*. The herbaceous layer sometimes includes *Pteridium aquilinum*, *Dryopteris arguta*, and *Polystichum munitum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	3.2	1 – 10	8.0	2 – 15
Regenerating or Shrubby Tree	0.0	0 – 0.1	0.3	0 – 0.5
Shrub	62.2	26 – 95	3.5	2 – 5
Herb	23.8	10 – 40	0.4	0 – 1

### **Local Environmental Description**

**Elevation:** Mean 108 m, Range 6 – 286 m

**Aspect:** NW (1)

**Slope:** 27 degrees

**Macro Topography:** no data

**Large Rock:** 0.0%

**Small Rock:** 0.2%

**Fines Cover:** 12%

**Litter Cover:** 85%

**Soil Texture (field assessed):** Moderately coarse, sandy loam (1)

**Geology (field or map data):** Granitic (2), Franciscan melange (1), Sandstone and other sedimentary (1)

**Marin County Watersheds:** Inverness (2), Bolinas (1), Novato (1)

### **Site Impacts**

This association has low non-native plant cover (average 3.3%) relative to native cover.

### **Classification Comments**

The association name *Baccharis pilularis* – *Holodiscus discolor* was used in the 2003 classification for Point Reyes, and placed in the *Baccharis pilularis* Alliance. Additional data and analysis have led us to lump that concept into this new association.

**References:** Keeler-Wolf et al. 2003a

**Global Rarity Rank:** G3

**State Rarity Rank:** S3?

**State Rare:** Y

### **Surveys Used for Description**

**Total: N=5; Marin County (n=5):** MARIN160, PGA1407, PGA1705, PGA51, PGA60

### **Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

<b>Layer</b>	<b>Taxon</b>	<b>Con</b>	<b>Rel</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>	<b>Ch</b>	<b>D</b>	<b>cD</b>	<b>Oft</b>
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	100	34.4	28.6	10.0	40.0	X		X	X
	<i>Holodiscus discolor</i>	100	30.0	23.0	15.0	35.0	X			X
	<i>Rubus ursinus</i>	60	12.2	13.0	10.0	45.0				X
	<i>Toxicodendron diversilobum</i>	60	7.5	7.6	3.0	20.0				X
	<i>Morella californica</i>	40	4.8	3.2	1.0	15.0				
	<i>Frangula californica</i>	40	3.0	2.2	1.0	10.0				
	<i>Diplacus aurantiacus</i>	40	2.8	1.2	0.2	6.0				
<b>Herb</b>										
	<i>Polystichum munitum</i>	40	26.6	3.0	5.0	10.0				
	<i>Pteridium aquilinum</i>	40	9.2	1.6	3.0	5.0				
	<i>Dryopteris arguta</i>	40	0.3	0.1	0.2	0.2				

## ***Rubus parviflorus* Association**

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**Common Name:** Western Thimbleberry Shrubland

**Alliance:** *Gaultheria shallon* – *Rubus (ursinus)* Shrubland Alliance

### **Local Vegetation Description**

The Western Thimbleberry Association forms an intermittent to continuous shrub layer. The emergent tree layer is typically absent, and the herbaceous layer is sparse to intermittent. Dominant and characteristic shrubs include *Rubus parviflorus*, *Baccharis pilularis*, and *Toxicodendron diversilobum*, and those that are often present include *Rubus ursinus*. The herbaceous layer typically includes *Marah fabaceus*, and herbs that are often present include *Heracleum maximum*, *Polystichum munitum*, *Scrophularia californica*, and *Urtica dioica*, and herbs that are sometimes present include *Artemisia douglasiana*, *Dryopteris arguta*, *Equisetum telmateia*, *Eriophyllum stoechadifolium*, *Galium aparine*, *Maianthemum stellatum*, *Pteridium aquilinum*, *Stachys bullata*, and *Symphytotrichum chilense*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	77.9	55 – 100	2.0	0 – 5
Herb	13.1	1 – 38	1.1	0 – 5

### **Local Environmental Description**

**Elevation:** Mean 199 m, Range 13 – 535 m

**Aspect:** NE (3), SW (3), NW (2), Variable (1)

**Slope:** Mean 18 degrees, Range 0 – 43 degrees

**Macro Topography:** Middle 1/3 of slope (3), Upper 1/3 of slope (3), Bottom to Lower 1/3 of slope (2), Bottom (1)

**Large Rock:** Mean 0.0%, Range 0.0 – 0.0%

**Small Rock:** Mean 1.2%, Range 0.0 – 5.0%

**Fines Cover:** Mean 28.0%, Range 5.0 – 86.0%

**Litter Cover:** Mean 67.3%, Range 10.0 – 91%

**Soil Texture (field assessed):** Moderately coarse, sandy loam (2), Medium loam (2), Medium to very fine, loamy sand (1), Medium to very fine, sandy loam (1), Not recorded (1)

**Geology (field or map data):** Granitic (generic) (2), Sandstone and other sedimentary (2), Volcanic and metavolcanic rocks (1), Sandstone, shale, and conglomerate (1), Mixed sedimentary (1), Alluvium (1), Mixed alluvium (1)

**Marin County Watersheds:** Bolinas (1), Point Reyes (1)

**Other Watersheds, San Mateo Co.:** San Mateo Coastal (4), Pescadero Creek (1); **Sonoma Co.:** Gualala River (1), Salmon Creek (1)

### **Site Impacts**

This association has low non-native plant cover (average 1.0%) relative to native cover.

### **Classification Comments**

Since the number of surveys of this association in Marin are low, data from nearby counties were included. This association was previously placed in the *Rubus (parviflorus, spectabilis, ursinus)* Alliance

(Sawyer et al. 2009) and in the *Morella californica* – *Rubus spectabilis* Alliance (Klein et al. 2015) but is now being placed here since it primarily occurs in upland forest edges and coastal scrub situations.

**References:** Belsher 1999, Klein et al. 2015

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

**Total: N=8; Marin County (n=2):** MARIN080, WRBL016

San Mateo County (n=5): SMAT0065, SMAT0074, SMAT0106, SMAT0176, SMAT0673

Sonoma County (n=1): , SONO0974

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Rubus parviflorus</i>	100	61.7	50.3	15.0	70.0	X	X		X
	<i>Toxicodendron diversilobum</i>	78	11.1	8.5	0.2	20.0	X			X
	<i>Baccharis pilularis</i>	78	8.2	6.0	0.2	20.0	X			X
	<i>Rubus ursinus</i>	67	7.3	6.5	0.2	20.0				X
	<i>Sambucus racemosa</i>	33	3.0	3.1	3.0	20.0				
	<i>Salix lasiolepis</i>	33	1.9	1.7	0.2	10.0				
	<i>Frangula californica</i>	33	0.4	0.3	0.2	2.0				
	<i>Symphoricarpos albus</i>	22	0.2	0.2	1.0	1.0				
<b>Herb</b>										
	<i>Marah fabaceus</i>	78	11.8	2.2	0.2	10.0	X			X
	<i>Scrophularia californica</i>	67	8.3	0.7	0.2	2.0				X
	<i>Polystichum munitum</i>	56	12.7	2.9	0.2	20.0				X
	<i>Heracleum maximum</i>	56	20.2	2.7	0.2	15.0				X
	<i>Urtica dioica</i>	56	4.8	0.6	0.2	3.0				X
	<i>Pteridium aquilinum</i>	44	2.7	0.3	0.2	1.0				
	<i>Equisetum telmateia</i>	33	10.6	3.9	0.2	35.0				
	<i>Eriophyllum stoechadifolium</i>	33	1.1	0.2	0.2	1.0				
	<i>Dryopteris arguta</i>	22	3.6	0.4	0.2	3.0				
	<i>Maianthemum stellatum</i>	22	2.1	0.4	0.2	3.0				
	<i>Artemisia douglasiana</i>	22	0.9	0.2	1.0	1.0				
	<i>Galium aparine</i>	22	0.4	0.0	0.2	0.2				
	<i>Stachys bullata</i>	22	0.3	0.0	0.2	0.2				
	<i>Symphotrichum chilense</i>	22	0.3	0.0	0.2	0.2				

## ***Rubus ursinus* Association**

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**Common Name:** California Blackberry Shrubland

**Alliance:** *Gaultheria shallon* – *Rubus (ursinus)* Shrubland Alliance

### **Local Vegetation Description**

The California Blackberry Association forms an open to continuous shrub layer. The emergent tree layer is typically absent, and the herbaceous layer is open to continuous. Dominant and characteristic shrubs include *Rubus ursinus*. The herbaceous layer often includes *Conium maculatum*, and herbs that are sometimes present include *Carex obnupta*, *Heracleum maximum*, *Hirschfeldia incana*, *Holcus lanatus*, and *Pteridium aquilinum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.4	0 – 2	no data	
Hardwood	2.3	0 – 8	no data	
Regenerating or Shrubby Tree	0.3	0 – 4	no data	
Shrub	53.8	20 – 100	0.8	0 – 2
Herb	50.6	5 – 95	0.8	0.5 – 1

### **Local Environmental Description**

**Elevation:** Mean 55 m, Range 8 – 184 m

**Aspect:** SW (1), SE (1), NE (1), NW (1)

**Slope:** Mean 7 degrees, Range 0 – 33 degrees

**Macro Topography:** Middle 1/3 of slope (2), Lower 1/3 of slope (1)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** 2.0%

**Litter Cover:** Mean 51.5%, Range 7.0 – 96%

**Soil Texture (field assessed):** Fine silty clay (1), Not recorded (1), Sand, (class unknown) (1)

**Geology (field or map data):** Sandstone and other sedimentary (10), Alluvium (2), Granitic (1), Sandstone (1), Siltstone (1)

**Marin County Watersheds:** Bolinas (9), Point Reyes (6)

### **Site Impacts**

This association has moderate non-native plant cover (average 24.5%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Conium maculatum*, *Hirschfeldia incana*, and *Holcus lanatus*.

### **Classification Comments**

This association was previously placed in the *Rubus (parviflorus, spectabilis, ursinus)* Alliance (Sawyer et al. 2009)..

**References:** Duebendorfer 1989, Klein et al. 2015

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

### **Surveys Used for Description**

**Total: N=15; Marin County (n=15):** MARIN082, PGA1738, PGA181, PGA3064, PGA5169, PGA7666, PGA7842, PORE107, SFANF06, TEVA010c, TEVA017a, TEVA04b, TEVA07b, TEVA08c, WRBL017



### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Rubus ursinus</i>	100	79.8	43.9	13.9	88.0	X	X		X
	<i>Baccharis pilularis</i>	47	8.4	4.4	0.2	28.0				
	<i>Toxicodendron diversilobum</i>	27	4.0	3.1	10.0	15.0				
<b>Herb</b>										
	<i>Conium maculatum</i>	53	9.7	4.7	0.2	20.0				X
	<i>Holcus lanatus</i>	47	10.7	11.5	1.0	62.5				
	<i>Heracleum maximum</i>	33	2.3	0.8	0.2	5.0				
	<i>Carex obnupta</i>	27	5.8	4.8	1.0	26.0				
	<i>Pteridium aquilinum</i>	27	2.9	1.8	0.2	23.0				
	<i>Hirschfeldia incana</i>	27	2.0	1.0	1.0	5.0				

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***Lotus scoparius* – *Lupinus albifrons* – *Eriodictyon* spp. Shrubland Alliance**

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**Common Name:** Deer weed – silver bush lupine – yerba santa scrub

**NVC Alliance Code:** N/A

**Statewide Description**

*Lotus scoparius* or *Lupinus albifrons*, *Eriodictyon californicum* or another *Eriodictyon* sp. is dominant or co-dominant in the shrub canopy with *Adenostoma fasciculatum*, *Artemisia californica*, *Baccharis pilularis*, *Ephedra californica*, *Ericameria linearifolia*, *Eriodictyon californicum*, *Eriogonum fasciculatum*, *Hazardia squarrosa*, *Malacothamnus densiflorus*, *Prunus fremontii*, *Rhus ovata*, *Ribes quercetorum* and *Salvia apiana*.

*Lotus scoparius*, *Lupinus albifrons*, and *Eriodictyon californicum* are early colonizing shrubs of disturbed sites throughout much of central and southern California. Stands of the alliance dominate recently burned patches of chaparral and coastal scrub (e.g., *Adenostoma fasciculatum*, *Artemisia californica*, and *Eriogonum fasciculatum* alliances).

**Local Vegetation Description**

The Deer weed – silver bush lupine – yerba santa scrub Alliance forms an open to intermittent shrub layer. The emergent tree layer is typically sparse, and the herbaceous layer is open. Shrubs that are often present include *Lupinus albifrons*. Commonly associated emergent trees at sparse cover include *Arbutus menziesii* and *Pseudotsuga menziesii*. The herbaceous layer typically includes *Hypochaeris radicata*, and herbs that are often present include *Aira caryophyllea*, *Avena* spp., *Brachypodium distachyon*, *Briza maxima*, *Bromus diandrus*, *Bromus hordeaceus*, *Centaurea melitensis*, *Clarkia purpurea*, *Dudleya farinosa*, *Elymus glaucus*, *Erodium botrys*, *Eschscholzia californica*, *Logfia gallica*, *Monardella villosa*, *Nassella pulchra*, *Phacelia imbricata*, *Silene gallica*, *Trifolium hirtum*, *Trifolium*

*willdenovii* and *Vulpia myuros*. Commonly associated non-vascular plants include Cryptogammic crust.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	No data	
Hardwood	0.1	0 – 0.2	3.5	2 – 5
Regenerating or Shrubby Tree	0.0	0 – 0	0.3	0 – 0.5
Shrub	18.3	4.0 – 45.0	0.3	0– 0.5
Herb	20.7	11 – 31	0.3	0 –0.5

### **Local Membership Rule**

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

### **Local Environmental Description**

**Elevation:** Mean 322 m, Range 218 – 475 m

**Aspect:** None recorded

**Slope:** Mean 28 degrees, Range 8 – 43 degrees

**Macro Topography:** Middle to Upper 1/3 of slope (1), Ridge top (1), Upper 1/3 of slope (1)

**Large Rock:** Mean 5.2%, Range 0.2 – 9.2%

**Small Rock:** Mean 37.1%, Range 24 – 50%

**Fines Cover:** Mean 38.7%, Range 25 – 50%

**Litter Cover:** Mean 17.0%, Range 6.0 – 25%

**Soil Texture (field assessed):** Not recorded (2), Medium to very fine, loamy sand (1)

**Geology (field or map data):** Franciscan melange (2), Sandstone and other sedimentary (1)

**Marin County Watersheds:** Lagunitas Creek (1), Novato (1), San Rafael (1)

### **Site Impacts**

This alliance has moderate non-native plant cover (average 36.5%) relative to native cover. Non-native species with highest frequency and abundance include *Aira caryophyllea*, *Anagallis arvensis*, *Brachypodium distachyon*, *Briza maxima*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Centaurea melitensis*, *Erodium botrys*, *Galium parisiense*, *Hypochaeris glabra*, *Hypochaeris radicata*, *Logfia gallica*, *Rumex acetosella*, *Silene gallica*, *Trifolium hirtum* and *Vulpia* spp.

### **Associations in Marin County**

*Eriodictyon californicum* / Herbaceous

*Lupinus albifrons*

### **Classification Comments**

None.

**References:** Buck-Diaz and Evens 2011a, Buck-Diaz and Evens 2011b, Buck-Diaz et al. 2011, Buck-Diaz et al. 2012, Buck-Diaz et al. 2013, CNPS Vegetation Program 2015, Evens et al. 2004, Evens et al. 2006, Keeler-Wolf et al. 2003b, Klein et al. 2007, Klein et al. 2015

**Global Rarity Rank:** G5      **State Rarity Rank:** S5

### **Surveys Used for Description**

**Total: N=3; Marin County (n=3):** MARIN284, MARIN303, MOSD0026

## Alliance Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Arbutus menziesii</i>	33	16.7	0.1	0.2	0.2				
	<i>Pseudotsuga menziesii</i>	33	16.7	0.1	0.2	0.2				
<b>Shrub</b>										
	<b><i>Lupinus albifrons</i></b>	<b>67</b>	<b>65.1</b>	<b>3.3</b>	<b>4.0</b>	<b>6.0</b>				<b>X</b>
	<i>Pickeringia montana</i>	33	24.5	10.0	30.0	30.0				
	<b><i>Eriodictyon californicum</i></b>	<b>33</b>	<b>8.2</b>	<b>3.3</b>	<b>10.0</b>	<b>10.0</b>				
	<i>Diplacus aurantiacus</i>	33	0.2	0.1	0.2	0.2				
	<i>Arctostaphylos</i> spp.	33	0.2	0.1	0.2	0.2				
	<i>Artemisia californica</i>	33	1.6	0.1	0.2	0.2				
	<i>Toxicodendron diversilobum</i>	33	0.2	0.1	0.2	0.2				
	<i>Baccharis pilularis</i>	33	0.2	0.1	0.2	0.2				
<b>Herb</b>										
	<i>Hypochaeris radicata</i>	100	2.6	0.2	0.2	0.2	<b>X</b>			<b>X</b>
	<i>Brachypodium distachyon</i>	67	30.2	7.7	3.0	20.0				<b>X</b>
	<i>Trifolium hirtum</i>	67	2.7	0.7	0.2	2.0				<b>X</b>
	<i>Briza maxima</i>	67	3.9	0.7	0.2	2.0				<b>X</b>
	<i>Monardella villosa</i>	67	3.2	0.4	0.2	1.0				<b>X</b>
	<i>Phacelia imbricata</i>	67	3.2	0.4	0.2	1.0				<b>X</b>
	<i>Avena</i> spp.	67	0.8	0.1	0.2	0.2				<b>X</b>
	<i>Logfia gallica</i>	67	0.8	0.1	0.2	0.2				<b>X</b>
	<i>Centaurea melitensis</i>	67	0.8	0.1	0.2	0.2				<b>X</b>
	<i>Vulpia myuros</i>	67	0.8	0.1	0.2	0.2				<b>X</b>
	<i>Trifolium willdenovii</i>	67	0.8	0.1	0.2	0.2				<b>X</b>
	<i>Bromus diandrus</i>	67	0.8	0.1	0.2	0.2				<b>X</b>
	<i>Bromus hordeaceus</i>	67	0.8	0.1	0.2	0.2				<b>X</b>
	<i>Elymus glaucus</i>	67	2.3	0.1	0.2	0.2				<b>X</b>
	<i>Eschscholzia californica</i>	67	0.8	0.1	0.2	0.2				<b>X</b>
	<i>Clarkia purpurea</i>	67	0.8	0.1	0.2	0.2				<b>X</b>
	<i>Aira caryophyllea</i>	67	0.8	0.1	0.2	0.2				<b>X</b>
	<i>Nassella pulchra</i>	67	0.8	0.1	0.2	0.2				<b>X</b>
	<i>Erodium botrys</i>	67	0.8	0.1	0.2	0.2				<b>X</b>
	<i>Dudleya farinosa</i>	67	0.8	0.1	0.2	0.2				<b>X</b>
	<i>Silene gallica</i>	67	0.8	0.1	0.2	0.2				<b>X</b>
	<i>Pteridium aquilinum</i>	33	17.5	0.7	2.0	2.0				
	<i>Eriogonum nudum</i>	33	3.0	0.3	1.0	1.0				
	<i>Epilobium canum</i>	33	1.1	0.3	1.0	1.0				
	<i>Lotus micranthus</i>	33	1.1	0.3	1.0	1.0				
	<i>Trifolium microcephalum</i>	33	0.6	0.1	0.2	0.2				
	<i>Luzula comosa</i>	33	1.8	0.1	0.2	0.2				
	<i>Lupinus nanus</i>	33	0.2	0.1	0.2	0.2				

*Lotus scoparius* – *Lupinus albifrons* – *Eriodictyon* spp. Shrubland Alliance

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<i>Lotus wrangelianus</i>	33	0.6	0.1	0.2	0.2				
	<i>Elymus multisetus</i>	33	0.2	0.1	0.2	0.2				
	<i>Juncus</i> spp.	33	1.8	0.1	0.2	0.2				
	<i>Iris douglasiana</i>	33	1.8	0.1	0.2	0.2				
	<i>Hypochaeris glabra</i>	33	0.2	0.1	0.2	0.2				
	<i>Hypericum concinnum</i>	33	1.8	0.1	0.2	0.2				
	<i>Melica californica</i>	33	0.2	0.1	0.2	0.2				
	<i>Marah fabaceus</i>	33	0.6	0.1	0.2	0.2				
	<i>Chlorogalum pomeridianum</i>	33	0.2	0.1	0.2	0.2				
	<i>Gilia clivorum</i>	33	0.6	0.1	0.2	0.2				
	<i>Lotus humistratus</i>	33	0.6	0.1	0.2	0.2				
	<i>Carex</i> spp.	33	1.8	0.1	0.2	0.2				
	<i>Whipplea modesta</i>	33	1.8	0.1	0.2	0.2				
	<i>Minuartia douglasii</i>	33	0.2	0.1	0.2	0.2				
	<i>Anagallis arvensis</i>	33	0.6	0.1	0.2	0.2				
	<i>Carduus pycnocephalus</i>	33	0.6	0.1	0.2	0.2				
	<i>Galium parisiense</i>	33	0.6	0.1	0.2	0.2				
	<i>Rumex acetosella</i>	33	0.6	0.1	0.2	0.2				
	<i>Croton setigerus</i>	33	0.2	0.1	0.2	0.2				
	<i>Crassula connata</i>	33	0.2	0.1	0.2	0.2				
	<i>Dichelostemma capitatum</i>	33	0.2	0.1	0.2	0.2				
	<i>Achillea millefolium</i>	33	0.2	0.1	0.2	0.2				

## *Eriodictyon californicum* / herbaceous Association

**Common Name:** California Yerba Santa Shrubland

**Alliance:** *Lotus scoparius* – *Lupinus albifrons* – *Eriodictyon* spp. Shrubland Alliance

### Local Vegetation Description

The California Yerba Santa Association forms an open to continuous shrub layer. The emergent tree layer is typically sparse, and the herbaceous layer is sparse to open. Dominant and characteristic shrubs include *Eriodictyon californicum*, and those that are often present include *Baccharis pilularis*, *Diplacus aurantiacus*, and *Toxicodendron diversilobum*. Commonly associated emergent trees at sparse cover include *Quercus agrifolia*. The herbaceous layer often includes *Avena* spp. and *Briza maxima*, and herbs that are sometimes present include *Bromus diandrus*, *Bromus hordeaceus*, *Croton setigerus*, *Heracleum maximum*, *Iris douglasiana*, *Marah fabaceus*, *Pseudognaphalium*, *Pteridium aquilinum*, *Scrophularia californica*, and *Stachys bullata*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.1	0 – 0.2	4.8	2 – 10
Regenerating or Shrubby Tree	0.6	0 – 5.2	1.9	0 – 5
Shrub	38.3	16 – 80	1.2	0 – 2
Herb	17.4	1 – 30	0.4	0 – 1

### Local Environmental Description

**Elevation:** Mean 463 m, Range 218 – 597 m

**Aspect:** NW (3), SE (2), NE (1), SW (1), Variable (1)

**Slope:** Mean 17 degrees, Range 6 – 30 degrees

**Macro Topography:** Ridge top (3), Upper 1/3 of slope to Ridgetop (3), Middle 1/3 of slope (1), Upper 1/3 of slope (1)

**Large Rock:** Mean 1.6%, Range 0.0 – 7.0%

**Small Rock:** Mean 20.8%, Range 0.2 – 50.0%

**Fines Cover:** Mean 17.6%, Range 5.0 – 45.0%

**Litter Cover:** Mean 57.4%, Range 20.0 – 92%

**Soil Texture (field assessed):** Moderately coarse, sandy loam (2), Coarse, loamy sand (1), Medium to very fine, loamy sand (1)

**Geology (field or map data):** Franciscan melange (3), Sandstone (2), Granitic (generic) (1), Sandstone, shale, and conglomerate (1), Serpentine (1)

**Marin County Watersheds:** San Rafael (1)

**Other Watersheds, San Mateo Co.:** San Mateo Bayside (1), San Mateo Coastal (1); **Sonoma Co.:** Middle Russian River (5)

### Site Impacts

This association has moderate non-native plant cover (average 26.7%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Avena* spp., *Briza maxima*, *Bromus diandrus*, and *Bromus hordeaceus*.

### Classification Comments

Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** Buck-Diaz and Evens 2011a, Buck-Diaz et al. 2012, Evens et al. 2004, Klein et al. 2007, Klein et al. 2015

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** N

**Surveys Used for Description**

**Total: N=8; Marin County (n=1):** MOSD0026

San Mateo County (n=2): SMAT0064, SMAT0156

Sonoma County (n=5): SONO0071, SONO0077, SONO0352, SONO0967, SONO2023

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>	<i>Quercus agrifolia</i>	25	18.8	0.1	0.2	0.2				
<b>Shrub</b>	<b><i>Eriodictyon californicum</i></b>	<b>100</b>	<b>76.9</b>	<b>26.6</b>	<b>10.0</b>	<b>60.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Baccharis pilularis</i>	50	6.7	5.7	0.2	25.0				<b>X</b>
	<i>Diplacus aurantiacus</i>	50	1.3	0.4	0.2	2.0				<b>X</b>
	<i>Toxicodendron diversilobum</i>	50	0.3	0.1	0.2	0.2				<b>X</b>
	<i>Lotus scoparius</i>	38	0.9	0.2	0.2	1.0				
	<i>Frangula californica</i>	25	1.2	1.0	3.0	5.0				
	<i>Ceanothus thyrsiflorus</i>	25	0.8	0.7	0.2	5.0				
	<i>Rubus ursinus</i>	25	0.4	0.4	1.0	2.0				
<b>Herb</b>	<i>Avena</i> spp.	63	21.5	4.9	1.0	15.0				<b>X</b>
	<i>Briza maxima</i>	50	11.4	3.4	0.2	15.0				<b>X</b>
	<i>Bromus diandrus</i>	38	3.7	1.2	0.2	7.0				
	<i>Bromus hordeaceus</i>	38	7.5	1.1	2.0	5.0				
	<i>Pteridium aquilinum</i>	25	12.4	0.6	2.0	3.0				
	<i>Croton setigerus</i>	25	1.5	0.3	1.0	1.0				
	<i>Stachys bullata</i>	25	6.4	0.3	1.0	1.0				
	<i>Scrophularia californica</i>	25	2.8	0.2	0.2	1.0				
	<i>Heracleum maximum</i>	25	1.3	0.1	0.2	0.2				
	<i>Iris douglasiana</i>	25	1.0	0.1	0.2	0.2				
	<i>Marah fabaceus</i>	25	1.3	0.1	0.2	0.2				
	<i>Pseudognaphalium</i> spp.	25	1.3	0.1	0.2	0.2				
<b>Non-vasc</b>	Lichen	25	12.5	0.2	0.2	1.0				
	Moss	25	12.5	0.2	0.2	1.0				

## ***Lupinus albifrons* Association**

**Common Name:** Silver Bush Lupine Shrubland

**Alliance:** *Lotus scoparius* – *Lupinus albifrons* – *Eriodictyon* spp. Shrubland Alliance

### **Local Vegetation Description**

The Silver Bush Lupine Association forms an open shrub layer. The emergent tree layer is typically absent, and the herbaceous layer is open. Dominant and characteristic shrubs include *Lupinus albifrons*. The herbaceous layer typically includes *Brachypodium distachyon*, *Avena* spp. and *Nassella pulchra*, and herbs that are often present include *Bromus diandrus*, *Bromus hordeaceus*, *Dichelostemma capitatum*, *Erodium botrys*, *Erodium cicutarium*, *Eschscholzia californica*, *Logfia gallica*, *Melica californica*, *Phacelia imbricata*, *Trifolium hirtum*, and *Trifolium willdenovii*, and herbs that are sometimes present include *Aira caryophyllea*, *Bromus madritensis*, *Centaurea melitensis*, *Clarkia purpurea*, *Dudleya farinosa*, *Epilobium canum*, *Eriogonum nudum*, *Hypochaeris glabra*, *Hypochaeris radicata*, *Lotus humistratus*, *Monardella villosa*, *Silene gallica*, *Streptanthus glandulosus*, *Trifolium microcephalum*, and *Vulpia myuros*. Commonly associated non-vascular plants include Lichen and MossMoss.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	11.3	4 – 26	0.6	0 – 2
Herb	16.3	6 – 31	0.3	0 – 1

### **Local Environmental Description**

**Elevation:** Mean 476 m, Range 233 – 743 m

**Aspect:** SW (5), SE (1)

**Slope:** Mean 35 degrees, Range 28 – 43 degrees

**Macro Topography:** Upper 1/3 of slope (4), Middle 1/3 of slope (1), Middle to Upper 1/3 of slope (1)

**Large Rock:** Mean 5.8%, Range 0.0 – 9.2%

**Small Rock:** Mean 26.9%, Range 0.2 – 71.0%

**Fines Cover:** Mean 42.0%, Range 19.0 – 70.0%

**Litter Cover:** Mean 23.8%, Range 5.0 – 57%

**Soil Texture (field assessed):** Not recorded (2), Fine clay (1), Moderately fine sandy clay loam (1)

**Geology (field or map data):** Franciscan melange (5), Sandstone and other sedimentary (1)

**Marin County Watersheds:** Lagunitas Creek (1), Novato (1)

**Other Watersheds, Sonoma Co.:** Lower Russian River (1), Middle Russian River (1), Russian Gulch (1), Sonoma Creek (1)

### **Site Impacts**

This association has moderate non-native plant cover (average 45.6%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*, *Avena* spp., *Brachypodium distachyon*, *Bromus diandrus*, *Bromus hordeaceus*, *Bromus madritensis*, *Centaurea melitensis*, *Erodium botrys*, *Erodium cicutarium*, *Hypochaeris glabra*, *Hypochaeris radicata*, *Logfia gallica*, *Silene gallica*, *Trifolium hirtum*, and *Vulpia myuros*.

### **Classification Comments**

Since the number of surveys of this association in Marin are low, data from nearby counties were included.



**References:** Buck-Diaz and Evens 2011b, Buck-Diaz et al. 2011, Buck-Diaz et al. 2012, Buck-Diaz et al. 2013, CNPS Vegetation Program 2015, Evens et al. 2006, Keeler-Wolf et al. 2003b, Klein et al. 2015

**Global Rarity Rank:** G3?

**State Rarity Rank:** SNR

**State Rare:** N

**Surveys Used for Description**

**Total: N=6; Marin County (n=2):** MARIN284, MARIN303

Sonoma County (n=4): SONO0409, SONO0525, SONO0933, SONO2189

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Lupinus albifrons</i>	100	94.7	10.8	4.0	26.0	X	X		X
<b>Herb</b>										
	<i>Brachypodium distachyon</i>	100	38.3	7.4	0.2	20.0	X		X	X
	<i>Avena</i> spp.	100	12.1	1.9	0.2	7.0	X			X
	<i>Nassella pulchra</i>	83	4.5	0.6	0.2	1.0	X			X
	<i>Trifolium hirtum</i>	67	2.0	0.4	0.2	2.0				X
	<i>Dichelostemma capitatum</i>	67	1.1	0.1	0.2	0.2				X
	<i>Logfia gallica</i>	67	1.0	0.1	0.2	0.2				X
	<i>Bromus hordeaceus</i>	50	6.5	0.7	0.2	4.0				X
	<i>Bromus diandrus</i>	50	1.9	0.2	0.2	1.0				X
	<i>Erodium botrys</i>	50	1.9	0.2	0.2	1.0				X
	<i>Phacelia imbricata</i>	50	1.9	0.2	0.2	1.0				X
	<i>Erodium cicutarium</i>	50	1.0	0.1	0.2	0.2				X
	<i>Eschscholzia californica</i>	50	0.8	0.1	0.2	0.2				X
	<i>Melica californica</i>	50	0.8	0.1	0.2	0.2				X
	<i>Trifolium willdenovii</i>	50	0.7	0.1	0.2	0.2				X
	<i>Bromus madritensis</i>	33	4.9	0.5	0.2	3.0				
	<i>Eriogonum nudum</i>	33	3.0	0.3	1.0	1.0				
	<i>Epilobium canum</i>	33	0.8	0.2	0.2	1.0				
	<i>Monardella villosa</i>	33	1.6	0.2	0.2	1.0				
	<i>Aira caryophyllea</i>	33	0.4	0.1	0.2	0.2				
	<i>Centaurea melitensis</i>	33	0.4	0.1	0.2	0.2				
	<i>Clarkia purpurea</i>	33	0.4	0.1	0.2	0.2				
	<i>Dudleya farinosa</i>	33	0.4	0.1	0.2	0.2				
	<i>Lotus humistratus</i>	33	0.6	0.1	0.2	0.2				
	<i>Silene gallica</i>	33	0.4	0.1	0.2	0.2				
	<i>Streptanthus glandulosus</i>	33	0.7	0.1	0.2	0.2				
	<i>Trifolium microcephalum</i>	33	0.6	0.1	0.2	0.2				
<b>Non-vasc</b>										
	Lichen	50	38.0	1.0	0.2	4.0				X
	Moss	50	11.3	0.1	0.2	0.4				X

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## ***Lupinus arboreus* Shrubland Alliance**

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**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 central and southern California from Sonoma to Ventura 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). 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* Alliance, 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).

### Local Vegetation Description

The Yellow bush lupine scrub Alliance forms a sparse to continuous shrub layer. The emergent tree layer is typically sparse, and the herbaceous layer is open to continuous. Dominant and characteristic shrubs include *Lupinus arboreus*, and those that are often present include *Baccharis pilularis*. The herbs that are often present include *Achillea millefolium*, *Lolium perenne* and *Rumex acetosella*, and herbs that are sometimes present include *Bromus diandrus*, *Eschscholzia californica*, *Holcus lanatus*, *Plantago lanceolata*, *Pteridium aquilinum*, *Stachys ajugoides* and *Vulpia* spp.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer or Hardwood	0.0	0 – 0	No data	
Regenerating or Shrubby Tree	0.0	0 – 0	No data	
Shrub	35.0	1 – 95	0.5	0– 2
Herb	61.6	15 – 99	0.3	0–2

### Local Membership Rule

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

### Local Environmental Description

**Elevation:** Mean 60 m, Range 5 – 186 m

**Aspect:** NW (3), SW (2), NE (2), Flat (1), SE (1)

**Slope:** Mean 11 degrees, Range 0 – 35 degrees

**Macro Topography:** Middle 1/3 of slope (2), Upper 1/3 of slope (2), Dune/sandfield (2), Bottom (2), Ridge top (1)

**Soil Texture (field assessed):** Medium sand (3), Moderately coarse, sandy loam (2), Coarse, loamy sand (2), Not recorded (1), Medium to very fine, loamy sand (1)

**Geology (field or map data):** Sandstone and other sedimentary (13), Granitic (7), Sandstone, shale, and conglomerate (3), Marine and nonmarine sand deposits (2), Shale (2), Franciscan melange (2), Sand dunes (2), Granitic (generic) (1), Large landslides (1)

**Marin County Watersheds:** Point Reyes (26), Bolinas (3), Inverness (2), Walker Creek (2)

### Site Impacts

This alliance has moderate non-native plant cover (average 39.2%) relative to native cover. Non-native species with highest frequency and abundance include *Bromus diandrus*, *Holcus lanatus*, *Plantago lanceolata* and *Rumex acetosella*.

### Associations in Marin County

*Baccharis pilularis* – *Lupinus arboreus*  
*Lupinus arboreus*

### Classification Comments

None.

**References:** Buck-Diaz et al. 2019, Duebendorfer 1989, Holton and Johnson 1979, Klein et al. 2015, LaBanca 1993

**Global Rarity Rank:** G4

**State Rarity Rank:** S4

**Surveys Used for Description**

**Total: N=36; Marin County (n=36):** HEAD0182, HEAD0307, MARIN286, PGA1055, PGA116, PGA1478, PGA1559, PGA188, PGA197, PGA23, PGA31, PGA335, PGA3378, PGA340, PGA449, PGA452, PGA470, PGA471, PGA492, PGA497, PGA498, PGA505, PGA507, PGA6, PGA6068, PGA6399, PGA6778, PGA6924, PGA7035, PGA89, PORE023, PORE030, PORE055, PORE091, PORE151, PORE173

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Lupinus arboreus</i>	97	69.3	23.0	5.0	95.0	X	X		X
	<i>Baccharis pilularis</i>	58	21.0	9.4	0.2	50.0				X
	<i>Rubus ursinus</i>	28	4.4	1.5	0.2	18.0				
<b>Herb</b>										
	<i>Lolium perenne</i>	61	17.9	12.5	0.2	68.0				X
	<i>Achillea millefolium</i>	53	5.9	4.3	0.2	20.0				X
	<i>Rumex acetosella</i>	50	3.0	1.5	0.2	10.0				X
	<i>Bromus diandrus</i>	44	7.3	6.6	0.2	60.0				
	<i>Pteridium aquilinum</i>	44	2.9	2.0	0.2	15.0				
	<i>Holcus lanatus</i>	36	8.2	5.0	0.2	65.0				
	<i>Vulpia</i> spp.	25	4.1	2.5	0.2	25.0				
	<i>Plantago lanceolata</i>	25	2.0	1.6	0.2	18.0				
	<i>Stachys ajugoides</i>	25	0.4	0.3	0.2	3.0				
	<i>Eschscholzia californica</i>	22	1.5	1.0	0.2	14.0				

***Baccharis pilularis* – *Lupinus arboreus* Association**

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**Common Name:** Coyote Brush – Yellow Bush Lupine Shrubland

**Alliance:** *Lupinus arboreus* Shrubland Alliance

**Local Vegetation Description**

The Coyote Brush – Dune Lupine – Yellow Bush Lupine Association forms an open to continuous shrub layer. The emergent tree layer is typically absent, and the herbaceous layer is open to continuous. Dominant and characteristic shrubs include *Baccharis pilularis* and *Lupinus arboreus*. The herbaceous layer typically includes *Vulpia*, and herbs that are often present include *Pteridium aquilinum*, and herbs that are sometimes present include *Bromus diandrus*, *Cardionema ramosissimum*, *Eriogonum latifolium*, *Holcus lanatus*, and *Rumex acetosella*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	51.3	25 – 80	0.3	0 – 0.5
Herb	55.0	20 – 75	0.3	0 – 0.5

**Local Environmental Description**

**Elevation:** Mean 40 m, Range 8 – 70 m

**Aspect:** Flat (1)

**Slope:** 0 degrees

**Macro Topography:** Dune/sandfield (1)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** no data

**Litter Cover:** 65%

**Soil Texture (field assessed):** Medium sand (1)

**Geology (field or map data):** Sandstone and other sedimentary (4), Sand dunes (1)

**Marin County Watersheds:** Point Reyes (3), Bolinas (2)

**Site Impacts**

This association has moderate non-native plant cover (average 24.4%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Bromus diandrus*, *Holcus lanatus*, and *Rumex acetosella*.

**Classification Comments**

This association was originally placed in the *Baccharis pilularis* Alliance.

**References:** Belsher 1999, Keeler-Wolf et al. 2003a, Parker 1974

**Global Rarity Rank:** G3

**State Rarity Rank:** S3?

**State Rare:** N

**Surveys Used for Description**

**Total: N=5; Marin County (n=5):** PGA188, PGA452, PGA6778, PGA7035, PORE030

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	100	65.3	33.6	18.0	50.0	X	X		X
	<i>Lupinus arboreus</i>	100	21.3	11.2	5.0	19.0	X			X
	<i>Artemisia californica</i>	40	5.9	4.8	8.0	16.0				
	<i>Diplacus aurantiacus</i>	40	3.2	2.6	5.0	8.0				
	<i>Ericameria ericoides</i>	40	3.2	1.0	2.0	3.0				
<b>Herb</b>										
	<i>Vulpia</i> spp.	80	11.2	5.6	0.2	15.0	X			X
	<i>Pteridium aquilinum</i>	60	7.2	3.4	0.2	15.0				X
	<i>Holcus lanatus</i>	40	21.3	12.4	2.0	60.0				
	<i>Bromus diandrus</i>	40	7.1	3.0	3.0	12.0				
	<i>Cardionema ramosissimum</i>	40	5.9	1.6	3.0	5.0				
	<i>Eriogonum latifolium</i>	40	0.8	0.4	0.2	2.0				
	<i>Rumex acetosella</i>	40	1.3	0.2	0.2	1.0				

## *Lupinus arboreus* Association

**Common Name:** Yellow Bush Lupine Shrubland

**Alliance:** *Lupinus arboreus* Shrubland Alliance

### Local Vegetation Description

The Yellow Bush Lupine Association forms an open to continuous shrub layer. The emergent tree layer is typically absent, and the herbaceous layer is open to continuous. Dominant and characteristic shrubs include *Lupinus arboreus*, and those that are often present include *Baccharis pilularis*. The herbaceous layer often includes *Achillea millefolium*, *Lolium perenne*, and *Rumex acetosella*, and herbs that are sometimes present include *Bromus diandrus*, *Eschscholzia californica*, *Holcus lanatus*, *Plantago lanceolata*, *Pteridium aquilinum*, and *Stachys ajugoides*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	33.8	7 – 95	0.7	0 – 2
Herb	62.6	15 – 99	0.3	0 – 2

### Local Environmental Description

**Elevation:** Mean 58 m, Range 5 – 146 m

**Aspect:** NW (3), SW (2), NE (1), SE (1)

**Slope:** Mean 17 degrees, Range 2 – 35 degrees

**Macro Topography:** Middle 1/3 of slope (2), Upper 1/3 of slope (2), Bottom (2), Dune/sandfield (1)

**Large Rock:** Mean 0.3%, Range 0.0 – 2.2%

**Small Rock:** Mean 0.1%, Range 0.0 – 0.4%

**Fines Cover:** Mean 35.5%, Range 1.0 – 70%

**Litter Cover:** Mean 62.3%, Range 27.0 – 100%

**Soil Texture (field assessed):** Medium sand (2), Moderately coarse, sandy loam (2), Medium to very fine, loamy sand (1), Coarse, loamy sand (1)

**Geology (field or map data):** Sandstone and other sedimentary (9), Granitic (7), Sandstone, shale, and conglomerate (3), Marine and nonmarine sand deposits (2), Shale (2), Franciscan melange (1), Granitic (generic) (1), Large landslides (1), Sand dunes (1)

**Marin County Watersheds:** Point Reyes (23), Inverness (2), Bolinas (1), Walker Creek (1)

### Site Impacts

This association has moderate non-native plant cover (average 36.8%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Bromus diandrus*, *Holcus lanatus*, *Lolium perenne*, *Plantago lanceolata*, and *Rumex acetosella*.

### Classification Comments

The previously separate *Lupinus arboreus* / *Bromus diandrus* Association is included here.

**References:** Buck-Diaz et al. 2019, Duebendorfer 1989, Holton and Johnson 1979, Klein et al. 2015, LaBanca 1993

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** N

**Surveys Used for Description**

**Total: N=26; Marin County (n=26):** MARIN286, PGA1055, PGA116, PGA1478, PGA1559, PGA197, PGA23, PGA335, PGA3378, PGA340, PGA449, PGA470, PGA471, PGA492, PGA497, PGA498, PGA505, PGA507, PGA6, PGA6068, PGA6399, PGA6924, PGA89, PORE023, PORE055, PORE151

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Lupinus arboreus</i>	100	79.6	25.7	8.0	95.0	X	X		X
	<i>Baccharis pilularis</i>	50	13.9	5.5	0.2	35.0				X
	<i>Rubus ursinus</i>	30	5.3	1.8	0.2	18.0				
<b>Herb</b>										
	<i>Lolium perenne</i>	67	20.4	14.8	0.2	68.0				X
	<i>Achillea millefolium</i>	57	6.9	5.1	0.2	20.0				X
	<i>Rumex acetosella</i>	50	3.4	1.7	0.2	10.0				X
	<i>Bromus diandrus</i>	47	7.6	7.4	0.2	60.0				
	<i>Pteridium aquilinum</i>	40	2.2	1.7	0.2	15.0				
	<i>Holcus lanatus</i>	33	6.2	3.8	0.2	65.0				
	<i>Plantago lanceolata</i>	27	1.7	1.3	0.2	13.0				
	<i>Eschscholzia californica</i>	23	1.8	1.2	0.2	14.0				
	<i>Stachys ajugoides</i>	23	0.5	0.4	0.2	3.0				



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## ***Lupinus chamissonis* – *Ericameria ericoides* Shrubland Alliance**

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**Common Name:** Silver dune lupine – mock heather scrub

**NVC Alliance Code:** A0822. *Isocoma menziesii* - *Lupinus chamissonis* - *Ericameria ericoides* Shrubland Alliance

### **Statewide Description**

*Ericameria ericoides* and *Lupinus chamissonis* occur together or alone in the shrub canopy with *Artemisia californica*, *Artemisia pycnocephala*, *Ephedra californica*, *Isocoma menziesii*, *Lupinus arboreus*, *Opuntia littoralis*, *Rhus integrifolia*, and *Toxicodendron diversilobum*.

This alliance occurs as isolated patches along the California coastline. It shares species with the *Abronia latifolia* – *Ambrosia chamissonis* Alliance and other coastal bluff scrub alliances. Stands tend to occupy settings on stabilized dunes and near-shore uplifted terraces that are more exposed than other coastal shrubby alliances such as *Lupinus arboreus* or *Baccharis pilularis*.

### **Local Vegetation Description**

The Silver dune lupine – mock heather scrub Alliance forms an open to continuous shrub layer. The emergent tree layer is typically sparse, and the herbaceous layer is open to continuous. Dominant and characteristic shrubs include *Ericameria ericoides* and *Baccharis pilularis*, and those that are often present include *Lupinus chamissonis*. The herbs that are often present include *Bromus diandrus* and *Carpobrotus edulis*, and herbs that are sometimes present include *Abronia latifolia*, *Achillea millefolium*, *Artemisia pycnocephala*, *Bromus maritimus*, *Camissonia cheiranthifolia*, *Cardionema ramosissimum*, *Chorizanthe cuspidata*, *Claytonia perfoliata*, *Daucus pusillus*, *Elymus pacificus*, *Erigeron glaucus*, *Eriogonum latifolium*, *Erysimum concinnum*, *Eschscholzia californica*, Forb (herbaceous, not grass nor grasslike), *Galium aparine*, *Gamochaeta ustulata*, *Marah fabaceus*, *Monardella sinuata* ssp. *nigrescens*,

*Poa douglasii*, *Pteridium aquilinum*, *Pterostegia drymarioides*, *Rumex acetosella*, *Stellaria media*, *Vulpia bromoides*, *Vulpia* spp.. Commonly associated non-vascular plants include *Moss*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	No data	
Hardwood	0.0	0 – 0	No data	
Regenerating or Shrubby Tree	0.0	0 – 0	No data	
Shrub	30.0	7.0 – 70.0	0.3	0 – 1
Herb	48.6	5 – 95	0.3	0 – 0.5

### **Local Membership Rule**

*Ericameria ericoides* and/or *Lupinus chamissonis* dominate as individuals or in combination as co-dominants with *Baccharis pilularis* or *Lupinus arboreus*.

### **Local Environmental Description**

**Elevation:** Mean 29 m, Range 10 – 57 m

**Aspect:** NW (7), SW (4), NE (3), SE (2), Flat (1)

**Slope:** Mean 9 degrees, Range 0 – 20 degrees

**Macro Topography:** Dune/sandfield (2), Upper 1/3 of slope (2), Lower 1/3 of slope (1), Middle to Upper 1/3 of slope (1)

**Large Rock:** Mean 0.0%, Range 0.0 – 0.0%

**Small Rock:** Mean 0.0%, Range 0.0 – 0.0%

**Fines Cover:** Mean 33.3%, Range 5.3 – 87%

**Litter Cover:** Mean 41.0%, Range 12 – 80%

**Soil Texture (field assessed):** Sand, (class unknown) (3), Medium sand (2), Coarse, loamy sand (1)

**Geology (field or map data):** Sandstone and other sedimentary (18), Marine and nonmarine sand deposits (6), Sand dunes (2), Shale (1), Sandstone (1)

**Marin County Watersheds:** Point Reyes (26), Bolinas (1), Walker Creek (1)

### **Site Impacts**

This alliance has moderate non-native plant cover (average 25.2%) relative to native cover. Non-native species with highest frequency and abundance include *Bromus diandrus*, *Carpobrotus edulis*, *Rumex acetosella*, *Stellaria media* and *Vulpia bromoides*.

### **Associations in Marin County**

*Ericameria ericoides*

*Lupinus chamissonis*

*Lupinus chamissonis* – *Ericameria ericoides*

### **Classification Comments**

None.

**References:** Bluestone 1981, Holton and Johnson 1979, Keeler-Wolf et al. 2003a, Klein et al. 2015

**Global Rarity Rank:** G3

**State Rarity Rank:** S3

### **Surveys Used for Description**

**Total: N=30; Marin County (n=30):** MARIN135, MARIN136, MARIN273, PGA166, PGA1736A, PGA221, PGA291, PGA304, PGA306, PGA309, PGA309A, PGA311, PGA353, PGA368, PGA416, PGA484A, PORE015, PORE043, PORE047, SFAND01, SFAND02, SFAND04, SFAND05, SFAND06, SFAND07, SFAND08, SFAND09, SFAND10, SFAND11, SFAND12

## Alliance Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	90	21.9	9.4	1.0	56.3	X			X
	<b><i>Ericameria ericoides</i></b>	<b>80</b>	<b>41.3</b>	<b>18.9</b>	<b>1.0</b>	<b>76.4</b>	X		X	X
	<b><i>Lupinus chamissonis</i></b>	<b>70</b>	<b>27.2</b>	<b>11.5</b>	<b>0.2</b>	<b>56.9</b>				X
	<i>Lupinus arboreus</i>	40	5.0	2.3	0.7	17.4				
<b>Herb</b>										
	<i>Carpobrotus edulis</i>	60	24.7	14.5	0.2	75.0				X
	<i>Bromus diandrus</i>	53	4.3	2.1	0.2	25.0				X
	<i>Poa douglasii</i>	47	5.0	1.6	0.2	10.0				
	<i>Cardionema ramosissimum</i>	43	2.5	1.2	0.2	6.7				
	<i>Camissonia cheiranthifolia</i>	43	1.2	0.5	0.2	10.7				
	<i>Marah fabaceus</i>	37	3.0	1.8	0.2	22.9				
	<i>Pterostegia drymarioides</i>	37	3.1	1.5	0.2	14.9				
	<i>Achillea millefolium</i>	37	1.6	1.1	0.2	17.0				
	<i>Vulpia bromoides</i>	37	2.4	1.0	0.2	13.3				
	<i>Bromus maritimus</i>	37	1.3	0.8	0.2	7.3				
	<i>Eriogonum latifolium</i>	33	4.1	1.5	0.2	15.3				
	<i>Pteridium aquilinum</i>	33	2.4	1.4	0.2	10.0				
	<i>Abronia latifolia</i>	33	1.9	0.6	0.2	12.0				
	<i>Vulpia</i> spp.	30	4.7	2.0	0.2	22.0				
	<i>Claytonia perfoliata</i>	30	1.1	0.6	0.2	7.3				
	<i>Monardella sinuata</i> ssp. <i>nigrescens</i>	30	0.9	0.3	0.2	2.9				
	<i>Chorizanthe cuspidata</i>	27	2.9	1.9	0.2	29.3				
	<i>Stellaria media</i>	27	2.6	1.6	0.2	14.0				
	<i>Erigeron glaucus</i>	27	0.8	0.3	0.2	3.0				
	<i>Eschscholzia californica</i>	23	1.3	1.0	0.2	10.0				
	<i>Rumex acetosella</i>	23	0.4	0.2	0.2	4.0				
	<i>Artemisia pycnocephala</i>	20	4.7	1.6	0.2	17.0				
	<i>Galium aparine</i>	20	0.6	0.5	0.2	5.3				
	<i>Elymus pacificus</i>	20	0.4	0.2	0.2	2.4				
	<i>Daucus pusillus</i>	20	0.3	0.1	0.2	2.0				
	<i>Erysimum concinnum</i>	20	0.1	0.0	0.2	0.4				
	<i>Gamochaeta ustulata</i>	20	0.1	0.0	0.2	0.2				
<b>Non-vascular</b>										
	Moss	27	26.5	0.5	0.7	4.0				

## *Ericameria ericoides* Association

**Common Name:** Heather Goldenbush Shrubland

**Alliance:** *Lupinus chamissonis* – *Ericameria ericoides* Shrubland Alliance

### Local Vegetation Description

The Heather Goldenbush Association forms an open shrub layer. The emergent tree layer is typically absent, and the herbaceous layer is intermittent to continuous. *Ericameria ericoides* is dominant to co-dominant with other characteristic shrubs including *Baccharis pilularis*, and *Lupinus arboreus*, and those that are often present include *Rubus ursinus*. The herbaceous layer typically includes *Bromus diandrus*, *Carpobrotus edulis*, *Pteridium aquilinum*, *Vulpia* spp., and herbs that are often present include *Achillea millefolium*, *Ammophila arenaria*, *Artemisia pycnocephala*, *Bromus carinatus*, *Cardionema ramosissimum*, *Grindelia hirsutula*, *Lolium perenne*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	25.0	20.0 – 30	0.3	0 – 0.5
Herb	65.0	40 – 90	0.3	0 – 0.5

### Local Environmental Description

**Elevation:** Mean 37 m, Range 34 – 40 m

**Aspect:** no data

**Slope:** no data

**Macro Topography:** no data

**Large Rock:** no data

**Small Rock:** no data

**Fines Cover:** no data

**Litter Cover:** no data

**Soil Texture (field assessed):** no data

**Geology (field or map data):** Sandstone and other sedimentary (2)

**Marin County Watersheds:** Point Reyes (2)

### Site Impacts

This association has moderate non-native plant cover (average 24.0%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Ammophila arenaria*, *Bromus diandrus*, *Carpobrotus edulis*, and *Lolium perenne*.

### Classification Comments

None.

**References:** Bluestone 1981

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

### Surveys Used for Description

**Total: N=2; Marin County (n=2):** PGA416, PGA484A

### **Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

<b>Layer</b>	<b>Taxon</b>	<b>Con</b>	<b>Rel</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>	<b>Ch</b>	<b>D</b>	<b>cD</b>	<b>Oft</b>
<b>Shrub</b>										
	<i>Ericameria ericoides</i>	100	38.8	9.5	9.0	10.0	X		X	X
	<i>Baccharis pilularis</i>	100	33.3	8.5	7.0	10.0	X		X	X
	<i>Lupinus arboreus</i>	100	22.9	6.0	4.0	8.0	X			X
	<i>Rubus ursinus</i>	50	5.0	1.5	3.0	3.0				X
<b>Herb</b>										
	<i>Carpobrotus edulis</i>	100	14.6	7.5	5.0	10.0	X			X
	<i>Pteridium aquilinum</i>	100	12.2	7.5	5.0	10.0	X			X
	<i>Bromus diandrus</i>	100	9.9	6.5	3.0	10.0	X			X
	<i>Vulpia</i> spp.	100	9.9	6.5	3.0	10.0	X			X
	<i>Achillea millefolium</i>	50	11.0	8.5	17.0	17.0				X
	<i>Artemisia pycnocephala</i>	50	17.0	7.5	15.0	15.0				X
	<i>Bromus carinatus</i>	50	6.5	5.0	10.0	10.0				X
	<i>Lolium perenne</i>	50	6.5	5.0	10.0	10.0				X
	<i>Ammophila arenaria</i>	50	3.2	2.5	5.0	5.0				X
	<i>Cardionema ramosissimum</i>	50	5.7	2.5	5.0	5.0				X
	<i>Grindelia hirsutula</i>	50	3.4	1.5	3.0	3.0				X

***Lupinus chamissonis* Association**

**Common Name:** Dune Lupine Shrubland

**Alliance:** *Lupinus chamissonis* – *Ericameria ericoides* Shrubland Alliance

**Local Vegetation Description**

The Dune Lupine Association forms an open to intermittent shrub layer. The emergent tree layer is typically absent, and the herbaceous layer is open to intermittent. The dominant and characteristic shrub is *Lupinus chamissonis*, and those that are often present include *Baccharis pilularis* and *Lupinus arboreus*. The herbaceous layer typically includes *Carpobrotus edulis*, and herbs that are often present include *Abronia latifolia*, *Achillea millefolium*, *Bromus diandrus*, *Bromus maritimus*, *Camissonia cheiranthifolia*, *Chorizanthe cuspidata*, *Claytonia perfoliata*, *Elymus pacificus*, *Erigeron glaucus*, *Eriogonum latifolium*, *Eriophyllum stoechadifolium*, *Eschscholzia californica*, *Galium aparine*, *Marah fabaceus*, *Pterostegia drymarioides*, *Stellaria media*, and *Vulpia bromoides*, and herbs that are sometimes present include *Artemisia pycnocephala*, *Brassica nigra*, *Cardionema ramosissimum*, *Daucus pusillus*, *Monardella sinuata* ssp. *Nigrescens* spp..

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	46.7	20 – 65	0.3	0 – 0.5
Herb	33.3	15 – 60	0.3	0 – 0.5

**Local Environmental Description**

**Elevation:** Mean 41 m, Range 21 – 112 m

**Aspect:** NW (2), SW (1)

**Slope:** Mean 9 degrees, Range 2 – 14 degrees

**Macro Topography:** no data

**Large Rock:** no data

**Small Rock:** no data **Fines Cover:** Mean 9.1%, Range 7.3 – 12.0%

**Litter Cover:** no data

**Soil Texture (field assessed):**

**Geology (field or map data):** Marine and nonmarine sand deposits (3), Sandstone and other sedimentary (2), Volcanic and metavolcanic rocks (1)

**Marin County Watersheds:** Point Reyes (4)

**Other Watersheds, San Mateo Co.:** San Francisco Coastal (2)

**Site Impacts**

This association has moderate non-native plant cover (average 20.9%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Brassica nigra*, *Bromus diandrus*, *Carpobrotus edulis*, *Stellaria media*, and *Vulpia bromoides*.

**Classification Comments**

Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** Holton and Johnson 1979

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

**Total: N=6; Marin County (n=4):** PGA311, SFAND01, SFAND05, SFAND06

San Mateo County (n=2): PGA1747, PGA1750

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Lupinus chamissonis</i>	100	69.9	31.3	12.0	60.0	X	X		X
	<i>Baccharis pilularis</i>	50	17.9	12.4	2.8	56.3				X
	<i>Lupinus arboreus</i>	50	7.3	4.2	0.7	17.4				X
	<i>Toxicodendron diversilobum</i>	33	4.9	2.9	6.9	10.4				
<b>Herb</b>										
	<i>Carpobrotus edulis</i>	83	19.0	12.1	0.2	37.0	X			X
	<i>Eschscholzia californica</i>	67	6.5	3.8	2.9	7.3				X
	<i>Achillea millefolium</i>	67	3.7	1.0	0.2	5.0				X
	<i>Marah fabaceus</i>	50	6.0	5.3	3.5	22.9				X
	<i>Stellaria media</i>	50	6.5	4.8	4.0	14.0				X
	<i>Eriogonum latifolium</i>	50	4.9	3.4	0.2	15.3				X
	<i>Pterostegia drymarioides</i>	50	5.1	3.4	1.5	14.9				X
	<i>Eriophyllum stoechadifolium</i>	50	5.3	2.3	0.7	8.0				X
	<i>Bromus maritimus</i>	50	2.8	1.7	1.5	6.7				X
	<i>Bromus diandrus</i>	50	2.7	1.6	0.2	5.3				X
	<i>Chorizanthe cuspidata</i>	50	2.7	1.4	0.2	8.2				X
	<i>Galium aparine</i>	50	1.2	1.1	0.2	5.3				X
	<i>Elymus pacificus</i>	50	1.0	0.8	0.2	2.4				X
	<i>Vulpia bromoides</i>	50	1.0	0.6	0.2	2.0				X
	<i>Abronia latifolia</i>	50	0.8	0.5	0.2	2.0				X
	<i>Claytonia perfoliata</i>	50	0.6	0.5	0.7	1.3				X
	<i>Erigeron glaucus</i>	50	0.4	0.4	0.2	2.1				X
	<i>Camissonia cheiranthifolia</i>	50	0.1	0.1	0.2	0.2				X
	<i>Artemisia pycnocephala</i>	33	5.2	3.2	2.0	17.0				
	<i>Brassica nigra</i>	33	1.2	0.4	0.2	2.0				
	Forb (herbaceous, not grass nor grasslike)	33	0.4	0.3	0.7	0.9				
	<i>Daucus pusillus</i>	33	0.3	0.2	0.2	0.9				
	<i>Monardella sinuata</i> ssp. <i>nigrescens</i>	33	0.3	0.1	0.2	0.7				
	<i>Cardionema ramosissimum</i>	33	0.1	0.1	0.2	0.2				

## *Lupinus chamissonis* – *Ericameria ericoides* Association

**Common Name:** Dune Lupine – Heather Goldenbush Shrubland

**Alliance:** *Lupinus chamissonis* – *Ericameria ericoides* Shrubland Alliance

### Local Vegetation Description

The Dune Lupine – Heather Goldenbush Association forms an open to continuous shrub layer. The emergent tree layer is typically absent, and the herbaceous layer is open to continuous. Dominant and characteristic shrubs include *Ericameria ericoides*, *Baccharis pilularis*, and *Lupinus chamissonis*. The herbaceous layer often includes *Carpobrotus edulis* and *Poa douglasii*, and herbs that are sometimes present include *Abronia latifolia*, *Achillea millefolium*, *Bromus diandrus*, *Bromus maritimus*, *Camissonia cheiranthifolia*, *Cardionema ramosissimum*, *Chorizanthe cuspidata*, *Claytonia perfoliata*, *Erigeron glaucus*, *Eriogonum latifolium*, *Erysimum concinnum*, *Gamochaeta ustulata*, *Marah fabaceus*, *Monardella sinuata* ssp. *nigrescens*, *Pteridium aquilinum*, *Pterostegia drymarioides*, *Rumex acetosella*, *Stellaria media*, *Vulpia* spp., *Vulpia bromoides*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	31.5	7 – 70	0.3	0 – 1
Herb	45.2	5 – 95	0.3	0 – 0.5

### Local Environmental Description

**Elevation:** Mean 29 m, Range 10 – 57 m

**Aspect:** NW (5), NE (3), SW (3), SE (2), Flat (1)

**Slope:** Mean 9 degrees, Range 0 – 20 degrees

**Macro Topography:** Upper 1/3 of slope (2), Dune/sandfield (2), Middle to Upper 1/3 of slope (1), Lower 1/3 of slope (1)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** Mean 39.9%, Range 5.3 – 87.0%

**Litter Cover:** Mean 41.0%, Range 12.0 – 80%

**Soil Texture (field assessed):** Sand, (class unknown) (3), Medium sand (2), Coarse, loamy sand (1)

**Geology (field or map data):** Sandstone and other sedimentary (15), Marine and nonmarine sand deposits (3), Sand dunes (2), Shale (1), Sandstone (1)

**Marin County Watersheds:** Point Reyes (20), Bolinas (1), Walker Creek (1)

### Site Impacts

This association has moderate non-native plant cover (average 25.8%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Bromus diandrus*, *Carpobrotus edulis*, *Rumex acetosella*, *Stellaria media*, and *Vulpia bromoides*.

### Classification Comments

None.

**References:** Holton and Johnson 1979, Keeler-Wolf et al. 2003a, Klein et al. 2015

**Global Rarity Rank:** G2

**State Rarity Rank:** S2.2

**State Rare:** Y



**Surveys Used for Description**

**Total: N=24; Marin County (n=24):** MARIN135, MARIN136, MARIN273, PGA166, PGA1736A, PGA221, PGA291, PGA304, PGA306, PGA309, PGA309A, PGA353, PGA368, PORE015, PORE043, PORE047, SFAND02, SFAND04, SFAND07, SFAND08, SFAND09, SFAND10, SFAND11, SFAND12

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Ericameria ericoides</i>	92	48.4	22.8	1.0	76.4	X		X	X
	<i>Baccharis pilularis</i>	92	20.2	7.9	1.0	27.8	X			X
	<i>Lupinus chamissonis</i>	71	24.8	10.7	0.2	56.9				X
	<i>Lupinus arboreus</i>	29	2.5	1.3	0.7	13.0				
<b>Herb</b>										
	<i>Poa douglasii</i>	54	6.3	2.0	0.2	10.0				X
	<i>Carpobrotus edulis</i>	50	26.6	15.0	0.2	75.0				X
	<i>Bromus diandrus</i>	46	3.9	1.7	0.2	25.0				
	<i>Cardionema ramosissimum</i>	42	2.7	1.3	0.2	6.7				
	<i>Camissonia cheiranthifolia</i>	42	1.5	0.6	0.2	10.7				
	<i>Pteridium aquilinum</i>	33	1.9	1.1	0.2	9.3				
	<i>Vulpia bromoides</i>	33	2.7	1.1	0.2	13.3				
	<i>Pterostegia drymarioides</i>	33	2.7	1.0	0.2	6.7				
	<i>Eriogonum latifolium</i>	33	4.0	1.0	0.2	9.0				
	<i>Marah fabaceus</i>	33	2.3	0.9	0.2	10.0				
	<i>Achillea millefolium</i>	33	1.1	0.6	0.2	10.0				
	<i>Bromus maritimus</i>	33	1.0	0.6	0.2	7.3				
	<i>Vulpia</i> spp.	29	5.0	2.0	0.2	22.0				
	<i>Abronia latifolia</i>	29	2.2	0.7	0.2	12.0				
	Forb (herbaceous, not grass nor grasslike)	29	1.7	0.4	0.2	4.0				
	<i>Monardella sinuata</i> ssp. <i>nigrescens</i>	29	1.1	0.3	0.2	2.9				
	<i>Claytonia perfoliata</i>	25	1.2	0.6	0.2	7.3				
	<i>Rumex acetosella</i>	25	0.4	0.2	0.2	4.0				
	<i>Gamochoeta ustulata</i>	25	0.1	0.1	0.2	0.2				
	<i>Chorizanthe cuspidata</i>	21	3.0	2.0	0.2	29.3				
	<i>Stellaria media</i>	21	1.7	0.8	0.2	10.0				
	<i>Erigeron glaucus</i>	21	0.9	0.3	0.2	3.0				
	<i>Erysimum concinnum</i>	21	0.2	0.1	0.2	0.4				
<b>Non-vasc</b>										
	Moss	29	29.0	0.5	0.7	4.0				

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***Prunus ilicifolia* – *Heteromeles arbutifolia* – *Ceanothus spinosus* Shrubland Alliance**

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**Common Name:** Holly leaf cherry – toyon – greenbark ceanothus chaparral

**NVC Alliance Code:** A3863. *Prunus ilicifolia* - *Heteromeles arbutifolia* - *Ceanothus spinosus* Mesic Chaparral Alliance

**Statewide Description**

*Ceanothus spinosus*, *Heteromeles arbutifolia* and/or *Prunus ilicifolia* is dominant or co-dominant in the shrub canopy with *Artemisia californica*, *Ceanothus megacarpus*, *Cercocarpus montanus*, *Clematis lasiantha*, *Diplacus aurantiacus*, *Eriogonum fasciculatum*, *Fraxinus dipetala*, *Keckiella antirrhinoides*, *Keckiella cordifolia*, *Quercus berberidifolia*, *Rhamnus ilicifolia*, *Rhus ovata* and *Salvia mellifera*. Emergent trees may be present at low cover, including *Juglans californica* or *Quercus agrifolia*.

Both *H. arbutifolia* and *P. ilicifolia* are variable in size and growth habit, being low and dense in exposed places, becoming open and rangy, or tree like in protected areas with long intervals between fires. Stands are heterogeneous in mesic chaparral habitats on north-facing slopes. The differences between this and other chaparral types appears to be mostly related to site history, largely time since last fire, fire frequency, and adjacent alliances. In many cases, stands appear to be small fragments in suburban landscapes where fires are rare but human disturbance is high.

**Local Vegetation Description**

The Holly leaf cherry – toyon – greenbark ceanothus chaparral Alliance forms an intermittent shrub layer in the single sample available. The herbaceous layer is open. Dominant and characteristic shrubs include *Heteromeles arbutifolia* with *Baccharis pilularis*, *Cytisus scoparius*, *Diplacus aurantiacus*, *Lonicera*

*hispidula* and *Toxicodendron diversilobum*. The herbaceous layer typically includes unknown Poaceae, *Anagallis arvensis*, *Chlorogalum pomeridianum*, *Convolvulus arvensis*, *Dichelostemma capitatum* and *Elymus glaucus*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	No data	
Hardwood	0.2	0.2 – 0.2	7.5	5 – 10
Regenerating or Shrubby Tree	0.0	0 – 0	No data	
Shrub	45.0	45.0 – 45.0	1.5	1 – 2
Herb	25.0	25 – 25	0.3	0 – 0.5

### **Local Membership Rule**

*Heteromeles arbutifolia* and/or *Prunus virginiana* dominates or co-dominates in the shrub layer with *Baccharis pilularis*, and/or *Toxicodendron diversilobum*. *Sanicula crassicaulis* and other herbs such as *Clinopodium douglasii* may be present to abundant in the understory.

### **Local Environmental Description**

**Elevation:** 196 m

**Aspect:** SW (1)

**Slope:** 20 degrees

**Macro Topography:** Middle 1/3 of slope (1)

**Large Rock:** 3.0%

**Small Rock:** 1.0%

**Fines Cover:** 40.0%

**Litter Cover:** 53.0%

**Soil Texture (field assessed):** Moderately fine clay loam (1)

**Geology (field or map data):** Franciscan melange (1)

**Marin County Watersheds:** San Rafael (1)

### **Site Impacts**

This alliance has low non-native plant cover (average 2.1%) relative to native cover. Non-native species with highest frequency and abundance include *Anagallis arvensis*, *Convolvulus arvensis* and *Cytisus scoparius*.

### **Associations in Marin County**

None

### **Classification Comments**

The single sample was classified to the alliance level only because we only have one occurrence of this in Marin County with *Heteromeles arbutifolia* co-dominant in the shrub layer, and we need more information to differentiate an Association. Transitional stands of *Prunus virginiana* may occur very infrequently and they are associated with this alliance of northerly mesic slope stands.

**References:** Borchert et al. 2004, Evens and San 2004, Keeler-Wolf et al. 2006, Kittel et al. 2012, Klein et al. 2007, NatureServe 2020, Rodriguez et al. 2017

**Global Rarity Rank:** G5

**State Rarity Rank:** S4

### **Surveys Used for Description**

**Total: N=1; Marin County (n=1):** MOSD0049

### Alliance Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	100	43.3	20.0	20.0	20.0	X		X	X
	<b><i>Heteromeles arbutifolia</i></b>	<b>100</b>	<b>32.5</b>	<b>15.0</b>	<b>15.0</b>	<b>15.0</b>	X		X	X
	<i>Diplacus aurantiacus</i>	100	17.3	8.0	8.0	8.0	X			X
	<i>Toxicodendron diversilobum</i>	100	4.3	2.0	2.0	2.0	X			X
	<i>Cytisus scoparius</i>	100	2.2	1.0	1.0	1.0	X			X
	<i>Lonicera hispidula</i>	100	0.4	0.2	0.2	0.2	X			X
<b>Herb</b>										
	unknown <i>Poaceae</i>	100	91.7	20.0	20.0	20.0	X	X		X
	<i>Elymus glaucus</i>	100	4.6	1.0	1.0	1.0	X			X
	<i>Dichelostemma capitatum</i>	100	0.9	0.2	0.2	0.2	X			X
	<i>Anagallis arvensis</i>	100	0.9	0.2	0.2	0.2	X			X
	<i>Chlorogalum pomeridianum</i>	100	0.9	0.2	0.2	0.2	X			X
	<i>Convolvulus arvensis</i>	100	0.9	0.2	0.2	0.2	X			X



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## ***Quercus durata* Shrubland Alliance**

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**Common Name:** Leather oak chaparral

**NVC Alliance Code:** A3862. *Quercus durata* Ultramafic Chaparral Alliance

### **Statewide Description**

*Quercus durata* is dominant, co-dominant, or characteristic in the shrub canopy with *Adenostoma fasciculatum*, *Arctostaphylos glandulosa*, *Arctostaphylos glauca*, *Arctostaphylos pungens*, *Arctostaphylos viscida*, *Ceanothus jepsonii*, *Cercocarpus montanus*, *Eriodictyon californicum*, *Fremontodendron californicum*, *Garrya congdonii*, *Heteromeles arbutifolia*, *Quercus berberidifolia*, *Quercus wislizeni*, and *Umbellularia californica*. Emergent trees may be present at low cover, including *Hesperocyparis macnabiana*, *Hesperocyparis sargentii*, *Juniperus californica*, *Pinus attenuata*, or *Pinus sabiniana*.

Stands of this alliance have high fidelity to serpentine or other ultramafic substrates (Alexander et al. 2007, Kruckeberg 1984), typically occupying mesic sites, including north-facing slopes. *Quercus durata* includes two varieties: var. *durata* and var. *gabrielensis*. This alliance mainly describes *Quercus durata* var. *durata*, which grows on serpentine substrates in the Coastal Ranges and the foothills of the Sierra Nevada. The southern variety, *Q. durata* var. *gabrielensis*, occupies barren gneiss-derived soils in the San Gabriel Mountains.

### **Local Vegetation Description**

The Leather oak chaparral Alliance forms an intermittent to continuous shrub layer. The emergent tree layer is typically sparse, and the herbaceous layer is open. Dominant and characteristic shrubs include *Quercus durata*, *Adenostoma fasciculatum*, *Eriodictyon californicum*, *Heteromeles arbutifolia* and *Toxicodendron diversilobum*, and those that are often present include *Arctostaphylos glandulosa* and *Arctostaphylos montana*. Regenerating or shrubby trees that are often present include *Umbellularia*

*californica*. Commonly associated emergent trees at sparse cover include *Umbellularia californica*. Herbs that are often present include *Calamagrostis ophitidis*, *Chlorogalum pomeridianum*, *Iris douglasiana*, and herbs that are sometimes present include *Aira caryophyllea*, *Aspidotis densa*, *Epilobium minutum*, *Festuca californica*, *Galium porrigens*, *Galium* spp., *Gastridium phleoides*, *Iris* spp., *Lotus humistratus*, *Melica torreyana*, *Nassella pulchra*, *Navarretia* spp., *Pentagramma triangularis*, *Sanicula tuberosa*, *Sisyrinchium bellum* and *Vulpia microstachys*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.1	0 – 0.2	7.5	5 – 10
Hardwood	0.5	0.2 – 1	5.1	0 – 10
Regenerating or Shrubby Tree	6.4	0 – 30.2	No data	
Shrub	66.7	35.0 – 95.0	1.5	1 – 2
Herb	5.8	2 – 10	0.3	0 – 0.5

### **Local Membership Rule**

*Quercus durata* dominates or co-dominates with *Adenostoma fasciculatum*, *Arctostaphylos glandulosa* or *Ceanothus jepsonii* on ultramafic soils. Occasionally, *Ceanothus jepsonii* exceeds *Q. durata* in cover when present. *Heteromeles arbutifolia* and/or *Umbellularia californica* are often present in stands.

### **Local Environmental Description**

**Elevation:** Mean 380 m, Range 183 – 772 m

**Aspect:** SE (3), NE (2), SW (2), NW (1)

**Slope:** Mean 22 degrees, Range 14 – 30 degrees

**Macro Topography:** Middle 1/3 of slope (4), Upper 1/3 of slope (3), Ridge top (1)

**Large Rock:** Mean 8.3%, Range 0.0 – 20.2%

**Small Rock:** Mean 53.4%, Range 7.0 – 99%

**Fines Cover:** Mean 32.0%, Range 20 – 49%

**Litter Cover:** Mean 51.0%, Range 5.0 – 99%

**Soil Texture (field assessed):** Coarse, loamy sand (3), Medium to very fine, loamy sand (2), Medium to very fine, sandy loam (2), Moderately fine sandy clay loam (1)

**Geology (field or map data):** Serpentine (6), Franciscan melange (1)

**Marin County Watersheds:** Lagunitas Creek (4), Bolinas (1), San Rafael (1)

### **Site Impacts**

This alliance has very low non-native plant cover (average 0.5%) relative to native cover. Non-native species with highest frequency and abundance include *Aira caryophyllea* and *Gastridium phleoides*.

### **Associations in Marin County**

*Quercus durata* – *Adenostoma fasciculatum*

*Quercus durata* – *Arctostaphylos glandulosa*

### **Classification Comments**

None.

**References:** Buck and Evens 2010, Evens and Kentner 2006, Keeler-Wolf et al. 2003a, Klein et al. 2015

**Global Rarity Rank:** G4

**State Rarity Rank:** S4

### **Surveys Used for Description**

**Total: N=8; Marin County (n=8):** GGNRA254, GGNRA256, GGNRA258, MARIN117, MMWD0050, MMWD0063, MMWD0469, MOSD0047

## Alliance Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Umbellularia californica</i>	25	25.0	0.1	0.2	0.2				
<b>Regenerating or Shrubby Trees</b>										
	<i>Umbellularia californica</i> *	63	52.1	5.2	0.2	30.0				X
	<i>Pseudotsuga menziesii</i>	38	3.3	0.1	0.2	0.4				
<b>Shrub</b>										
	<i>Adenostoma fasciculatum</i>	100	22.3	11.1	0.2	30.0	X			X
	<b><i>Quercus durata</i></b>	<b>88</b>	<b>33.0</b>	<b>29.6</b>	<b>10.0</b>	<b>85.0</b>	X		X	X
	<i>Heteromeles arbutifolia</i>	88	4.6	3.7	0.2	25.2	X			X
	<i>Eriodictyon californicum</i>	75	1.7	1.0	0.2	4.0	X			X
	<i>Toxicodendron diversilobum</i>	75	0.9	0.5	0.2	2.0	X			X
	<i>Arctostaphylos glandulosa</i>	63	19.7	19.5	1.0	70.2				X
	<i>Arctostaphylos montana</i>	50	3.9	1.8	1.0	10.0				X
	<i>Ceanothus jepsonii</i>	38	2.9	1.7	0.2	7.0				
	<i>Frangula californica</i>	38	0.8	0.8	1.0	3.0				
	<i>Lonicera hispidula</i>	38	0.2	0.1	0.2	0.2				
	<i>Pickeringia montana</i>	25	4.2	1.3	0.2	10.0				
	<i>Garrya elliptica</i>	25	0.3	0.2	0.2	1.0				
	<i>Baccharis pilularis</i>	25	0.0	0.1	0.2	0.2				
<b>Herb</b>										
	<i>Chlorogalum pomeridianum</i>	63	4.5	0.4	0.2	2.0				X
	<i>Calamagrostis ophitidis</i>	50	14.6	1.3	0.2	7.0				X
	<i>Iris douglasiana</i>	50	14.4	0.4	0.2	2.0				X
	<i>Festuca californica</i>	25	5.8	0.5	0.2	4.0				
	<i>Vulpia microstachys</i>	25	7.4	0.5	1.0	3.0				
	<i>Nassella pulchra</i>	25	1.8	0.2	0.2	1.0				
	<i>Galium porrigens</i>	25	1.7	0.2	0.2	1.0				
	<i>Gastridium phleoides</i>	25	2.3	0.2	0.2	1.0				
	<i>Iris</i> spp.	25	0.6	0.1	0.2	0.2				
	<i>Galium</i> spp.	25	1.1	0.1	0.2	0.2				
	<i>Sisyrinchium bellum</i>	25	0.6	0.1	0.2	0.2				
	<i>Sanicula tuberosa</i>	25	1.1	0.1	0.2	0.2				
	<i>Pentagramma triangularis</i>	25	1.1	0.1	0.2	0.2				
	<i>Navarretia</i> spp.	25	0.5	0.1	0.2	0.2				
	<i>Aira caryophyllea</i>	25	0.7	0.1	0.2	0.2				
	<i>Lotus humistratus</i>	25	0.6	0.1	0.2	0.2				
	<i>Aspidotis densa</i>	25	0.6	0.1	0.2	0.2				
	<i>Epilobium minutum</i>	25	0.6	0.1	0.2	0.2				
	<i>Melica torreyana</i>	25	0.6	0.1	0.2	0.2				

***Quercus durata* – *Adenostoma fasciculatum* Provisional Association**

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**Common Name:** Leather Oak – Chamise Shrubland

**Alliance:** *Quercus durata* Shrubland Alliance

**Local Vegetation Description**

The Leather Oak – Chamise Association forms an open to continuous shrub layer. The emergent tree layer is typically sparse to open, and the herbaceous layer is open to intermittent. Dominant and characteristic shrubs include *Adenostoma fasciculatum*, *Quercus durata*, and *Heteromeles arbutifolia*, and those that are often present include *Toxicodendron diversilobum*. Commonly associated emergent trees at sparse cover include *Pseudotsuga menziesii* and *Umbellularia californica*. The herbaceous layer often includes *Achillea millefolium* and *Chlorogalum pomeridianum*, and herbs that are sometimes present include *Agrostis* spp., *Calamagrostis ophitidis*, *Calystegia collina*, *Galium* spp., *Galium porrigens*, *Gastrium phleoides*, *Lomatium dasycarpum*, *Melica torreyana*, *Monardella villosa*, *Nassella lepida*, *Nassella pulchra*, and *Plantago erecta*. Commonly associated non-vascular plants include MossMoss.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.2	0 – 1	9.2	5 – 15
Hardwood	1.0	0 – 4	6.5	0 – 10
Regenerating or Shrubby Tree	0.2	0 – 1.2	3.0	1 – 5
Shrub	49.8	29 – 75	1.8	0.5 – 5
Herb	10.2	3 – 35	0.3	0 – 0.5

**Local Environmental Description**

**Elevation:** Mean 300 m, Range 130 – 548 m

**Aspect:** SE (5), SW (4), NE (2), NW (2)

**Slope:** Mean 15 degrees, Range 3 – 35 degrees

**Macro Topography:** Upper 1/3 of slope (4), Middle 1/3 of slope (4), Ridge top (2), Middle to Upper 1/3 of slope (2)

**Large Rock:** Mean 5.6%, Range 0.2 – 15.0%

**Small Rock:** Mean 26.9%, Range 7.0 – 55.0%

**Fines Cover:** Mean 32.8%, Range 7.0 – 55.0%

**Litter Cover:** Mean 26.3%, Range 3.7 – 60%

**Soil Texture (field assessed):** Medium to very fine, sandy loam (3), Moderately fine clay loam (2), Medium to very fine, loamy sand (2), Moderately coarse, sandy loam (1), Moderately fine sandy clay loam (1), Medium loam (1)

**Geology (field or map data):** Serpentine (9), Franciscan melange (2), Ultramafic (type unknown) (1), Ultramafic rocks, mostly serpentine (1)

**Marin County Watersheds:** Lagunitas Creek (3), San Rafael (1)

**Other Watersheds, San Mateo Co.:** San Mateo Bayside (2), Palo Alto (1); **Sonoma Co.:** Lower Russian River (2), Middle Russian River (2), Sonoma Creek (2)

**Site Impacts**

This association has very low non-native plant cover (average 0.9%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Gastrium phleoides*.



**Classification Comments**

This association is considered provisional since it is under-sampled in its expected range. Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** Buck and Evens 2010, Klein et al. 2015

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

**Total: N=13; Marin County (n=4):** MARIN117, MMWD0063, MMWD0469, MOSD0047

San Mateo County (n=3): SCLAR146, SMAT0020, SMAT0091

Sonoma County (n=6): MILO008, MILOB021, SONO0111, SONO0586, SONO0837, VASE0070

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Umbellularia californica</i>	46	41.6	0.6	0.2	3.8				
	<i>Pseudotsuga menziesii</i>	23	5.8	0.1	0.2	1.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Umbellularia californica</i> *	31	21.8	0.1	0.2	1.0				
	<i>Pseudotsuga menziesii</i> *	23	9.0	0.0	0.2	0.2				
<b>Shrub</b>										
	<b><i>Adenostoma fasciculatum</i></b>	<b>100</b>	<b>40.4</b>	<b>24.4</b>	<b>6.0</b>	<b>49.1</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<i>Heteromeles arbutifolia</i>	100	4.3	3.1	0.2	13.8	<b>X</b>			<b>X</b>
	<b><i>Quercus durata</i></b>	<b>92</b>	<b>34.0</b>	<b>20.7</b>	<b>8.0</b>	<b>45.0</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<i>Toxicodendron diversilobum</i>	69	2.1	1.1	0.2	5.0				<b>X</b>
	<i>Frangula californica</i>	46	2.0	1.2	0.2	10.0				
	<i>Eriodictyon californicum</i>	31	1.0	0.6	0.2	4.0				
	<i>Diplacus aurantiacus</i>	31	0.5	0.2	0.2	1.0				
	<i>Lonicera hispidula</i>	31	0.6	0.2	0.2	2.0				
	<i>Ceanothus jepsonii</i>	23	1.9	1.1	1.0	7.0				
	<i>Ceanothus cuneatus</i>	23	1.5	1.0	0.2	10.0				
	<i>Pickeringia montana</i>	23	2.6	0.8	0.2	10.0				
	<i>Arctostaphylos montana</i>	23	0.7	0.3	1.0	2.0				
	<i>Rhamnus crocea</i>	23	0.8	0.3	0.2	3.0				
	<i>Baccharis pilularis</i>	23	0.4	0.2	0.2	1.0				
<b>Herb</b>										
	<i>Chlorogalum pomeridianum</i>	69	8.8	0.8	0.2	3.2				<b>X</b>
	<i>Achillea millefolium</i>	54	3.5	0.6	0.2	4.0				<b>X</b>
	<i>Agrostis</i> spp.	31	8.9	2.2	0.2	17.0				
	<i>Calamagrostis ophitidis</i>	31	9.1	0.8	0.2	7.0				
	<i>Galium</i> spp.	31	1.0	0.1	0.1	0.2				
	<i>Calystegia collina</i>	23	1.2	0.6	0.2	6.0				
	<i>Plantago erecta</i>	23	1.0	0.3	0.2	3.0				
	<i>Nassella lepida</i>	23	2.9	0.3	0.2	3.0				

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<i>Melica torreyana</i>	23	2.0	0.2	0.1	2.4				
	<i>Monardella villosa</i>	23	1.9	0.2	0.6	1.0				
	<i>Lomatium dasycarpum</i>	23	2.0	0.2	0.2	2.0				
	<i>Nassella pulchra</i>	23	1.2	0.2	0.2	1.0				
	<i>Gastroidium phleoides</i>	23	1.7	0.1	0.2	1.0				
	<i>Galium porrigens</i>	23	1.0	0.1	0.2	0.7				
<b>Non-vasc</b>										
	Moss	54	37.2	0.6	0.2	5.0				X
	Lichen	38	16.7	0.1	0.2	1.0				

***Quercus durata* – *Arctostaphylos glandulosa* Association**

**Common Name:** Leather Oak – Eastwood Manzanita Shrubland

**Alliance:** *Quercus durata* Shrubland Alliance

**Local Vegetation Description**

The Leather Oak – Eastwood Manzanita Association forms an intermittent to continuous shrub layer. The emergent tree layer is typically sparse, and the herbaceous layer is open. Dominant and characteristic shrubs include *Arctostaphylos glandulosa*, *Quercus durata*, *Adenostoma fasciculatum*, *Eriodictyon californicum*, *Heteromeles arbutifolia*, and *Toxicodendron diversilobum*, and those that are often present include *Baccharis pilularis* and *Frangula californica*. Regenerating or shrubby trees that are dominant and characteristic include *Umbellularia californica*, and those that are often present include *Pseudotsuga menziesii*. The herbaceous layer often present include *Iris douglasiana*, and herbs that are sometimes present include *Agrostis* spp., *Aspidotis densa*, *Avena* spp., *Bromus* spp., *Bromus hordeaceus*, *Calamagrostis ophitidis*, *Chlorogalum pomeridianum*, *Clarkia purpurea*, *Cynosurus echinatus*, *Epilobium minutum*, *Festuca californica*, *Galium aparine*, *Galium californicum*, *Galium porrigens*, *Iris* spp., *Lotus humistratus*, *Melica torreyana*, *Polygala californica*, *Pteridium aquilinum*, *Sisyrinchium bellum*, *Vulpia bromoides*, and *Vulpia myuros*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	12.7	0.2 – 30.2	no data	
Shrub	81	44 – 95	no data	
Herb	5.2	1.4 – 9.0	no data	

**Local Environmental Description**

**Elevation:** Mean 492 m, Range 183 – 772 m

**Aspect:** SW (2), SE (2)

**Slope:** Mean 24 degrees, Range 16 – 30 degrees

**Macro Topography:** Middle 1/3 of slope (2), Upper 1/3 of slope (2)

**Large Rock:** Mean 5.3%, Range 0.0 – 20.2%

**Fines Cover:** 30.0%

**Small Rock:** Mean 75.5%, Range 7.0 – 99%

**Litter Cover:** Mean 78.8%, Range 40 – 99%

**Soil Texture (field assessed):** Coarse, loamy sand (3), Moderately fine sandy clay loam (1)

**Geology (field or map data):** Serpentine (3)

**Marin County Watersheds:** Bolinas (1), Lagunitas Creek (1)

**Site Impacts**

This association has very low non-native plant cover (average 0.2%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Avena* spp., *Bromus hordeaceus*, *Cynosurus echinatus*, *Vulpia bromoides*, and *Vulpia myuros*.

**Classification Comments**

None.

**References:** Evens and Kentner 2006, Keeler-Wolf et al. 2003a

**Global Rarity Rank:** G3

**State Rarity Rank:** S3

**State Rare:** Y

**Surveys Used for Description**

**Total: N=4; Marin County (n=4):** GGNRA254, GGNRA256, GGNRA258, MMWD0050

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Regenerating or Shrubby Trees</b>										
	<i>Umbellularia californica</i>	100	79.2	10.4	0.2	30.0	X	X		X
	<i>Pseudotsuga menziesii</i>	75	6.7	0.2	0.2	0.4	X			X
	<i>Quercus chrysolepis</i>	25	9.7	1.8	7.2	7.2				
	<i>Chrysolepis chrysophylla</i> var. <i>minor</i>	25	1.3	0.3	1.0	1.0				
	<i>Arbutus menziesii</i>	25	3.1	0.1	0.2	0.2				
<b>Shrub</b>										
	<b><i>Quercus durata</i></b>	<b>100</b>	<b>44.0</b>	<b>48.3</b>	<b>10.0</b>	<b>85.0</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<b><i>Arctostaphylos glandulosa</i></b>	<b>100</b>	<b>38.9</b>	<b>38.8</b>	<b>20.0</b>	<b>70.2</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<i>Adenostoma fasciculatum</i>	100	0.7	0.7	0.2	1.0	X			X
	<i>Heteromeles arbutifolia</i>	75	7.0	6.6	0.2	25.2	X			X
	<i>Toxicodendron diversilobum</i>	75	1.4	0.8	0.2	2.0	X			X
	<i>Eriodictyon californicum</i>	75	0.2	0.2	0.2	0.2	X			X
	<i>Frangula californica</i>	50	1.0	1.3	2.0	3.0				X
	<i>Baccharis pilularis</i>	50	0.1	0.1	0.2	0.2				X
	<i>Arctostaphylos montana</i>	25	5.7	2.5	10.0	10.0				
	<i>Arctostaphylos virgata</i>	25	0.3	0.3	1.0	1.0				
	<i>Ceanothus cuneatus</i>	25	0.3	0.3	1.0	1.0				
	<i>Ceanothus foliosus</i>	25	0.2	0.3	1.0	1.0				
	<i>Ceanothus jepsonii</i>	25	0.1	0.1	0.2	0.2				
	<i>Garrya elliptica</i>	25	0.1	0.1	0.2	0.2				
	<i>Lonicera hispidula</i>	25	0.1	0.1	0.2	0.2				
	unknown Asteraceae	25	0.1	0.1	0.2	0.2				
<b>Herb</b>										
	<i>Iris douglasiana</i>	50	27.5	0.8	1.0	2.0				X
	<i>Festuca californica</i>	25	11.1	1.0	4.0	4.0				
	<i>Chlorogalum pomeridianum</i>	25	5.6	0.5	2.0	2.0				
	<i>Pteridium aquilinum</i>	25	9.6	0.5	2.0	2.0				
	<i>Galium porrigens</i>	25	2.8	0.3	1.0	1.0				
	<i>Aspidotis densa</i>	25	0.6	0.1	0.2	0.2				
	<i>Bromus hordeaceus</i>	25	1.0	0.1	0.2	0.2				
	<i>Calamagrostis ophitidis</i>	25	0.6	0.1	0.2	0.2				
	<i>Clarkia purpurea</i>	25	0.6	0.1	0.2	0.2				
	<i>Cynosurus echinatus</i>	25	1.0	0.1	0.2	0.2				
	<i>Epilobium minutum</i>	25	0.6	0.1	0.2	0.2				
	<i>Galium aparine</i>	25	0.6	0.1	0.2	0.2				
	<i>Galium californicum</i>	25	3.6	0.1	0.2	0.2				
	<i>Iris</i> spp.	25	0.6	0.1	0.2	0.2				

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<i>Lotus humistratus</i>	25	0.6	0.1	0.2	0.2				
	<i>Melica torreyana</i>	25	0.6	0.1	0.2	0.2				
	<i>Polygala californica</i>	25	0.6	0.1	0.2	0.2				
	<i>Sisyrinchium bellum</i>	25	0.6	0.1	0.2	0.2				
	<i>Vulpia bromoides</i>	25	3.6	0.1	0.2	0.2				
	<i>Vulpia myuros</i>	25	1.0	0.1	0.2	0.2				

***Quercus durata* – *Ceanothus jepsonii* Association**

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**Common Name:** Leather Oak – Musk Brush Shrubland

**Alliance:** *Quercus durata* Shrubland Alliance

**Local Vegetation Description**

The Leather Oak – Musk Brush Association forms an open shrub layer. The emergent tree layer is typically absent, and the herbaceous layer is open. Dominant and characteristic shrubs include *Ceanothus jepsonii* and *Eriodictyon californicum*, and those that are often present include *Adenostoma fasciculatum*, *Arctostaphylos glandulosa*, *Arctostaphylos montana*, and *Quercus durata*. *Chlorogalum pomeridianum* is characteristic in the herbaceous layer. Other herbs often present include *Calamagrostis ophitidis*, *Calystegia collina*, *Chlorogalum pomeridianum*, *Clarkia purpurea*, *Elymus glaucus*, *Epilobium minutum*, *Erigeron reductus*, *Galium porrigens*, *Iris spp.*, *Lotus humistratus*, *Madia exigua*, *Madia madioides*, *Melica torreyana*, *Monardella purpurea*, *Nassella pulchra*, *Plantago erecta*, *Sisyrinchium bellum*, and *Vulpia microstachys*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	14.5	4 – 25	0.3	0 – 0.5
Herb	5.5	1 – 10	0.3	0 – 0.5

**Local Environmental Description**

**Elevation:** Mean 256 m, Range 228 – 283 m

**Aspect:** SW (2)

**Slope:** Mean 19 degrees, Range 17 – 20 degrees

**Macro Topography:** Upper 1/3 of slope (2)

**Large Rock:** Mean 9.5%, Range 3 – 16.2%

**Fines Cover:** Mean 21.0%, Range 10 – 32%

**Small Rock:** Mean 66.0%, Range 46 – 86%

**Litter Cover:** Mean 1.6%, Range 0.2 – 3%

**Soil Texture (field assessed):** Fine sandy clay (1), Moderately coarse, sandy loam (1)

**Geology (field or map data):** Franciscan mélange (1), Serpentine (1)

**Marin County Watersheds:** Lagunitas Creek (1), San Rafael (1)

**Site Impacts**

This association has very low non-native plant cover (average 0.0%) relative to native cover. No non-native species were recorded by the surveyors.

**Classification Comments**

None.

**References:** Klein et al. 2015

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

**Total: N=2; Marin County (n=2):** MMWD0051, MOSD0048

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<b><i>Ceanothus jepsonii</i></b>	<b>100</b>	<b>87.3</b>	<b>12.0</b>	<b>4.0</b>	<b>20.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Eriodictyon californicum</i>	100	4.4	0.6	0.2	1.0	X			X
	<b><i>Quercus durata</i></b>	<b>50</b>	<b>4.0</b>	<b>1.0</b>	<b>2.0</b>	<b>2.0</b>				<b>X</b>
	<i>Arctostaphylos glandulosa</i>	50	2.0	0.5	1.0	1.0				X
	<i>Arctostaphylos montana</i>	50	2.0	0.5	1.0	1.0				X
	<i>Adenostoma fasciculatum</i>	50	0.4	0.1	0.2	0.2				X
<b>Herb</b>										
	<i>Chlorogalum pomeridianum</i>	100	13.3	0.6	0.2	1.0	X			X
	<i>Melica torreyana</i>	50	10.0	1.0	2.0	2.0				X
	<i>Calystegia collina</i>	50	5.0	0.5	1.0	1.0				X
	<i>Elymus glaucus</i>	50	41.7	0.5	1.0	1.0				X
	<i>Erigeron reductus</i>	50	5.0	0.5	1.0	1.0				X
	<i>Galium porrigens</i>	50	5.0	0.5	1.0	1.0				X
	<i>Monardella purpurea</i>	50	5.0	0.5	1.0	1.0				X
	<i>Nassella pulchra</i>	50	5.0	0.5	1.0	1.0				X
	<i>Calamagrostis ophitidis</i>	50	1.0	0.1	0.2	0.2				X
	<i>Clarkia purpurea</i>	50	1.0	0.1	0.2	0.2				X
	<i>Epilobium minutum</i>	50	1.0	0.1	0.2	0.2				X
	<i>Iris</i> spp.	50	1.0	0.1	0.2	0.2				X
	<i>Lotus humistratus</i>	50	1.0	0.1	0.2	0.2				X
	<i>Madia exigua</i>	50	1.0	0.1	0.2	0.2				X
	<i>Madia madioides</i>	50	1.0	0.1	0.2	0.2				X
	<i>Plantago erecta</i>	50	1.0	0.1	0.2	0.2				X
	<i>Sisyrinchium bellum</i>	50	1.0	0.1	0.2	0.2				X
	<i>Vulpia microstachys</i>	50	1.0	0.1	0.2	0.2				X

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## ***Quercus wislizeni* – *Quercus chrysolepis* (shrub) Shrubland Alliance**

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**Common Name:** Canyon live oak - Interior live oak chaparral

**NVC Alliance Code:** A3860. *Quercus wislizeni* var. *frutescens* - *Arctostaphylos glandulosa* Pre-montane Chaparral Alliance

### **Statewide Description**

*Quercus chrysolepis*, *Quercus parvula* and/or *Quercus wislizeni* is dominant or co-dominant together or with other *Quercus* spp. in the shrub canopy with *Adenostoma fasciculatum*, *Adenostoma sparsifolium*, *Arctostaphylos glandulosa*, *Arctostaphylos glauca*, *Carpenteria californica*, *Ceanothus cuneatus*, *Ceanothus integerrimus*, *Ceanothus leucodermis*, *Ceanothus oliganthus*, *Cercocarpus montanus*, *Frangula californica*, *Fraxinus dipetala*, *Hesperoyucca whipplei*, *Heteromeles arbutifolia*, *Prunus ilicifolia*, *Quercus agrifolia*, *Quercus berberidifolia*, *Rhamnus ilicifolia* and/or *Toxicodendron diversilobum*. Emergent trees may be present at low cover, including *Aesculus californica*, *Juniperus californica*, *Pinus attenuata*, *Pinus coulteri*, *Pinus sabiniana* or *Umbellularia californica*.

*Quercus wislizeni* is a widespread and common species in shrublands, forests, and woodlands of the state. Shrubby stands, either because they represent the possible distinct var. *frutescens* or because of age-related limited height growth, are included in this alliance. White and Sawyer (1995) consider that many southern California shrublands are the result of frequent sprouting after fires. However, plants previously identified as *Quercus wislizeni* in the coastal regions from parts of Mendocino County south to Santa Barbara County, are now considered a variety of *Quercus parvula* or a related hybrid (Hauser et al. 2017, Al Keuter, pers. comm. 2020). *Quercus chrysolepis* is also a widespread and common species in chaparral, forests, and woodlands throughout the state. It is a slow-growing, evergreen shrub or tree.



The shrubby nature of this alliance in the landscape arises because of various limiting factors, such as repeat fires, nutrient poor soils, rocky slopes and ridgetops with poor soil development, wind shearing, etc. These stands are shorter than their tree-alliance counterpart, and other shrubs are often present and contribute overall to the shrubby character of the stands.

### Local Vegetation Description

The Canyon live oak - Interior live oak chaparral Alliance forms an open to continuous shrub layer. The emergent tree layer is typically sparse to intermittent, and the herbaceous layer is sparse to open. *Quercus agrifolia*, *Quercus wislizeni*, *Q. parvula*, or other *Quercus* sp. is a shrubby tree that is (co-) dominant and characteristic. Other characteristic shrubs include *Arctostaphylos glandulosa* and *Toxicodendron diversilobum*. Commonly associated emergent trees at open cover include *Arbutus menziesii*, *Pseudotsuga menziesii* and *Quercus wislizeni*. The herbs that are sometimes present include *Carex globosa*, *Galium porrigens*, *Iris douglasiana*, *Marah fabaceus*, *Pentagramma triangularis*, *Polygala californica*, *Polystichum munitum*, *Pteridium aquilinum*, *Stachys ajugoides* and *Zigadenus fremontii*. Commonly associated non-vascular plants include Moss.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	1.4	0 – 11	9.4	2 – 20
Hardwood	8.4	0 – 40	5.8	2 – 10
Regenerating or Shrubby Tree	35.2	0 – 75.0	2.5	1 – 5
Shrub	28.2	2.0 – 98.0	2.4	0.5– 5
Herb	5.4	0 – 25	0.3	0 –0.5

### Local Membership Rule

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

### Local Environmental Description

**Elevation:** Mean 374 m, Range 124 – 743 m

**Aspect:** SE (6), NE (4), NW (4), SW (3),  
Variable (2)

**Slope:** Mean 21 degrees, Range 0–45 degrees

**Macro Topography:** Middle 1/3 of slope (10),  
Upper 1/3 of slope (4), Ridge top (3), Bottom  
(1), Middle to Upper 1/3 of slope (1)

**Large Rock:** Mean 0.8%, Range 0 – 5%

**Small Rock:** Mean 4.3%, Range 0 – 27%

**Fines Cover:** Mean 9.4%, Range 0.2 – 28%

**Litter Cover:** Mean 73.1%, Range 5.6 – 95%

**Soil Texture (field assessed):** Moderately fine clay loam (5), Moderately fine sandy clay loam (3), Moderately coarse, sandy loam (3), Not recorded (2), Loam, (class unknown) (1), Moderately fine silty clay loam (1), Medium to very fine, sandy loam (1), Medium to very fine, loamy sand (1), Medium loam (1), Medium silt (1)

**Geology (field or map data):** Franciscan melange (14), Chert (4), Sandstone and other sedimentary (3), Serpentine (1), Volcanic and metavolcanic rocks (1)

**Marin County Watersheds:** Bolinas (10), Lagunitas Creek (7), San Rafael (6)

### Site Impacts

This alliance has very low non-native plant cover (average 0.8%) relative to native cover. Non-native species with highest frequency and abundance include *Aira caryophyllea*, *Briza maxima*, and *Genista monspessulana*.

**Associations in Marin County**

*Quercus (parvula, wislizeni) – Arctostaphylos glandulosa*  
*Quercus agrifolia – Quercus chrysolepis – Quercus parvula (shrub)*  
*Quercus parvula (shrub)*

**Classification Comments**

Due to hybridization and morphological similarity between the species, plants identified as *Quercus wislizeni* may be *Quercus parvula*, which has been found to be the most widespread genotype in Marin County (Dodd and Afzul-Rafii 2004, Hauser et al. 2017).

**References:** AECOM 2013, Borchert et al. 2004, Evens and Kentner 2006, Klein et al. 2015

**Global Rarity Rank:** G4

**State Rarity Rank:** S3S4

**Surveys Used for Description**

**Total: N=23; Marin County (n=23):** MARIN200, MARIN201, MARIN300, MMWD0111, MMWD0163, MMWD0212, MMWD0235, MMWD0263, MMWD0266, MMWD0268A, MMWD0304, MMWD0306, MMWD0315, MMWD0317, MMWD0404, MOSD0028, MOSD0084, MOSD0129, PGA1528, PGA564, PGA654, PGA7738, VASE0045

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Quercus wislizeni</i>	26	21.0	6.3	6.0	37.8				
	<i>Arbutus menziesii</i>	22	8.5	0.9	2.0	6.0				
	<i>Pseudotsuga menziesii</i>	22	13.3	0.2	0.2	3.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Quercus wislizeni</i> *	78	62.5	27.7	3.0	74.0	X	X		X
	<i>Notholithocarpus densiflorus</i>	30	5.0	0.7	0.2	6.0				
	<i>Pseudotsuga menziesii</i> *	26	2.9	0.4	0.2	5.2				
<b>Shrub</b>										
	<i>Arctostaphylos glandulosa</i>	78	46.6	13.1	0.2	40.0	X		X	X
	<i>Toxicodendron diversilobum</i>	78	10.4	2.3	0.2	18.3	X			X
	<i>Diplacus aurantiacus</i>	48	2.6	1.4	0.2	19.4				
	<i>Heteromeles arbutifolia</i>	48	5.4	1.3	0.2	11.6				
	<i>Vaccinium ovatum</i>	39	6.0	2.5	0.2	26.0				
	<i>Lonicera hispidula</i>	39	3.0	0.2	0.2	2.0				
	<i>Ceanothus thyrsiflorus</i>	35	4.3	1.7	0.2	20.0				
	<i>Baccharis pilularis</i>	30	12.2	2.9	4.0	17.0				
	<i>Adenostoma fasciculatum</i>	30	2.9	1.6	0.2	27.7				
	<i>Symphoricarpos mollis</i>	30	0.8	0.2	0.2	3.0				
	<i>Rubus ursinus</i>	22	0.5	0.1	0.2	2.0				
	<i>Rosa californica</i>	22	0.6	0.0	0.2	0.2				
<b>Herb</b>										
	<i>Pteridium aquilinum</i>	48	21.3	0.7	0.2	5.0				
	<i>Zigadenus fremontii</i>	39	8.6	0.1	0.2	0.9				
	<i>Polygala californica</i>	35	6.3	0.1	0.2	0.2				

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<i>Stachys ajugoides</i>	30	8.5	0.3	0.2	4.0				
	<i>Iris douglasiana</i>	26	4.7	0.1	0.2	2.0				
	<i>Polystichum munitum</i>	26	2.9	0.1	0.2	1.0				
	<i>Pentagramma triangularis</i>	26	2.0	0.1	0.2	0.5				
	<i>Marah fabaceus</i>	22	2.8	0.1	0.2	1.9				
	<i>Galium porrigens</i>	22	5.4	0.0	0.2	0.2				
	<i>Carex globosa</i>	22	2.0	0.0	0.2	0.2				
<b>Non-vascular</b>										
	Moss	26	16.1	0.1	0.2	2.0				

***Quercus agrifolia* – *Quercus chrysolepis* – *Quercus parvula* (shrub) Provisional Association**

**Common Name:** Coast Live Oak – Canyon Live Oak – Tamalpais or Shreve Oak (shrub) Shrubland

**Alliance:** *Quercus wislizeni* – *Quercus chrysolepis* (shrub) Shrubland Alliance

**Local Vegetation Description**

The Coast Live Oak – Canyon Live Oak – Tamalpais or Shreve Oak (shrub) Association forms an intermittent to continuous shrub layer. The emergent tree layer is typically sparse to open, and the herbaceous layer is open. Characteristic shrubby trees are present include *Quercus xmoreha*, *Quercus agrifolia*, *Quercus parvula* and *Quercus wislizeni*. Shrubs often include *Arctostaphylos glandulosa*, *Baccharis pilularis*, *Ceanothus thrysiflorus*, *Corylus cornuta*, *Rubus ursinus*, *Toxicodendron diversilobum*, and *Vaccinium ovatum*. Commonly associated emergent trees at sparse cover include *Pseudotsuga menziesii*, *Torreya californica*, and *Umbellularia californica*. The herbaceous layer often includes *Achillea millefolium*, *Chlorogalum pomeridianum*, *Galium porrigens*, *Pteridium aquilinum*, and *Stachys ajugoides*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	2.7	0 – 8	3.5	2 – 5
Hardwood	1.0	0 – 3	no data	
Regenerating or Shrubby Tree	55.9	49.6 – 60.2	3.5	2 – 5
Shrub	53.3	3 – 87	1.5	1 – 2
Herb	13.3	8 – 20	0.3	0 – 0.5

**Local Environmental Description**

**Elevation:** Mean 310 m, Range 124 – 661 m

**Aspect:** NW (2), SW (1)

**Slope:** Mean 24 degrees, Range 20 – 29 degrees

**Macro Topography:** Middle to Upper 1/3 of slope (1), Upper 1/3 of slope (1), Middle 1/3 of slope (1)

**Large Rock:** Mean 0.7%, Range 0.0 – 2.0%

**Small Rock:** Mean 14.0%, Range 5.0 – 27.0%

**Fines Cover:** Mean 9.0%, Range 3.0 – 14.0%

**Litter Cover:** Mean 73.3%, Range 65.0 – 78%

**Soil Texture (field assessed):** Moderately coarse, sandy loam (2), Not recorded (1)

**Geology (field or map data):** Chert (2), Franciscan melange (1)

**Marin County Watersheds:** Bolinas (2), Lagunitas Creek (1)

**Site Impacts**

This association has low non-native plant cover (average 4.0%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Briza maxima* and *Vulpia myuros*.

**Classification Comments**

This association is newly described here and is considered provisional since it is under-sampled in its expected range. Due to hybridization and morphological similarity between the species, plants identified as *Quercus wislizeni* may be *Quercus parvula*, which has been found to be the most widespread genotype in Marin County (Dodd and Afzul-Rafii 2004, Hauser et al. 2017).

**References:** none

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

Total: N=3; Marin County (n=3): MARIN200, MARIN300, MMWD0317

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Torreya californica</i>	33	7.4	2.7	8.0	8.0				
	<i>Umbellularia californica</i>	33	2.8	1.0	3.0	3.0				
	<i>Pseudotsuga menziesii</i>	33	33.3	0.1	0.2	0.2				
<b>Regenerating or Shrubby Trees</b>										
	<b><i>Quercus wislizeni</i>*</b>	<b>100</b>	<b>49.0</b>	<b>27.3</b>	<b>25.0</b>	<b>30.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<b><i>Quercus agrifolia</i></b>	<b>67</b>	<b>26.3</b>	<b>15.7</b>	<b>14.0</b>	<b>33.0</b>				<b>X</b>
	<i>Quercus xmoreha</i>	67	8.2	4.7	0.2	14.0				<b>X</b>
	<b><i>Quercus chrysolepis</i></b>	<b>33</b>	<b>32.5</b>	<b>8.0</b>	<b>24.0</b>	<b>24.0</b>				
	<i>Notholithocarpus densiflorus</i>	33	0.3	0.1	0.2	0.2				
	<i>Pseudotsuga menziesii</i> *	33	0.3	0.1	0.2	0.2				
	<b><i>Quercus parvula</i> var. <i>shrevei</i></b>	<b>33</b>	<b>0.3</b>	<b>0.1</b>	<b>0.2</b>	<b>0.2</b>				
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	67	28.1	6.0	4.0	14.0				<b>X</b>
	<i>Corylus cornuta</i>	67	11.0	3.4	0.2	10.0				<b>X</b>
	<i>Vaccinium ovatum</i>	67	9.9	1.7	2.0	3.0				<b>X</b>
	<i>Toxicodendron diversilobum</i>	67	6.4	1.1	0.2	3.0				<b>X</b>
	<i>Arctostaphylos glandulosa</i>	67	10.1	0.7	0.2	2.0				<b>X</b>
	<i>Rubus ursinus</i>	67	2.8	0.7	0.2	2.0				<b>X</b>
	<i>Ceanothus thyrsiflorus</i>	67	3.6	0.4	0.2	1.0				<b>X</b>
	<i>Lonicera hispidula</i>	33	16.7	0.3	1.0	1.0				
	<i>Artemisia californica</i>	33	0.7	0.1	0.2	0.2				
	<i>Diplacus aurantiacus</i>	33	0.7	0.1	0.2	0.2				
	<i>Heteromeles arbutifolia</i>	33	3.3	0.1	0.2	0.2				
	<i>Rosa californica</i>	33	3.3	0.1	0.2	0.2				
	<i>Symphoricarpos mollis</i>	33	3.3	0.1	0.2	0.2				
<b>Herb</b>										
	<i>Stachys ajugoides</i>	67	14.8	2.0	2.0	4.0				<b>X</b>
	<i>Chlorogalum pomeridianum</i>	67	10.6	1.7	2.0	3.0				<b>X</b>
	<i>Pteridium aquilinum</i>	67	10.3	1.3	1.0	3.0				<b>X</b>
	<i>Achillea millefolium</i>	67	0.9	0.1	0.2	0.2				<b>X</b>
	<i>Galium porrigens</i>	67	5.3	0.1	0.2	0.2				<b>X</b>
	<i>Briza maxima</i>	33	14.2	3.0	9.0	9.0				
	<i>Festuca idahoensis</i>	33	4.7	1.0	3.0	3.0				
	<i>Vulpia myuros</i>	33	3.1	0.7	2.0	2.0				
	<i>Polystichum munitum</i>	33	2.9	0.3	1.0	1.0				
	<i>Agrostis hallii</i>	33	0.3	0.1	0.2	0.2				
	<i>Cardamine californica</i>	33	4.8	0.1	0.2	0.2				

*Quercus agrifolia* – *Quercus chrysolepis* – *Quercus parvula* (shrub) Provisional Association  
*Quercus wislizeni* – *Quercus chrysolepis* (shrub) Shrubland Alliance

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<i>Dudleya farinosa</i>	33	0.3	0.1	0.2	0.2				
	<i>Eriophyllum stoechadifolium</i>	33	0.6	0.1	0.2	0.2				
	<i>Festuca californica</i>	33	0.3	0.1	0.2	0.2				
	<i>Galium triflorum</i>	33	4.8	0.1	0.2	0.2				
	<i>Heracleum maximum</i>	33	0.6	0.1	0.2	0.2				
	<i>Iris douglasiana</i>	33	4.8	0.1	0.2	0.2				
	<i>Iris macrosiphon</i>	33	0.3	0.1	0.2	0.2				
	<i>Marah fabaceus</i>	33	0.6	0.1	0.2	0.2				
	<i>Nassella pulchra</i>	33	0.3	0.1	0.2	0.2				
	<i>Phacelia malvifolia</i>	33	0.6	0.1	0.2	0.2				
	<i>Polygala californica</i>	33	4.8	0.1	0.2	0.2				
	<i>Sanicula crassicaulis</i>	33	0.6	0.1	0.2	0.2				
	<i>Zigadenus fremontii</i>	33	4.8	0.1	0.2	0.2				

## ***Quercus parvula* (shrub) Provisional Association**

**Common Name:** Tamalpais or Shreve Oak (shrub) Shrubland

**Alliance:** *Quercus wislizeni* – *Quercus chrysolepis* (shrub) Shrubland Alliance

### **Local Vegetation Description**

The Tamalpais or Shreve Oak (shrub) Association forms an open to continuous shrub layer. The emergent tree layer is typically sparse to open, and the herbaceous layer is sparse to open. The dominant shrubby tree is *Quercus parvula*. Characteristic shrubs include *Diplacus aurantiacus* and *Toxicodendron diversilobum*, and those that are often present include *Ceanothus thyrsiflorus* and *Vaccinium ovatum*. Regenerating or shrubby trees that are dominant and characteristic include *Quercus wislizeni*. The herbaceous layer often includes *Marah fabaceus* and *Stachys ajugoides*, and herbs that are sometimes present include *Chlorogalum pomeridianum*, *Polystichum munitum*, *Pteridium aquilinum*, and *Zigadenus fremontii*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.6	0 – 3	17.5	15 – 20
Hardwood	4.0	0 – 20	5.5	2 – 10
Regenerating or Shrubby Tree	50.0	0 – 75	no data	
Shrub	68.2	3 – 98	2.5	1 – 5
Herb	1.4	0 – 4	0.3	0 – 0.5

### **Local Environmental Description**

**Elevation:** Mean 271 m, Range 145 – 403 m

**Aspect:** SW (1), NE (1), NW (1)

**Slope:** Mean 17 degrees, Range 10 – 20 degrees

**Macro Topography:** Middle 1/3 of slope (2), Upper 1/3 of slope (1)

**Large Rock:** Mean 0.1%, Range 0.0 – 0.2%

**Small Rock:** Mean 6.0%, Range 3.0 – 10.0%

**Fines Cover:** Mean 7.3%, Range 5.0 – 10.0%

**Litter Cover:** Mean 83.7%, Range 81.0 – 85%

**Soil Texture (field assessed):** Moderately fine clay loam (2), Not recorded (1)

**Geology (field or map data):** Franciscan melange (2), Chert (1), Sandstone and other sedimentary (1), Volcanic and metavolcanic rocks (1)

**Marin County Watersheds:** Bolinas (3), Lagunitas Creek (1), San Rafael (1)

### **Site Impacts**

This association has very low non-native plant cover (average 0.0%) relative to native cover.

### **Classification Comments**

This association is considered provisional since it is under-sampled in its expected range. Due to hybridization and morphological similarity between the species, plants identified as *Quercus wislizeni* are likely *Quercus parvula*, which has been found to be the most widespread genotype in Marin County (Dodd and Afzul-Rafii 2004, Hauser et al. 2017).

**References:** Borchert et al. 2004, Evens and Kentner 2006, Klein et al. 2015

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

**Total: N=5; Marin County (n=5):** MARIN201, MMWD0212, MOSD0129, PGA564, PGA654

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Regenerating or Shrubby Trees</b>										
	<i>Quercus parvula</i>	100	93.1	42.3	20.0	74.0	X	X		X
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	100	24.9	3.6	0.2	6.0	X			X
	<i>Diplacus aurantiacus</i>	80	1.0	0.2	0.2	0.2	X			X
	<i>Ceanothus thyrsiflorus</i>	60	13.5	5.0	0.2	20.0				X
	<i>Vaccinium ovatum</i>	60	8.9	4.1	0.2	20.0				X
	<i>Baccharis pilularis</i>	40	31.6	6.4	15.0	17.0				
	<i>Heteromeles arbutifolia</i>	40	10.9	1.2	2.0	4.0				
	<i>Lonicera hispidula</i>	40	2.6	0.6	1.0	2.0				
	<i>Adenostoma fasciculatum</i>	40	0.7	0.1	0.2	0.2				
	<i>Rubus ursinus</i>	40	0.4	0.1	0.2	0.2				
<b>Herb</b>										
	<i>Stachys ajugoides</i>	60	28.5	0.3	0.2	1.0				X
	<i>Marah fabaceus</i>	60	9.9	0.1	0.2	0.2				X
	<i>Pteridium aquilinum</i>	40	14.1	0.4	0.2	2.0				
	<i>Chlorogalum pomeridianum</i>	40	9.5	0.2	0.2	1.0				
	<i>Polystichum munitum</i>	40	5.9	0.1	0.2	0.2				
	<i>Zigadenus fremontii</i>	40	7.3	0.1	0.2	0.2				



***Quercus (parvula, wislizeni) – Arctostaphylos glandulosa Association***

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**Common Name:** Shreve Oak – Interior Live Oak – Eastwood Manzanita Shrubland

**Alliance:** *Quercus wislizeni* – *Quercus chrysolepis* (shrub) Shrubland Alliance

**Local Vegetation Description**

The Shreve Oak – Interior Live Oak – Eastwood Manzanita Association forms an intermittent to continuous shrub layer. The emergent tree layer is typically sparse to intermittent, and the herbaceous layer is sparse to open. Dominant and characteristic shrubs or shrubby trees include *Arctostaphylos glandulosa* and *Quercus parvula* or *Q. wislizeni*, and those that are often present include *Heteromeles arbutifolia* and *Toxicodendron diversilobum*. Commonly associated emergent trees include *Quercus wislizeni* and *Arbutus menziesii*. The herbaceous layer sometimes includes *Carex globosa*, *Clinopodium douglasii*, *Iris douglasiana*, *Pentagramma triangularis*, *Polygala californica*, *Pteridium aquilinum*, and *Zigadenus fremontii*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	1.4	0 – 11	10.3	2 – 20
Hardwood	12.4	0 – 38	6.2	2 – 10
Regenerating or Shrubby Tree	24.8	0 – 74	2.5	1 – 5
Shrub	33.6	2 – 86	2.8	0.5 – 5
Herb	5.1	0 – 25	0.3	0 – 0.5

**Local Environmental Description**

**Elevation:** Mean 421 m, Range 181 – 743 m

**Aspect:** SE (6), NE (3), Variable (2), NW (1), SW (1)

**Slope:** Mean 22 degrees, Range 0 – 45 degrees

**Macro Topography:** Middle 1/3 of slope (7), Ridge top (3), Upper 1/3 of slope (2), Bottom (1)

**Large Rock:** Mean 1.0%, Range 0.0 – 5.0%

**Small Rock:** Mean 1.5%, Range 0.0 – 5.0%

**Fines Cover:** Mean 9.9%, Range 0.2 – 28.0%

**Litter Cover:** Mean 70.7%, Range 5.6 – 95%

**Soil Texture (field assessed):** Moderately fine clay loam (3), Moderately fine sandy clay loam (3), Medium to very fine, loamy sand (1), Medium to very fine, sandy loam (1), Medium loam (1), Loam, (class unknown) (1), Moderately coarse, sandy loam (1), Moderately fine silty clay loam (1), Medium silt (1)

**Geology (field or map data):** Franciscan melange (11), Sandstone and other sedimentary (2), Chert (1), Serpentine (1)

**Marin County Watersheds:** Bolinas (5), Lagunitas Creek (5), San Rafael (5)

**Site Impacts**

This association has very low non-native plant cover (average 0.4%) relative to native cover.

**Classification Comments**

Due to hybridization and morphological similarity between the species, plants identified as *Quercus wislizeni* may be *Quercus parvula*, which has been found to be the most widespread genotype in Marin County (Dodd and Afzul-Rafii 2004, Hauser et al. 2017). Therefore, the name of this association has been updated from *Quercus wislizeni* – *Arctostaphylos glandulosa* Association.

**References:** AECOM 2013, Evens and Kentner 2006

Global Rarity Rank: G3

State Rarity Rank: S3?

State Rare: Y

**Surveys Used for Description**

**Total: N=15; Marin County (n=15):** MMWD0111, MMWD0163, MMWD0235, MMWD0263, MMWD0266, MMWD0268A, MMWD0304, MMWD0306, MMWD0315, MMWD0404, MOSD0028, MOSD0084, PGA1528, PGA7738, VASE0045

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Quercus wislizeni</i>	40	32.2	9.6	6.0	37.8				
	<i>Arbutus menziesii</i>	33	13.1	1.3	2.0	6.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Quercus wislizeni</i> *	67	56.4	21.5	67	56.0				X
	<i>Notholithocarpus densiflorus</i>	33	7.5	0.9	0.2	6.0				
	<i>Pseudotsuga menziesii</i>	33	4.3	0.6	0.2	5.2				
<b>Shrub</b>										
	<i>Arctostaphylos glandulosa</i>	100	68.9	19.9	4.2	40.0	X	X		X
	<i>Toxicodendron diversilobum</i>	73	6.3	2.2	0.2	18.3				X
	<i>Heteromeles arbutifolia</i>	53	4.0	1.6	0.2	11.6				X
	<i>Diplacus aurantiacus</i>	40	3.5	2.0	1.0	19.4				
	<i>Symphoricarpos mollis</i>	40	0.5	0.3	0.2	3.0				
	<i>Lonicera hispidula</i>	40	0.4	0.1	0.2	0.2				
	<i>Adenostoma fasciculatum</i>	33	4.2	2.4	1.0	27.7				
	<i>Vaccinium ovatum</i>	27	4.3	2.1	0.2	26.0				
<b>Herb</b>										
	<i>Pteridium aquilinum</i>	47	25.9	0.7	0.2	5.0				
	<i>Zigadenus fremontii</i>	40	9.8	0.1	0.2	0.9				
	<i>Polygala californica</i>	40	7.6	0.1	0.2	0.2				
	<i>Pentagramma triangularis</i>	33	1.9	0.1	0.2	0.5				
	<i>Carex globosa</i>	33	3.0	0.1	0.2	0.2				
	<i>Clinopodium douglasii</i>	27	8.9	0.4	0.2	4.0				
	<i>Iris douglasiana</i>	27	5.2	0.2	0.2	2.0				
<b>Non-vasc</b>										
	Moss	33	18.0	0.2	0.2	2.0				
	Lichen	27	22.0	0.5	0.2	5.0				

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## ***Rhododendron columbianum* Shrubland Alliance**

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**Common Name:** Western Labrador-tea thickets

**NVC Alliance Code:** A2514. *Ledum glandulosum* - *Ledum groenlandicum* Shrub Bog & Acidic Fen Alliance

### **Statewide Description**

*Rhododendron columbianum* (= *Ledum glandulosum*) is dominant in the shrub canopy with *Frangula californica*, *Gaultheria shallon*, *Kalmia microphylla*, *Lonicera cauriana*, *Lonicera involucrata*, *Morella californica*, *Rubus ursinus*, *Salix orestera*, *Sambucus racemosa*, *Spiraea douglasii*, *Spiraea splendens* and *Vaccinium uliginosum*. Emergent trees may be present at low cover, including *Alnus rubra*, *Pinus contorta*, *Pinus muricata* or *Umbellularia californica*. Mosses may be present, including *Sphagnum subsecundum* and *Sphagnum teres*.

*Rhododendron columbianum* grows along the coast of the Pacific Northwest and in northern California mountains on acidic soils with or without mosses. Although the species is common, we know only a few shrubland stands in California scattered along the coast in coastal valleys, and other stands occur in fen/meadow complexes in the Sierra Nevada (Holland 1986, Cooper and Wolf 2006). Along the coast, they resemble associations described by Christy (2004) for Oregon in which *Carex obnupta*, *Gaultheria shallon*, and *Sphagnum* spp. are associates. Associations are often in early seral settings in Oregon and Washington, such as disturbed coastal swamps and heavily elk-browsed edges of moist lowland forests associated with fens and other wetlands (Christy 2004, NatureServe 2007a). Coastal and montane stands are currently combined in this alliance, though future analysis of wetland data may warrant splitting them into different shrub alliances as has been done in the NVC within North Pacific acidic bog & fen and Rocky Mountain fen groups.

Over most of the range in California, *R. columbianum* clusters in swampy areas under tree canopies that may represent many alliances, including both subspecies of *Pinus contorta*, as in the coastal zone

*Rhododendron columbianum* Shrubland Alliance

(Holland 1986) and in the Sierra Nevada (Potter 2005). Coastal, wet temperate as well as montane, cold temperate stands that lack tree canopies are included in this shrub alliance. However, cover and physiognomy across stands are quite variable with some stands appear as scrub with few scattered trees while others appear as woodland communities with a well-developed understory of shrubs. Stands can sometimes have higher tree cover (>10%).

### **Local Vegetation Description**

The Western Labrador-tea thickets Alliance forms a continuous shrub layer. The emergent tree layer is typically sparse to open, and the herbaceous layer is sparse to open. Dominant and characteristic shrubs include *Ledum glandulosum* and *Morella californica*, and those that are often present include *Rubus ursinus*. Commonly associated emergent trees at sparse cover include *Alnus rubra*, *Notholithocarpus densiflorus*, *Arbutus menziesii*, *Pinus muricata* and *Umbellularia californica*. The herbs that are often present include *Pteridium aquilinum*, and herbs that are sometimes present include *Athyrium filix-femina*, *Blechnum spicant*, *Carex obnupta*, *Polystichum munitum* and *Stachys ajugoides*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	1.7	0 – 5	25.0	15 – 35
Hardwood	13.3	0 – 25	10.0	5 – 15
Regenerating or Shrubby Tree	0.0	0 – 0	No data	
Shrub	85.0	75 – 95	2.8	1 – 5
Herb	6.3	2 – 10	1.4	0.5 – 2

### **Local Membership Rule**

*Rhododendron columbianum* is dominant in the shrub layer. This is a rare type, typically in wetland seeps and fens along the coast, though one stand was sampled in a small riparian channel. Other unsampled fen types in Marin County may include species such as *Carex utriculata*, *C. echinata*, *C. simulata*, *C. exsiccata*, and/or *C. pellita*.

### **Local Environmental Description**

**Elevation:** Mean 62 m, Range 21 – 102 m

**Aspect:** NW (1)

**Slope:** 10 degrees

**Macro Topography:** Upper 1/3 of slope (1)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** 0.0%

**Litter Cover:** 97%

**Soil Texture (field assessed):** Not recorded (1)

**Geology (field or map data):** Granitic (2)

**Marin County Watersheds:** Inverness (2)

### **Site Impacts**

This alliance has very low non-native plant cover (average 0.0%) relative to native cover. No non-native species were recorded in the field.

### **Associations in Marin County**

*Rhododendron columbianum* – *Gaultheria shallon* / *Carex obnupta*

### **Classification Comments**

None.

**References:** Holland 1986

Global Rarity Rank: G4

State Rarity Rank: S2?

**Surveys Used for Description**

Total: N=3; Marin County (n=3): MARIN314, PGA606, PGA607

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Alnus rubra</i>	67	43.0	10.7	7.0	25.0				X
	<i>Notholithocarpus densiflorus</i>	67	11.3	1.7	0.2	5.0				X
	<i>Pinus muricata</i>	33	5.5	1.7	5.0	5.0				
	<i>Umbellularia californica</i>	33	6.7	1.0	3.0	3.0				
	<i>Arbutus menziesii</i>	33	0.2	0.1	0.2	0.2				
<b>Shrub</b>										
	<b><i>Rhododendron columbianum</i></b>	<b>100</b>	<b>88.0</b>	<b>74.2</b>	<b>62.5</b>	<b>95.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Morella californica</i>	100	2.2	1.7	0.2	3.0	<b>X</b>			<b>X</b>
	<i>Rubus ursinus</i>	67	4.8	3.7	3.0	8.0				<b>X</b>
	<i>Gaultheria shallon</i>	33	4.2	3.3	10.0	10.0				
	<i>Frangula californica</i>	33	0.4	0.3	1.0	1.0				
	<i>Sambucus racemosa</i>	33	0.1	0.1	0.2	0.2				
	<i>Lonicera involucrata</i>	33	0.1	0.1	0.2	0.2				
	<i>Toxicodendron diversilobum</i>	33	0.1	0.1	0.2	0.2				
	<i>Ribes sanguineum</i>	33	0.1	0.1	0.2	0.2				
	<i>Rubus spectabilis</i>	33	0.1	0.1	0.2	0.2				
<b>Herb</b>										
	<i>Pteridium aquilinum</i>	67	49.0	1.7	2.0	3.0				<b>X</b>
	<i>Carex obnupta</i>	33	19.0	1.3	4.0	4.0				
	<i>Polystichum munitum</i>	33	14.3	1.0	3.0	3.0				
	<i>Blechnum spicant</i>	33	15.6	1.0	3.0	3.0				
	<i>Stachys ajugoides</i>	33	1.0	0.1	0.2	0.2				
	<i>Athyrium filix-femina</i>	33	1.0	0.1	0.2	0.2				

***Rhododendron columbianum* – *Gaultheria shallon* / *Carex obnupta* Association**

**Common Name:** Western Labrador Tea – Salal / Slough Sedge Shrubland

**Alliance:** *Rhododendron columbianum* Shrubland Alliance

**Classification Comments**

The association circumscription is the same as that of the alliance. See above for detailed description. *Rhododendron columbianum* is an updated name for *Ledum glandulosum*. This is a rare association known to occur in coastal fens.

**Global Rarity Rank:** G2

**State Rarity Rank:** SNR

**State Rare:** Y



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***Rubus armeniacus* – *Sesbania punicea* – *Ficus carica* Shrubland Semi-Natural Alliance**

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**Common Name:** Himalayan blackberry – rattlebox – edible fig riparian scrub

**NVC Alliance Code:** A4160. *Rubus armeniacus* - *Sesbania punicea* - *Ficus carica* Ruderal Riparian Scrub Alliance

**Statewide Description**

*Ficus carica*, *Rubus armeniacus*, *Sesbania punicea*, or other non-native is dominant or co-dominant in the shrub canopy in moist or riparian areas. Emergent trees may be present at low cover, including *Alnus rhombifolia*, *Populus fremontii*, *Quercus agrifolia*, *Quercus lobata*, *Quercus wislizeni* or *Salix laevigata*.

*Rubus armeniacus* has a Cal-IPC rating of High. The species is native of western Europe. Plants create sprawling, robust, spiny brambles to 3 m high with stems to 10 m long. Stems are biennial. Sterile first-year stems, called primocanes, develop from buds at or below the ground surface and can root when they hit the soil. During the second year, lateral branches, develop in the axils of the primocanes, and these flower and fruit and then die. Animals, especially birds and mammals, readily eat the fruit and seeds get spread over considerable distances (DiTomaso and Healy 2007, Francis 2002b, Global Invasive Species Database 2006, Hoshovsky 2000a, Tirmenstein 1989e). Other botanical references use the names *R. discolor* and *R. procerus* for this species. *Rubus armeniacus* grows along riparian sites, mesic clearings, disturbed areas, and stock ponds throughout cismontane California. The native *R. ursinus* and non-native *R. armeniacus* have similar ecologies, and these species sometimes grow intermixed. Stands dominated by the aggressive *R. armeniacus* are extensive in many areas in northern California.

*Sesbania punicea* has a Cal-IPC rating of High. This species is native to South America, being brought to California as an ornamental plant, likely because of its showy flowers and distinctive, 4-winged oblong seed pods. Its seed pods can float, easily travel and establish new populations along riparian waterways,

allowing this plant to spread rapidly. Dense stands can form after establishing with other detrimental effects: cutting off access to rivers and streams, overtaking native vegetation needed by wildlife, and leading to erosion and possibly flooding (DiTomaso et al. 2013).

*Ficus carica* has a Cal-IPC rating of Low. The species probably originated in western Asia and the Middle East (eastern Mediterranean), and it is widely grown throughout the world for its edible fruits. It has escaped cultivation in some regions of California and in most southern and eastern states of the U.S. Its fruits are dispersed by birds and mammals, and it easily resprouts from its shallow roots. In riparian areas, it can form dense clonal thickets (Bossard et al. 2000, DiTomaso et al. 2013), and can expand rapidly over time once critical conditions are met (Holmes et al. 2013).

### **Local Vegetation Description**

The Himalayan blackberry – rattlebox – edible fig riparian scrub Alliance forms an intermittent to continuous shrub layer. The emergent tree layer is sparse to open, and the herbaceous layer is sparse to open. Dominant and characteristic shrubs or vines include *Rubus armeniacus* or *Delairea odorata*, and those that are often present include *Baccharis pilularis*, and *Toxicodendron diversilobum*. Regenerating or shrubby trees that are often present include *Quercus agrifolia*. Commonly associated emergent trees at sparse cover include *Umbellularia californica*, *Aesculus californica*, *Juglans hindsii*, *Quercus agrifolia* and *Salix laevigata*. The herbs that are sometimes present include *Artemisia douglasiana*, *Cirsium vulgare*, *Cyperus eragrostis*, *Equisetum* spp., *Hordeum murinum* and *Phalaris aquatica*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	No data	
Hardwood	3.3	0 – 12	8.0	2 – 15
Regenerating or Shrubby Tree	0.1	0 – 0.2	2.5	1 – 5
Shrub	66.0	45.0 – 88.0	2.8	1 – 5
Herb	1.3	0 – 4	0.5	0 – 1

### **Local Membership Rule**

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

### **Local Environmental Description**

**Elevation:** Mean 238 m, Range 97 – 431 m

**Aspect:** NW (2), SW (2)

**Slope:** Mean 5 degrees, Range 1 – 11 degrees

**Macro Topography:** Lower 1/3 of slope (1), Middle 1/3 of slope (1), Bottom (1), Upper 1/3 of slope (1)

**Large Rock:** Mean 4.1%, Range 0.0 – 16.0%

**Small Rock:** Mean 17.5%, Range 0.0 – 45.0%

**Fines Cover:** Mean 33.0%, Range 10.0 – 58.0%

**Litter Cover:** Mean 42.8%, Range 27.0 – 72%

**Soil Texture (field assessed):** Medium silt (1), Sand, (class unknown) (1)

**Geology (field or map data):** Volcanic flow rocks (2), Mixed alluvium (1), Sandstone (1)

**Marin County Watersheds:** None

**Other Watersheds, Sonoma Co.:** Sonoma Creek (2), Estero San Antonio (1), Middle Russian River (1)

### **Site Impacts**

This alliance has greater cover of exotics than natives, non-native plant cover averages 91.9% relative to native cover. Non-native species with highest frequency and abundance include *Cirsium vulgare*, *Hordeum murinum*, *Phalaris aquatica* and *Rubus armeniacus*.

### **Associations in Marin County**

*Rubus armeniacus*\*

### Classification Comments

Though no samples were surveyed in Marin County, the *Rubus armeniacus* Association is known from nearby counties and occurs here and is mapped in small patches. We especially need more data on *Delairea odorata*, which was observed dominating in riparian and mesic areas in the region.

**References:** Klein et al. 2015

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

### Surveys Used for Description

**Total: N=4; Marin County (n=0):**

San Mateo County (n=0) San Francisco County (n=0)

Sonoma County (n=4): SONO0020, SONO0112, SONO0674, SONO0703

### Alliance Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Umbellularia californica</i>	50	31.7	1.3	1.0	4.0				X
	<i>Quercus agrifolia</i>	25	6.7	1.0	4.0	4.0				
	<i>Salix laevigata</i>	25	6.7	1.0	4.0	4.0				
	<i>Aesculus californica</i>	25	5.0	0.8	3.0	3.0				
	<i>Juglans hindsii</i>	25	25.0	0.1	0.2	0.2				
<b>Regenerating or Shrubby Trees</b>										
	<i>Quercus agrifolia</i> *	50	50.0	0.1	0.2	0.2				X
<b>Shrub</b>										
	<b><i>Rubus armeniacus</i></b>	<b>100</b>	<b>98.5</b>	<b>65.5</b>	<b>43.0</b>	<b>88.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Toxicodendron diversilobum</i>	50	0.6	0.3	0.2	1.0				X
	<i>Baccharis pilularis</i>	50	0.1	0.1	0.2	0.2				X
	<i>Salix lasiolepis</i>	25	0.7	0.3	1.2	1.2				
<b>Herb</b>										
	<i>Phalaris aquatica</i>	25	18.8	0.8	3.0	3.0				
	<i>Artemisia douglasiana</i>	25	6.3	0.3	1.0	1.0				
	<i>Cirsium vulgare</i>	25	6.3	0.1	0.2	0.2				
	<i>Cyperus eragrostis</i>	25	6.3	0.1	0.2	0.2				
	<i>Equisetum</i> spp.	25	6.3	0.1	0.2	0.2				
	<i>Hordeum murinum</i>	25	6.3	0.1	0.2	0.2				

### ***Rubus armeniacus* Association**

**Common Name:** Himalayan blackberry Shrubland

**Alliance:** *Rubus armeniacus* – *Sesbania punicea* – *Ficus carica* Shrubland Semi-Natural Alliance

### Classification Comments

The association circumscription is the same as that of the alliance. See above for detailed description.

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

**State Rare:** N

*Rubus armeniacus* – *Sesbania punicea* – *Ficus carica* Shrubland Semi-Natural Alliance



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## ***Rubus spectabilis* – *Morella californica* Shrubland Alliance**

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**Common Name:** Wax myrtle – salmonberry 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* was 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 *Rubus spectabilis* are now 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* and/or *Rubus spectabilis* stands are generally small (< 1 ha) and close to the coast on moist or wet soils with high water tables. Stands scattered in ravines of San Mateo Co., at Point Reyes National Seashore (Keeler-Wolf et al. 2003a), at Bodega Bay and other Sonoma County coastal settings, 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.

### Local Vegetation Description

The Wax myrtle – salmonberry scrub Alliance forms an open to continuous shrub layer. The emergent tree layer is typically sparse to open, and the herbaceous layer is sparse to continuous. Dominant and characteristic shrubs include *Rubus spectabilis* or *Morella californica*, and those that are often present include *Baccharis pilularis*, *Rubus ursinus* and *Sambucus racemosa*. The herbs that are often present include *Polystichum munitum*, and herbs that are sometimes present include *Athyrium filix-femina*, *Carex obnupta*, *Heracleum maximum*, *Holcus lanatus*, *Juncus effusus*, *Marah fabaceus*, *Oenanthe sarmentosa*, *Pteridium aquilinum*, *Stachys ajugoides* and *Urtica dioica*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.2	0 – 5	No data	
Hardwood	1.0	0 – 20	10.0	5 – 15
Regenerating or Shrubby Tree	0.2	0 – 5	No data	
Shrub	71.5	30 – 99	3.0	0.5– 5
Herb	29.4	0 – 70	1.0	0 –5

### Local Membership Rule

Either vegetation dominated or co-dominated by *Morella californica* and/or *Rubus spectabilis*, or sometimes *Sambucus racemosa* dominates in the shrub overstory. Stands may be small and are generally found close to the coast on moist or wet soils, ravines, and riparian areas. *Sambucus racemosa* stands often preferring riparian streams, seeps along slopes, and moist post-fire slopes where there was past disturbance.

### Local Environmental Description

**Elevation:** Mean 95 m, Range 6 – 360 m

**Aspect:** NE (5), NW (4), SE (1)

**Slope:** Mean 16 degrees, Range 3 – 47 degrees

**Macro Topography:** Lower 1/3 of slope (4), Draw (2), Middle 1/3 of slope (2), Backslope (cliff) (1), Edge of basin/wetland (1)

**Large Rock:** Mean 0.1%, Range 0.0 – 1.0%

**Small Rock:** Mean 1.3%, Range 0.0 – 10.0%

**Fines Cover:** Mean 49.0%, Range 1.0 – 94%

**Litter Cover:** Mean 66.0%, Range 3.0 – 99%

**Soil Texture (field assessed):** Moderately coarse, sandy loam (3), Coarse, loamy sand (2), Moderately fine sandy clay loam (2), Moderately fine silty clay loam (1), Sand, (class unknown) (1), Coarse sand (1)

**Geology (field or map data):** Sandstone and other sedimentary (12), Granitic (9), Granitic (generic) (7)

**Marin County Watersheds:** Point Reyes (19), Inverness (9), Lagunitas Creek (1)

### Site Impacts

This alliance has low non-native plant cover (average 4.4%) relative to native cover. Non-native species with highest frequency and abundance include *Holcus lanatus*.

### Associations in Marin County

*Morella californica* – *Rubus* spp.

*Rubus spectabilis*

*Sambucus racemosa* – (*Rubus ursinus*)

### Classification Comments

None.

**References:** Belsher 1999, Buck-Diaz et al. 2019, Keeler-Wolf et al. 2003a, Klein et al. 2015, VegCAMP 2018

Global Rarity Rank: G4

State Rarity Rank: S3

**Surveys Used for Description**

**Total: N=32; Marin County (n=32):** MARIN065, MARIN086, MARIN133, PGA102, PGA105, PGA1053, PGA160, PGA2246, PGA2639, PGA2702, PGA310, PGA3376, PGA35, PGA3504, PGA3554, PGA3656, PGA4156, PGA41A, PGA4303, PGA463A, PGA5138, PGA5242, PGA5668, PGA74, PGA94, PORE058, PORE088, PORE157, PORE159, PORE169, PORE171, PORE172

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Rubus spectabilis</i>	84	35.5	25.2	0.2	97.0	X		X	X
	<i>Morella californica</i>	53	24.7	22.2	3.0	98.2				X
	<i>Sambucus racemosa</i>	53	10.1	7.4	0.2	70.0				X
	<i>Rubus ursinus</i>	53	6.0	5.3	0.2	30.0				X
	<i>Baccharis pilularis</i>	53	6.1	4.2	0.2	25.0				X
	<i>Toxicodendron diversilobum</i>	44	4.9	3.8	0.2	40.0				
	<i>Rubus parviflorus</i>	34	4.5	3.6	0.4	48.2				
	<i>Frangula californica</i>	22	1.4	1.4	0.2	30.0				
<b>Herb</b>										
	<i>Polystichum munitum</i>	53	12.3	2.3	0.2	30.0				X
	<i>Holcus lanatus</i>	44	9.5	3.0	0.2	25.0				
	<i>Stachys ajugoides</i>	41	7.2	2.8	0.2	23.0				
	<i>Heracleum maximum</i>	41	4.9	1.0	0.2	7.0				
	<i>Athyrium filix-femina</i>	38	10.1	2.2	0.2	20.0				
	<i>Pteridium aquilinum</i>	38	4.7	1.2	0.2	10.0				
	<i>Juncus effusus</i>	34	3.8	1.6	0.2	20.0				
	<i>Carex obnupta</i>	31	8.0	2.6	0.2	30.0				
	<i>Marah fabaceus</i>	28	4.7	0.6	0.2	7.2				
	<i>Oenante sarmentosa</i>	22	1.4	0.6	0.2	6.0				
	<i>Urtica dioica</i>	22	1.5	0.4	0.2	7.0				

## **Morella californica – Rubus spp. Provisional Association**

**Common Name:** Wax myrtle – berry brambles Shrubland

**Alliance:** *Rubus spectabilis* – *Morella californica* Shrubland Alliance

### **Local Vegetation Description**

The Wax myrtle – berry brambles Association forms an intermittent to continuous shrub layer. The emergent tree layer is typically absent, and the herbaceous layer is open to intermittent. Dominant and characteristic shrubs include *Morella californica* and *Rubus spectabilis*, and those that are often present include *Sambucus racemosa*. The herbaceous layer sometimes includes *Athyrium filix-femina*, *Carex obnupta*, *Heracleum maximum*, *Holcus lanatus*, *Juncus effusus*, *Marah fabaceus*, *Polystichum munitum*, *Pteridium aquilinum*, and *Stachys ajugoides*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0	0 – 0	10.0	5 – 15
Regenerating or Shrubby Tree	0.1	0 – 1	no data	
Shrub	80.2	40 – 95	2.9	0.5 – 5
Herb	22.8	5 – 60	0.8	0 – 2

### **Local Environmental Description**

**Elevation:** Mean 101 m, Range 6 – 360 m

**Aspect:** NE (2), NW (1), SE (1)

**Slope:** Mean 26 degrees, Range 5 – 47 degrees

**Macro Topography:** Draw (2), Backslope (cliff) (1), Lower 1/3 of slope (1)

**Large Rock:** Mean 0.3%, Range 0.0 – 1.0%

**Small Rock:** Mean 0.8%, Range 0.0 – 3.2%

**Fines Cover:** no data

**Litter Cover:** Mean 89.8%, Range 80.0 – 99%

**Soil Texture (field assessed):** Moderately coarse, sandy loam (2), Coarse sand (1), Moderately fine silty clay loam (1)

**Geology (field or map data):** Granitic (generic) (4), Sandstone and other sedimentary (4), Granitic (2)

**Marin County Watersheds:** Point Reyes (8), Inverness (3)

### **Site Impacts**

This association has low non-native plant cover (average 2.8%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Holcus lanatus*.

### **Classification Comments**

This association is considered provisional since it is under-sampled in its expected range.

**References:** Buck-Diaz et al. 2019, Klein et al. 2015, VegCAMP 2018

**Global Rarity Rank:** G3

**State Rarity Rank:** S3

**State Rare:** Y

### **Surveys Used for Description**

**Total: N=13; Marin County (n=13):** PGA102, PGA160, PGA2639, PGA2702, PGA310, PGA3376, PGA41A, PGA74, PGA94, PORE058, PORE159, PORE169, PORE171

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Morella californica</i>	100	58.4	53.0	11.0	98.2	X	X		X
	<i>Rubus spectabilis</i>	85	15.4	12.4	0.2	40.0	X			X
	<i>Sambucus racemosa</i>	62	5.0	3.9	0.2	20.0				X
	<i>Toxicodendron diversilobum</i>	38	5.0	4.5	0.2	40.0				
	<i>Baccharis pilularis</i>	38	2.2	1.8	0.2	10.0				
	<i>Frangula californica</i>	31	2.6	2.7	0.2	30.0				
	<i>Rubus ursinus</i>	31	2.3	2.3	0.2	20.0				
	<i>Rubus parviflorus</i>	23	0.9	0.9	0.4	10.0				
<b>Herb</b>										
	<i>Athyrium filix-femina</i>	46	19.3	3.1	0.2	20.0				
	<i>Polystichum munitum</i>	46	14.5	1.4	0.2	8.0				
	<i>Carex obnupta</i>	38	11.9	3.8	1.0	30.0				
	<i>Holcus lanatus</i>	38	7.6	1.3	0.2	13.0				
	<i>Marah fabaceus</i>	31	3.3	0.7	0.2	7.2				
	<i>Pteridium aquilinum</i>	31	2.8	0.7	0.2	5.0				
	<i>Juncus effusus</i>	23	2.9	0.8	0.2	10.0				
	<i>Heracleum maximum</i>	23	4.5	0.6	0.2	5.0				
	<i>Stachys ajugoides</i>	23	0.7	0.0	0.2	0.2				

## ***Rubus spectabilis* Association**

**Common Name:** Salmonberry Shrubland

**Alliance:** *Rubus spectabilis* – *Morella californica* Shrubland Alliance

### **Local Vegetation Description**

The Salmonberry Association forms an intermittent to continuous shrub layer. The emergent tree layer is typically absent, and the herbaceous layer is sparse to intermittent. Dominant and characteristic shrubs include *Rubus spectabilis*, and those that are often present include *Baccharis pilularis*, *Rubus parviflorus*, *Rubus ursinus*, and *Toxicodendron diversilobum*. The herbaceous layer often includes *Heracleum maximum*, *Holcus lanatus*, *Polystichum munitum*, and *Stachys ajugoides*, and herbs that are sometimes present include *Athyrium filix-femina*, *Carex obnupta*, *Conium maculatum*, *Juncus effusus*, *Juncus patens*, *Marah fabaceus*, *Oenanthe sarmentosa*, *Pteridium aquilinum*, and *Urtica dioica*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.4	0 – 5	no data	
Hardwood	0.2	0 – 2	no data	
Regenerating or Shrubby Tree	0.3	0 – 5	no data	
Shrub	69.3	40 – 99	2.8	0.5 – 5
Herb	31.2	0.2 – 60	1.2	0 – 5

### **Local Environmental Description**

**Elevation:** Mean 82 m, Range 8 – 311 m

**Aspect:** NW (3), NE (3)

**Slope:** Mean 10 degrees, Range 3 – 17 degrees

**Macro Topography:** Lower 1/3 of slope (3), Middle 1/3 of slope (2), Edge of basin/wetland (1)

**Large Rock:** Mean 0.0%, Range 0.0 – 0.0%

**Small Rock:** Mean 1.7%, Range 0.0 – 10.0%

**Fines Cover:** Mean 49.0%, Range 1.0 – 94.0%

**Litter Cover:** Mean 50.2%, Range 3.0 – 96%

**Soil Texture (field assessed):** Moderately fine sandy clay loam (2), Coarse, loamy sand (2), Sand, (class unknown) (1), Moderately coarse, sandy loam (1)

**Geology (field or map data):** Sandstone and other sedimentary (6), Granitic (5), Granitic (generic) (3)

**Marin County Watersheds:** Point Reyes (8), Inverness (6)

### **Site Impacts**

This association has low non-native plant cover (average 7.0%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Conium maculatum* and *Holcus lanatus*.

### **Classification Comments**

None.

**References:** Belsher 1999, Buck-Diaz et al. 2019, Keeler-Wolf et al. 2003a, Klein et al. 2015

**Global Rarity Rank:** G4

**State Rarity Rank:** S2.2?

**State Rare:** Y

### **Surveys Used for Description**

**Total: N=15; Marin County (n=15):** MARIN065, MARIN086, MARIN133, PGA105, PGA1053, PGA2246, PGA35, PGA3554, PGA3656, PGA4156, PGA463A, PGA5668, PORE088, PORE157, PORE172

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Rubus spectabilis</i>	100	61.3	42.7	25.0	97.0	X	X		X
	<i>Rubus ursinus</i>	67	9.1	8.2	0.2	30.0				X
	<i>Baccharis pilularis</i>	67	6.9	5.3	0.2	25.0				X
	<i>Rubus parviflorus</i>	53	8.9	6.9	1.0	48.2				X
	<i>Toxicodendron diversilobum</i>	53	4.1	3.6	0.2	25.0				X
	<i>Sambucus racemosa</i>	40	0.8	0.6	0.2	3.0				
<b>Herb</b>										
	<i>Holcus lanatus</i>	60	13.6	5.3	0.2	25.0				X
	<i>Stachys ajugoides</i>	60	12.0	4.6	0.2	23.0				X
	<i>Polystichum munitum</i>	53	9.7	3.4	0.2	30.0				X
	<i>Heracleum maximum</i>	53	5.7	1.4	0.2	7.0				X
	<i>Juncus effusus</i>	47	5.3	2.5	0.2	20.0				
	<i>Pteridium aquilinum</i>	47	7.2	1.8	0.2	10.0				
	<i>Oenanthe sarmentosa</i>	33	1.9	0.9	0.2	6.0				
	<i>Athyrium filix-femina</i>	33	2.0	0.7	0.2	5.0				
	<i>Juncus patens</i>	27	3.2	1.5	0.2	15.0				
	<i>Carex obnupta</i>	27	1.7	0.9	0.2	5.0				
	<i>Conium maculatum</i>	27	3.2	0.8	0.2	9.0				
	<i>Urtica dioica</i>	27	2.7	0.7	0.2	7.0				
	<i>Marah fabaceus</i>	27	3.8	0.6	0.2	7.0				

## ***Sambucus racemosa* – (*Rubus ursinus*) Provisional Association**

**Common Name:** Red Elderberry – (California Blackberry) Shrubland

**Alliance:** *Rubus spectabilis* – *Morella californica* Shrubland Alliance

### **Local Vegetation Description**

The Red Elderberry – (California Blackberry) Shrubland Association forms an intermittent to continuous shrub layer. The emergent tree layer is typically sparse to open, and the herbaceous layer is sparse to intermittent. Dominant and characteristic shrubs include *Sambucus racemosa* and *Rubus ursinus*, and those that are often present include *Baccharis pilularis*. Commonly associated emergent trees at sparse cover include *Umbellularia californica*. The herbaceous layer often includes *Heracleum maximum*, *Polystichum munitum*, *Scrophularia californica*, and *Urtica dioica*, and herbs that are sometimes present include *Marah fabaceus*, *Pteridium aquilinum*, and *Stachys ajugoides*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	4.4	0 – 20	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	72.0	50 – 85	3.1	1 – 5
Herb	26.0	0 – 50	0.3	0 – 0.5

### **Local Environmental Description**

**Elevation:** Mean 263 m, Range 86 – 476 m

**Aspect:** NE (1)

**Slope:** Mean 20 degrees, Range 20 – 20 degrees

**Macro Topography:** Upper 1/3 of slope (1)

**Large Rock:** 0.0%

**Small Rock:** 3.0%

**Fines Cover:** 33.0%

**Litter Cover:** 60%

**Soil Texture (field assessed):** Medium to very fine, sandy loam (1)

**Geology (field or map data):** Granitic (3), Metamorphic (type unknown) (1), Sandstone and other sedimentary (1)

**Marin County Watersheds:** Point Reyes (2), Lagunitas Creek (1)

**Other Watersheds, San Mateo Co.:** San Mateo Bayside (1), San Mateo Coastal (1)

### **Site Impacts**

This association has very low non-native plant cover (average 0.1%) relative to native cover.

### **Classification Comments**

This association is new and considered provisional since it is under-sampled in its expected range. Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** none

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

### **Surveys Used for Description**

**Total: N=5; Marin County (n=3):** PGA3504, PGA4303, PGA5242

San Mateo County (n=2): PGA1011, SMAT0031

*Sambucus racemosa* – (*Rubus ursinus*) Provisional Association  
*Rubus spectabilis* – *Morella californica* Shrubland Alliance



**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>	<i>Umbellularia californica</i>	40	36.9	4.6	3.0	20.0				
<b>Shrub</b>	<b><i>Sambucus racemosa</i></b>	<b>100</b>	<b>75.7</b>	<b>57.5</b>	<b>35.0</b>	<b>75.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<b><i>Rubus ursinus</i></b>	<b>80</b>	<b>4.8</b>	<b>3.8</b>	<b>0.2</b>	<b>10.0</b>	<b>X</b>			<b>X</b>
	<i>Baccharis pilularis</i>	60	8.4	5.2	1.0	20.0				<b>X</b>
	<i>Frangula californica</i>	40	7.9	6.4	2.0	30.0				
	<i>Toxicodendron diversilobum</i>	40	1.5	1.2	2.0	4.0				
	<i>Ribes</i> spp.	40	1.3	1.0	0.2	5.0				
<b>Herb</b>	<i>Scrophularia californica</i>	60	14.6	2.8	1.0	10.0				<b>X</b>
	<i>Urtica dioica</i>	60	6.2	2.2	0.2	10.0				<b>X</b>
	<i>Heracleum maximum</i>	60	3.9	0.7	0.2	3.0				<b>X</b>
	<i>Polystichum munitum</i>	60	13.8	0.7	0.2	3.0				<b>X</b>
	<i>Stachys ajugoides</i>	40	13.9	6.0	10.0	20.0				
	<i>Pteridium aquilinum</i>	40	4.1	1.6	3.0	5.0				
	<i>Marah fabaceus</i>	40	11.5	0.1	0.2	0.2				

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## ***Salix exigua* Shrubland Alliance**

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**Common Name:** Sandbar willow thickets

**NVC Alliance Code:** A0947. *Salix exigua* Warm Desert Wet Shrubland Alliance

### **Statewide Description**

*Salix exigua* is dominant or co-dominant in the shrub canopy with *Baccharis* spp., *Brickellia californica*, *Rosa californica*, *Rubus armeniacus*, *Rubus ursinus*, *Salix lasiolepis*, and *Salix melanopsis*. Emergent trees of many different species may be present at low cover.

The *Salix exigua* Alliance is widespread and common throughout California, especially along seasonally or temporarily flowing streams and at seeps. It often forms dense, clonal stands. Great regional variation exists in shrub and understory composition, ranging from Sierran mountain meadow species to those found in Colorado Desert oases. Along the Sacramento River and elsewhere in the Central Valley, *Salix exigua* are the first shrubs to colonize point bars and cut banks, followed in time by *Populus fremontii* and other tall, longer-lived species (Sands 1980). Rivers with flood-control dams in place may have reduced acreage of *Salix exigua* stands with increases in stands of longer-lived tree willows such as *S. gooddingii*, *S. laevigata*, and *S. lucida*.

### **Local Vegetation Description**

The Sandbar willow thickets Alliance forms an intermittent to continuous shrub layer. The emergent tree layer is typically sparse, and the herbaceous layer is open. Dominant and characteristic shrubs include *Salix exigua*, and those that are often present include *Rubus ursinus* and *Salix lasiolepis*. Regenerating or shrubby trees that are often present include *Acer negundo*. The herbaceous layer typically includes *Polygonum punctatum*, and herbs that are often present include *Amaranthus deflexus*, *Artemisia douglasiana*, *Barbarea orthoceras*, *Bromus carinatus*, *Carduus pycnocephalus*, *Centaureum muehlenbergii*, *Chamerion angustifolium*, *Conium maculatum*, *Cynodon dactylon*, *Cyperus eragrostis*, *Eleocharis macrostachya*, *Epipactis helleborine*, *Euphorbia peplus*, *Galium aparine*, *Helenium puberulum*, *Heliotropium curassavicum*, *Heracleum maximum*, *Isolepis cernua*, *Leontodon taraxacoides*, *Lythrum tribracteatum*, *Marah oreganus*, *Mimulus guttatus*, *Phyla nodiflora*, *Plantago major*, *Polypogon interruptus*, *Polypogon monspeliensis*, *Pseudognaphalium luteoalbum*, *Rumex crispus*, *Rumex pulcher*, *Scrophularia californica*, *Solanum americanum*, *Solanum nigrum*, *Stellaria media*, *Thalictrum fendleri*, *Urtica dioica*, *Veronica americana* and *Xanthium strumarium*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	No data	
Hardwood	0.1	0 – 0.2	12.5	5 – 20
Regenerating or Shrubby Tree	0.1	0 – 0.2	12.5	10 – 15
Shrub	58.5	42 – 75	0.8	0.5– 1
Herb	11.0	7 – 15	1.5	1 – 2

### Local Membership Rule

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

### Local Environmental Description

**Elevation:** Mean 48 m, Range 40 – 56 m

**Aspect:** NE (1), SE (1)

**Slope:** Mean 4 degrees, Range 2 – 6 degrees

**Macro Topography:** Bottom (1), Bottom to Lower 1/3 of slope (1)

**Large Rock:** Mean 0.0%, Range 0.0 – 0.0%

**Small Rock:** Mean 2.5%, Range 0.0 – 5.0%

**Fines Cover:** Mean 54.0%, Range 21 – 87%

**Litter Cover:** Mean 38.0%, Range 6.0 – 70%

**Soil Texture (field assessed):** Sand, (class unknown) (1), Medium silt (1)

**Geology (field or map data):** Franciscan melange (2)

**Marin County Watersheds:** Novato (1), Walker Creek (1)

### Site Impacts

This alliance has low non-native plant cover (average 7.2%) relative to native cover. Non-native species with highest frequency and abundance include *Amaranthus deflexus*, *Carduus pycnocephalus*, *Conium maculatum*, *Cynodon dactylon*, *Epipactis helleborine*, *Euphorbia peplus*, *Leontodon taraxacoides*, *Lythrum tribracteatum*, *Plantago major*, *Polypogon monspeliensis*, *Pseudognaphalium luteoalbum*, *Rumex crispus*, *Rumex pulcher*, *Solanum nigrum* and *Stellaria media*.

### Associations in Marin County

*Salix exigua*

### Classification Comments

None.

**References:** Buck-Diaz et al. 2012, Evens et al. 2014, Kittel et al. 2012, Klein et al. 2007, Klein et al. 2015, Vaghti 2003

**Global Rarity Rank:** G5

**State Rarity Rank:** S4

### Surveys Used for Description

**Total: N=2; Marin County (n=2):** MARIN050, MARIN290

### Alliance Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Regenerating or Shrubby Trees</b>										
	<i>Acer negundo</i>	50	50.0	0.1	0.2	0.2				X
<b>Shrub</b>										
	<i>Salix exigua</i>	100	95.1	56.7	38.4	75.0	X	X		X

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<i>Rubus ursinus</i>	50	4.7	2.0	4.0	4.0				X
	<i>Salix lasiolepis</i>	50	0.2	0.1	0.2	0.2				X
<b>Herb</b>										
	<i>Polygonum punctatum</i>	100	6.9	1.1	0.2	2.0	X			X
	<i>Conium maculatum</i>	50	17.9	1.5	3.0	3.0				X
	<i>Centaureum muehlenbergii</i>	50	8.6	1.5	3.0	3.0				X
	<i>Cynodon dactylon</i>	50	8.6	1.5	3.0	3.0				X
	<i>Marah oreganus</i>	50	17.9	1.5	3.0	3.0				X
	<i>Cyperus eragrostis</i>	50	5.7	1.0	2.0	2.0				X
	<i>Xanthium strumarium</i>	50	2.9	0.5	1.0	1.0				X
	<i>Phyla nodiflora</i>	50	2.9	0.5	1.0	1.0				X
	<i>Pseudognaphalium luteoalbum</i>	50	2.9	0.5	1.0	1.0				X
	<i>Solanum nigrum</i>	50	2.9	0.5	1.0	1.0				X
	<i>Amaranthus deflexus</i>	50	0.6	0.1	0.2	0.2				X
	<i>Eleocharis macrostachya</i>	50	0.6	0.1	0.2	0.2				X
	<i>Lythrum tribracteatum</i>	50	0.6	0.1	0.2	0.2				X
	<i>Leontodon taraxacoides</i>	50	0.6	0.1	0.2	0.2				X
	<i>Isolepis cernua</i>	50	0.6	0.1	0.2	0.2				X
	<i>Helenium puberulum</i>	50	0.6	0.1	0.2	0.2				X
	<i>Heracleum maximum</i>	50	1.2	0.1	0.2	0.2				X
	<i>Heliotropium curassavicum</i>	50	0.6	0.1	0.2	0.2				X
	<i>Galium aparine</i>	50	1.2	0.1	0.2	0.2				X
	<i>Epipactis helleborine</i>	50	1.2	0.1	0.2	0.2				X
	<i>Mimulus guttatus</i>	50	0.6	0.1	0.2	0.2				X
	<i>Carduus pycnocephalus</i>	50	1.2	0.1	0.2	0.2				X
	<i>Barbarea orthoceras</i>	50	1.2	0.1	0.2	0.2				X
	<i>Scrophularia californica</i>	50	1.2	0.1	0.2	0.2				X
	<i>Stellaria media</i>	50	1.2	0.1	0.2	0.2				X
	<i>Thalictrum fendleri</i>	50	1.2	0.1	0.2	0.2				X
	<i>Chamerion angustifolium</i>	50	0.6	0.1	0.2	0.2				X
	<i>Solanum americanum</i>	50	0.6	0.1	0.2	0.2				X
	<i>Bromus carinatus</i>	50	1.2	0.1	0.2	0.2				X
	<i>Rumex pulcher</i>	50	0.6	0.1	0.2	0.2				X
	<i>Rumex crispus</i>	50	0.6	0.1	0.2	0.2				X
	<i>Veronica americana</i>	50	0.6	0.1	0.2	0.2				X
	<i>Polypogon monspeliensis</i>	50	0.6	0.1	0.2	0.2				X
	<i>Polypogon interruptus</i>	50	0.6	0.1	0.2	0.2				X
	<i>Plantago major</i>	50	0.6	0.1	0.2	0.2				X
	<i>Artemisia douglasiana</i>	50	1.2	0.1	0.2	0.2				X
	<i>Euphorbia peplus</i>	50	1.2	0.1	0.2	0.2				X
	<i>Urtica dioica</i>	50	0.6	0.1	0.2	0.2				X

## Salix exigua Association

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**Common Name:** Narrow-leaf Willow Shrubland

**Alliance:** *Salix exigua* Shrubland Alliance

### Local Vegetation Description

The Narrow-leaf Willow Association forms an open to continuous shrub layer. The emergent tree layer is typically sparse to open, and the herbaceous layer is open. Dominant and characteristic shrubs include *Salix exigua*. The herbaceous layer often includes *Artemisia douglasiana*, and herbs that are sometimes present include *Brassica nigra*, *Centaureum muehlenbergii*, *Cirsium vulgare*, *Cynodon dactylon*, *Cyperus eragrostis*, *Epilobium ciliatum*, *Epipactis helleborine*, *Helenium puberulum*, *Hirschfeldia incana*, *Melilotus*, *Polygonum punctatum*, *Pseudognaphalium luteoalbum*, *Sonchus asper*, and *Xanthium strumarium*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	1.4	0 – 7	10.0	5 – 20
Regenerating or Shrubby Tree	1.8	0 – 8.0	5.1	0.5 – 15
Shrub	48.1	30 – 75	2.3	0 – 5
Herb	9.0	3 – 21	0.7	0 – 2

### Local Environmental Description

**Elevation:** Mean 66 m, Range 8 – 137 m

**Aspect:** SE (3), Flat (2), NE (2)

**Slope:** Mean 2 degrees, Range 0 – 6 degrees

**Macro Topography:** Bottom (5), Bottom to Lower 1/3 of slope (2)

**Large Rock:** Mean 0.7%, Range 0.0 – 5.0%

**Small Rock:** Mean 22.7%, Range 0.0 – 70.0%

**Fines Cover:** Mean 33.1%, Range 3.0 – 87.0%

**Litter Cover:** Mean 40.3%, Range 6.0 – 95%

**Soil Texture (field assessed):** Sand, (class unknown) (3), Coarse, loamy sand (1), Medium silt (1), Moderately fine clay loam (1)

**Geology (field or map data):** Franciscan melange (2), Sandstone (2), General volcanic extrusives (1), Sandy alluvium (most alluvial fans and washes) (1), Silty alluvium (1)

**Marin County Watersheds:** Novato (1), Walker Creek (1)

**Other Watersheds, San Mateo Co.:** Palo Alto (1), San Mateo Bayside (1); **Sonoma Co.:** Lower Russian River (2), Middle Russian River (1)

### Site Impacts

This association has low non-native plant cover (average 10.6%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Brassica nigra*, *Cirsium vulgare*, *Cynodon dactylon*, *Epipactis helleborine*, *Hirschfeldia incana*, *Melilotus* spp., *Pseudognaphalium luteoalbum*, and *Sonchus asper*.

### Classification Comments

Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** Buck-Diaz et al. 2012, Evens et al. 2014, Kittel et al. 2012, Klein et al. 2007, Klein et al. 2015, Vaghti 2003

Global Rarity Rank: GNR

State Rarity Rank: SNR

State Rare: N

**Surveys Used for Description**

Total: N=7; Marin County (n=2): MARIN050, MARIN290

San Mateo County (n=2): SMAT0077, SMAT0242

Sonoma County (n=3): SONO0168, SONO0204, SONO0997

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Regenerating or Shrubby Trees</b>										
	<i>Salix laevigata</i>	43	25.0	1.1	1.0	6.0				
	<i>Acer negundo</i>	29	28.6	0.1	0.2	0.2				
<b>Shrub</b>										
	<b><i>Salix exigua</i></b>	<b>100</b>	<b>85.4</b>	<b>45.5</b>	<b>20.0</b>	<b>75.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Rubus ursinus</i>	43	6.3	4.1	4.0	15.0				
	<i>Vitis californica</i>	29	3.4	1.1	2.0	6.0				
<b>Herb</b>										
	<i>Artemisia douglasiana</i>	57	4.7	0.8	0.2	5.0				<b>X</b>
	<i>Cynodon dactylon</i>	43	14.2	1.5	0.2	7.0				
	<i>Polygonum punctatum</i>	43	2.2	0.3	0.2	2.0				
	<i>Xanthium strumarium</i>	43	1.9	0.2	0.2	1.0				
	<i>Helenium puberulum</i>	43	1.1	0.1	0.2	0.2				
	<i>Cyperus eragrostis</i>	29	3.0	0.6	2.0	2.0				
	<i>Centaurium muehlenbergii</i>	29	3.2	0.5	0.2	3.0				
	<i>Hirschfeldia incana</i>	29	2.2	0.5	0.2	3.0				
	<i>Brassica nigra</i>	29	5.3	0.3	1.0	1.0				
	<i>Pseudognaphalium luteoalbum</i>	29	1.0	0.2	0.2	1.0				
	<i>Cirsium vulgare</i>	29	0.9	0.1	0.2	0.2				
	<i>Epilobium ciliatum</i>	29	0.8	0.1	0.2	0.2				
	<i>Epipactis helleborine</i>	29	1.1	0.1	0.2	0.2				
	<i>Melilotus</i> spp.	29	1.1	0.1	0.2	0.2				
	<i>Sonchus asper</i>	29	0.9	0.1	0.2	0.2				
<b>Non-vasc</b>										
	Moss	43	28.6	0.1	0.2	0.2				
	Lichen	29	14.3	0.1	0.2	0.2				



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## ***Salix hookeriana* – *Salix sitchensis* – *Spiraea douglasii* Shrubland Alliance**

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**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**

*Salix hookeriana* is dominant or co-dominant in the tall shrub or low tree canopy with *Baccharis pilularis*, *Morella californica*, *Rubus* spp., *Salix lasiolepis* and *Salix sitchensis*. As a shrubland, emergent trees may be present at low cover, including *Alnus rubra*, *Picea sitchensis* or *Salix lucida*.

*Salix hookeriana* forms 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.

*Salix sitchensis* is dominant in the tall shrub or low tree canopy with *Acer macrophyllum*, *Alnus rubra*, *Cornus sericea*, *Populus trichocarpa*, *Rubus* spp., *Salix* spp. and *Sambucus nigra*. As a shrubland, emergent trees may be present at low cover.

*Salix sitchensis* and *S. hookeriana* range from Alaska to California. These species are ecologically and morphologically similar. They both grow along low elevation streams and lagoons along the North Coast of California. So far, most willow stands observed in this region are dominated by *S. lasiolepis*, but it is possible for stands with *S. sitchensis* dominant to exist.

### Local Vegetation Description

The Coastal dune willow – Sitka willow – Douglas spiraea thickets Alliance forms a sparse to continuous shrub layer. The emergent tree layer is typically sparse to open, and the herbaceous layer is sparse to continuous. Shrubs that are often present include *Baccharis pilularis*, *Rubus parviflorus*, *Rubus ursinus* and *Toxicodendron diversilobum*. Commonly associated emergent trees at sparse cover include *Alnus rubra* and *Pseudotsuga menziesii*. The herbs that are sometimes present include *Athyrium filix-femina*, *Carex nudata*, *Conium maculatum*, *Equisetum* spp., *Equisetum telmateia*, *Holcus lanatus*, *Juncus* spp., *Mentha pulegium*, *Scirpus microcarpus*, *Scrophularia californica* and *Woodwardia fimbriata*. Commonly associated non-vascular plants include Moss.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	1.0	0 – 4	10.8	5 – 15
Hardwood	3.3	0 – 20	7.8	2 – 15
Regenerating or Shrubby Tree	0.6	0 – 2.2	4.2	2 – 10
Shrub	49.6	0.2 – 88.0	3.2	0.5– 5
Herb	16.1	1 – 72	0.8	0 – 2

### Local Membership Rule

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

### Local Environmental Description

**Elevation:** Mean 41 m, Range 7 – 109 m

**Aspect:** SE (3), SW (3), Flat (1), NW (1)

**Slope:** Mean 4 degrees, Range 0 – 15 degrees

**Macro Topography:** Bottom (6), Bottom to Lower 1/3 of slope (1), Lower 1/3 of slope (1), Middle 1/3 of slope (1)

**Large Rock:** Mean 3.4%, Range 0.0 – 18.0%

**Small Rock:** Mean 26.0%, Range 0.0 – 76.0%

**Fines Cover:** Mean 17.2%, Range 0.2 – 50.0%

**Litter Cover:** Mean 46.6%, Range 2.0 – 97%

**Soil Texture (field assessed):** Unknown (1)

**Geology (field or map data):** Sandstone (4), Franciscan melange (2), Alluvium (1), Clayey alluvium (1), Mixed alluvium (1)

**Marin County Watersheds:** None

**Other Watersheds, San Mateo Co.:** Pacifica (1); **Sonoma Co.:** Gualala River (5), Russian Gulch (3)

### Site Impacts

This alliance has low non-native plant cover (average 6.7%) relative to native cover. Non-native species with highest frequency and abundance include *Conium maculatum*, *Holcus lanatus*, *Mentha pulegium* and *Rubus armeniacus*.

### Associations in Marin County

*Salix sitchensis*\*

### Classification Comments

Though no stands were surveyed in Marin County, this alliance is known from nearby counties with sample data, and it occurs here sporadically with a few stands mapped.

**References:** Buck-Diaz et al. 2019, Klein et al. 2015, NatureServe 2020



Global Rarity Rank: GNR

State Rarity Rank: SNR

**Surveys Used for Description**

**Total: N=9; Marin County (n=0)**

San Mateo County (n=1): SMAT0162, San Francisco County (n=0):

Sonoma County (n=8): SONO0062, SONO0396, SONO0728, SONO0730, SONO0738, SONO0873, SONO0882, SONO0975

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Pseudotsuga menziesii</i>	33	17.5	0.9	2.0	4.0				
	<i>Alnus rubra</i>	33	19.0	0.6	0.2	5.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Pseudotsuga menziesii</i> *	33	27.8	0.4	0.2	2.2				
	<i>Alnus rubra</i> *	22	18.5	0.2	0.4	1.2				
<b>Shrub</b>										
	<b><i>Salix sitchensis</i></b>	<b>100</b>	<b>80.3</b>	<b>40.6</b>	<b>17.0</b>	<b>65.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Rubus ursinus</i>	67	2.9	2.2	0.2	7.0				<b>X</b>
	<i>Rubus parviflorus</i>	56	2.5	1.9	0.2	9.0				<b>X</b>
	<i>Toxicodendron diversilobum</i>	56	1.2	0.8	0.2	5.0				<b>X</b>
	<i>Baccharis pilularis</i>	56	0.5	0.4	0.2	2.0				<b>X</b>
	<i>Salix lasiolepis</i>	33	2.8	2.0	0.2	10.0				
	<i>Morella californica</i>	33	0.8	0.7	0.2	5.0				
	<i>Lonicera involucrata</i>	22	2.1	2.1	2.0	17.0				
	<i>Rubus armeniacus</i>	22	3.5	1.9	2.0	15.0				
	<i>Ribes sanguineum</i>	22	0.5	0.4	0.2	3.0				
	<i>Frangula californica</i>	22	0.3	0.2	0.2	2.0				
	<i>Holodiscus discolor</i>	22	0.3	0.2	0.2	2.0				
<b>Herb</b>										
	<i>Scirpus microcarpus</i>	33	10.0	5.8	0.2	37.0				
	<i>Holcus lanatus</i>	33	7.3	0.7	0.2	3.0				
	<i>Equisetum</i> spp.	33	1.7	0.4	0.2	3.0				
	<i>Athyrium filix-femina</i>	33	3.4	0.3	0.2	2.0				
	<i>Scrophularia californica</i>	33	3.7	0.2	0.2	1.0				
	<i>Mentha pulegium</i>	33	1.5	0.1	0.2	0.2				
	<i>Equisetum telmateia</i>	22	8.5	4.8	1.0	42.0				
	<i>Juncus</i> spp.	22	1.9	1.1	0.2	10.0				
	<i>Carex nudata</i>	22	17.7	0.9	1.0	7.0				
	<i>Conium maculatum</i>	22	1.5	0.1	0.2	1.0				
	<i>Woodwardia fimbriata</i>	22	2.5	0.1	0.2	1.0				
<b>Non-vascular</b>										
	Moss	44	38.9	2.8	0.2	25.0				

## Salix sitchensis Provisional Association

**Common Name:** Sitka willow Shrubland

**Alliance:** *Salix hookeriana* – *Salix sitchensis* – *Spiraea douglasii* Shrubland Alliance

### Local Vegetation Description

The Sitka willow Association forms a continuous shrub layer in the single sample available. The emergent tree layer is absent, and the herbaceous layer is open. Dominant and characteristic shrubs include *Salix sitchensis*, *Baccharis pilularis*, *Cornus sericea*, *Frangula californica*, *Rubus armeniacus*, *Rubus parviflorus*, *Rubus ursinus*, and *Salix lasiolepis*. The herbaceous layer includes *Delairea odorata*, *Artemisia douglasiana*, *Conium maculatum*, *Cortaderia jubata*, *Crassula multicava*, *Dryopteris arguta*, *Galium aparine*, *Geranium dissectum*, *Picris echioides*, *Scirpus microcarpus*, *Scrophularia californica*, and *Symphotrichum chilense*. Associated non-vascular plants include Lichen and Moss.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	NA	no data	
Hardwood	0.0	NA	no data	
Regenerating or Shrubby Tree	0.0	NA	no data	
Shrub	75.0	NA	3.5	2 – 5
Herb	10.0	NA	0.3	0 – 0.5

### Local Environmental Description

**Elevation:** 10 m

**Aspect:** Flat (1)

**Slope:** 0 degrees

**Macro Topography:** Bottom (1)

**Large Rock:** 0.0%

**Small Rock:** 5.0%

**Fines Cover:** 50.0%

**Litter Cover:** 42%

**Soil Texture (field assessed):** Unknown (1)

**Geology (field or map data):** Alluvium (1)

**Marin County Watersheds:** None

**Other Watersheds, San Mateo Co.:** Pacifica (1)

### Site Impacts

This association has low non-native plant cover (average 15.5%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Delairea odorata*, *Crassula multicava*, *Picris echioides*, and *Rubus armeniacus*.

### Classification Comments

This association is considered provisional since it is under-sampled in its expected range, including a lack of sampling during the classification phase in Marin County.

**References:** Buck-Diaz et al. 2019, Klein et al. 2015

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

**Total: N=1; Marin County (n=0)**

San Mateo County (n=1): SMAT0162

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Salix sitchensis</i>	100	57.6	40.0	40.0	40.0	X	X		X
	<i>Cornus sericea</i>	100	14.4	10.0	10.0	10.0	X			X
	<i>Salix lasiolepis</i>	100	14.4	10.0	10.0	10.0	X			X
	<i>Rubus ursinus</i>	100	7.2	5.0	5.0	5.0	X			X
	<i>Baccharis pilularis</i>	100	2.9	2.0	2.0	2.0	X			X
	<i>Rubus armeniacus</i>	100	2.9	2.0	2.0	2.0	X			X
	<i>Frangula californica</i>	100	0.3	0.2	0.2	0.2	X			X
	<i>Rubus parviflorus</i>	100	0.3	0.2	0.2	0.2	X			X
<b>Herb</b>										
	<i>Delairea odorata</i>	100	67.8	8.0	8.0	8.0	X	X		X
	<i>Crassula multicava</i>	100	8.5	1.0	1.0	1.0	X			X
	<i>Picris echioides</i>	100	8.5	1.0	1.0	1.0	X			X
	<i>Artemisia douglasiana</i>	100	1.7	0.2	0.2	0.2	X			X
	<i>Conium maculatum</i>	100	1.7	0.2	0.2	0.2	X			X
	<i>Cortaderia jubata</i>	100	1.7	0.2	0.2	0.2	X			X
	<i>Dryopteris arguta</i>	100	1.7	0.2	0.2	0.2	X			X
	<i>Galium aparine</i>	100	1.7	0.2	0.2	0.2	X			X
	<i>Geranium dissectum</i>	100	1.7	0.2	0.2	0.2	X			X
	<i>Scirpus microcarpus</i>	100	1.7	0.2	0.2	0.2	X			X
	<i>Scrophularia californica</i>	100	1.7	0.2	0.2	0.2	X			X
	<i>Symphotrichum chilense</i>	100	1.7	0.2	0.2	0.2	X			X
<b>Non-vascular</b>										
	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

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## ***Salix lasiolepis* Shrubland Alliance**

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**Common Name:** Arroyo willow thickets

**NVC Alliance Code:** A3878. *Salix lasiolepis* Warm Desert Wet Shrubland Alliance

### **Statewide Description**

*Salix lasiolepis* is dominant or co-dominant in the tall shrub or low tree canopy with *Acer macrophyllum*, *Baccharis pilularis*, *Baccharis salicifolia*, *Cephalanthus occidentalis*, *Cornus sericea*, *Morella californica*, *Platanus racemosa*, *Populus fremontii*, *Populus trichocarpa*, *Salix* spp., and *Sambucus nigra*. Emergent trees may be present at low cover.

*Salix lasiolepis* grows on seasonally or intermittently flooded riparian sites. Some plants in California stands are sufficiently tall to be considered trees. Plants are typically shrubby and multi-branched along coastal creeks, at lower and middle elevations, and in parts of the Sacramento–San Joaquin River delta. Some taxonomists recognize varieties: *Salix lasiolepis* var. *bigelovii* is a coastal plant, and *S. lasiolepis* var. *lasiolepis* grows throughout the state (Argus 1997). Disturbances during winter floods modify stands; timing of seed dispersal and spring flood patterns determine seedling success.

### **Local Vegetation Description**

The Arroyo willow thickets Alliance forms an open to continuous shrub layer. The emergent tree layer is typically sparse to intermittent, and the herbaceous layer is sparse to continuous. Dominant and characteristic shrubs include *Salix lasiolepis*, and those that are often present include *Rubus ursinus*. The herbs that are sometimes present include *Athyrium filix-femina*, *Conium maculatum*, *Marah fabaceus*, *Scrophularia californica* and *Urtica dioica*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.9	0 – 22	No data	
Hardwood	4.1	0 – 40	6.3	2 – 20
Regenerating or Shrubby Tree	0.1	0 – 7.0	2.1	0.5 – 5
Shrub	80.4	31.0 – 100.0	2.2	0 – 5
Herb	23.6	0 – 85	1.0	0 – 5

### **Local Membership Rule**

*Salix lasiolepis* dominates or co-dominates with *Rubus* along stream banks and benches, slope seeps, and drainage stringers. Emergent riparian trees are often present, such as *Acer*, *Alnus*, *Fraxinus*, *Salix*, and others.

### **Local Environmental Description**

**Elevation:** Mean 37 m, Range 6 – 135 m

Middle 1/3 of slope (1), Upper 1/3 of slope (1), Draw or Wash (channel bed) (2)

**Aspect:** SW (4), Flat (3), NE (2), NW (2), SE (2)

**Slope:** Mean 5 degrees, Range 0 – 18 degrees

**Large Rock:** Mean 1.0%, Range 0.0 – 10.0%

**Small Rock:** Mean 4.9%, Range 0.0 – 25.0%

**Macro Topography:** Bottom (3), Edge of basin/wetland (3), Lower 1/3 of slope (3),

**Fines Cover:** Mean 24.3%, Range 5.0 – 74%

**Litter Cover:** Mean 43.5%, Range 5.0 – 86%

**Soil Texture (field assessed):** Medium to very fine, sandy loam (2), Moderately fine clay loam (2), Moderately fine sandy clay loam (2), Coarse, loamy sand (2), Fine clay (2), Moderately coarse, sandy loam (1), Muck (1), Medium silt loam (1)

**Geology (field or map data):** Sandstone and other sedimentary (17), Franciscan melange (10), Granitic (9), Alluvium (6), Granitic (generic) (2), Volcanic and metavolcanic rocks (1), Shale (1), Sandy alluvium (1), Sandstone, shale, and conglomerate (1), Large landslides (1), Mixed alluvium (1)

**Marin County Watersheds:** Bolinas (12), Point Reyes (12), Inverness (10), Lagunitas Creek (9), Walker Creek (6), Novato (1), San Rafael (1)

### **Site Impacts**

This alliance has low non-native plant cover (average 7.5%) relative to native cover. Non-native species with highest frequency and abundance include *Conium maculatum*.

### **Associations in Marin County**

*Salix lasiolepis*

*Salix lasiolepis* – *Rubus* spp.

*Salix lasiolepis* – *Salix lucida*

### **Classification Comments**

None.

**References:** AECOM 2013, Buck-Diaz et al. 2012, HDR 2014b, Hickson and Keeler-Wolf 2007, Keeler-Wolf et al. 1998b, Keeler-Wolf et al. 2003a, Klein et al. 2007, Klein et al. 2015, Reyes et al. 2020, Rodriguez et al. 2017, Sproul et al. 2011, Stillwater Sciences and URS 2007, VegCAMP 2015a

**Global Rarity Rank:** G4

**State Rarity Rank:** S4

### **Surveys Used for Description**

**Total: N=57; Marin County (n=57):** MARIN072, MARIN116, MMWD0130, MMWD0393, MOSD0275, MOSD0349, PGA1132, PGA1187, PGA1379, PGA141, PGA1465, PGA1467, PGA1510, PGA163, PGA1687, PGA1700, PGA1701, PGA1718, PGA1719, PGA1722, PGA1723, PGA1739, PGA2052, PGA2161, PGA2180, PGA224,

PGA2287, PGA2313, PGA2335, PGA2383, PGA2422, PGA3472, PGA3584, PGA3584A, PGA3998, PGA4382, PGA4475, PGA4669, PGA4993, PGA4999, PGA534, PGA54, PGA559, PGA5980A, PGA61, PGA635, PGA6584, PGA6816, PGA8222, PORE038, PORE067, PORE076, PORE090, PORE161, PORE168, PORE192, TEVA05a

### **Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

<b>Layer</b>	<b>Taxon</b>	<b>Con</b>	<b>Rel</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>	<b>Ch</b>	<b>D</b>	<b>cD</b>	<b>Oft</b>
<b>Shrub</b>										
	<i>Salix lasiolepis</i>	100	66.8	58.2	10.0	100.0	X	X		X
	<i>Rubus ursinus</i>	70	15.0	13.4	0.2	65.0				X
	<i>Toxicodendron diversilobum</i>	33	2.5	2.3	0.2	20.0				
	<i>Rubus parviflorus</i>	28	3.4	3.3	0.2	55.0				
	<i>Baccharis pilularis</i>	23	2.5	1.4	0.2	20.0				
	<i>Lonicera involucrata</i>	23	1.2	1.0	0.2	25.0				
	<i>Rubus spectabilis</i>	21	2.7	2.3	0.2	45.0				
<b>Herb</b>										
	<i>Conium maculatum</i>	40	11.8	4.3	0.2	75.0				
	<i>Urtica dioica</i>	33	8.5	2.6	0.2	35.0				
	<i>Marah fabaceus</i>	32	7.8	1.1	0.2	10.0				
	<i>Athyrium filix-femina</i>	21	4.3	0.6	0.2	7.0				
	<i>Scrophularia californica</i>	21	1.6	0.4	0.2	10.0				

## ***Salix lasiolepis* Association**

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**Common Name:** Arroyo Willow Riparian Shrubland

**Alliance:** *Salix lasiolepis* Shrubland Alliance

### **Local Vegetation Description**

The Arroyo Willow Riparian Association forms an intermittent to continuous shrub layer. The emergent tree layer is typically sparse to open, and the herbaceous layer is sparse to continuous. Dominant and characteristic shrubs include *Salix lasiolepis*, and those that are often present include *Toxicodendron diversilobum*. Commonly associated emergent trees include *Hesperocyparis macrocarpa*. The herbaceous layer sometimes includes *Conium maculatum* and *Juncus patens*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	4.6	0 – 22	no data	
Hardwood	0.9	0 – 7	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	82.2	55 – 100	3.5	2 – 5
Herb	22.5	0 – 70	0.3	0 – 0.5

### **Local Environmental Description**

**Elevation:** Mean 54 m, Range 8 – 94 m

**Aspect:** no data

**Slope:** no data

**Macro Topography:** no data

**Large Rock:** no data

**Small Rock:** no data

**Fines Cover:** no data

**Litter Cover:** no data

**Soil Texture (field assessed):** no data

**Geology (field or map data):** Granitic (3), Sandstone and other sedimentary (3), Sandstone, shale, and conglomerate (1)

**Marin County Watersheds:** Inverness (3), Bolinas (2), Point Reyes (2)

### **Site Impacts**

This association has low non-native plant cover (average 10.0%) relative to native cover. Non-native species that occur with highest frequency and abundance includes *Conium maculatum*.

### **Classification Comments**

None.

**References:** AECOM 2013, Buck-Diaz et al. 2012, HDR 2014b, Hickson and Keeler-Wolf 2007, Keeler-Wolf et al. 1998b, Reyes et al. 2020, Rodriguez et al. 2017, Sproul et al. 2011, VegCAMP 2015a

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

### **Surveys Used for Description**

**Total: N=8; Marin County (n=8):** PGA141, PGA1722, PGA1723, PGA1739, PGA2180, PGA54, PGA61, PGA6816

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>	<i>Hesperocyparis macrocarpa</i>	25	23.9	4.4	15.0	20.0				
<b>Shrub</b>	<b><i>Salix lasiolepis</i></b>	<b>100</b>	<b>87.5</b>	<b>74.3</b>	<b>25.0</b>	<b>100.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Toxicodendron diversilobum</i>	50	6.7	5.4	2.0	20.0				<b>X</b>
	<i>Baccharis pilularis</i>	25	2.7	1.8	4.0	10.0				
<b>Herb</b>	<i>Conium maculatum</i>	38	22.0	10.4	13.0	40.0				
	<i>Juncus patens</i>	25	13.9	2.1	7.0	10.0				



***Salix lasiolepis* – *Rubus* spp. Association**

**Common Name:** Arroyo Willow / Blackberry Shrubland

**Alliance:** *Salix lasiolepis* Shrubland Alliance

**Local Vegetation Description**

The Arroyo Willow / Blackberry Association forms an open to continuous shrub layer. The emergent tree layer is typically absent, and the herbaceous layer is sparse to continuous. Dominant and characteristic shrubs include *Salix lasiolepis* and *Rubus ursinus*. The herbaceous layer sometimes includes *Athyrium filix-femina*, *Conium maculatum*, *Marah fabaceus*, *Polystichum munitum*, *Scrophularia californica*, *Stachys ajugoides*, and *Urtica dioica*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.2	0 – 5	no data	
Hardwood	2.7	0 – 20	6.4	2 – 20
Regenerating or Shrubby Tree	0.0	0 – 0.2	2.1	0.5 – 5
Shrub	81.2	31 – 100	2.2	0 – 5
Herb	22.9	0 – 85	1.1	0 – 5

**Local Environmental Description**

**Elevation:** Mean 35 m, Range 6 – 108 m

**Aspect:** SW (4), Flat (2), NE (2), NW (1), SE (1)

**Slope:** Mean 4 degrees, Range 0 – 14 degrees

**Macro Topography:** Lower 1/3 of slope (3), Edge of basin/wetland (2), Bottom (1), Draw (1), Middle 1/3 of slope (1), Upper 1/3 of slope (1), Wash (channel bed) (1)

**Large Rock:** Mean 0.3%, Range 0.0 – 2.0%

**Small Rock:** Mean 4.8%, Range 0.0 – 25.0%

**Fines Cover:** Mean 24.3%, Range 5.0 – 74.0%

**Litter Cover:** Mean 49.3%, Range 6.0 – 86%

**Soil Texture (field assessed):** Fine clay (2), Moderately fine clay loam (2), Moderately fine sandy clay loam (2), Medium to very fine, sandy loam (1), Moderately coarse, sandy loam (1), Muck (1), Coarse, loamy sand (1)

**Geology (field or map data):** Sandstone and other sedimentary (13), Franciscan melange (8), Granitic (6), Alluvium (4), Volcanic and metavolcanic rocks (1), Shale (1), Sandy alluvium (most alluvial fans and washes) (1), Granitic (generic) (1), Large landslides (1)

**Marin County Watersheds:** Point Reyes (10), Bolinas (8), Inverness (7), Lagunitas Creek (5), Walker Creek (5), Novato (1), San Rafael (1)

**Site Impacts**

This association has low non-native plant cover (average 7.8%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Conium maculatum*.

**Classification Comments**

None.

**References:** Buck-Diaz et al. 2012, Keeler-Wolf et al. 2003a, Klein et al. 2007, Klein et al. 2015

**Global Rarity Rank:** G4

**State Rarity Rank:** S4?

**State Rare:** N

**Surveys Used for Description**

**Total: N=41; Marin County (n=41):** MARIN072, MARIN116, MMWD0130, MMWD0393, MOSD0275, MOSD0349, PGA1132, PGA1187, PGA1379, PGA1465, PGA1467, PGA163, PGA1700, PGA1701, PGA1718, PGA1719, PGA2052, PGA2161, PGA224, PGA2287, PGA2313, PGA2335, PGA2383, PGA2422, PGA3472, PGA3584, PGA3584A, PGA4382, PGA4669, PGA4993, PGA4999, PGA534, PGA559, PGA5980A, PGA635, PGA6584, PORE038, PORE067, PORE076, PORE168, TEVA05a

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Shrub	<i>Salix lasiolepis</i>	100	61.4	55.4	10.0	93.0	X	X		X
	<i>Rubus ursinus</i>	78	18.1	16.0	0.2	65.0	X			X
	<i>Rubus parviflorus</i>	32	3.9	3.9	0.2	55.0				
	<i>Rubus spectabilis</i>	29	3.7	3.3	0.2	45.0				
	<i>Toxicodendron diversilobum</i>	29	2.1	2.1	0.2	20.0				
	<i>Baccharis pilularis</i>	27	3.0	1.6	0.2	20.0				
	<i>Lonicera involucrata</i>	24	1.6	1.4	0.2	25.0				
Herb	<i>Conium maculatum</i>	37	10.3	3.6	0.2	75.0				
	<i>Urtica dioica</i>	37	9.4	3.0	0.4	35.0				
	<i>Marah fabaceus</i>	32	7.8	1.1	0.2	10.0				
	<i>Athyrium filix-femina</i>	24	4.1	0.7	0.2	5.0				
	<i>Stachys ajugoides</i>	24	3.1	0.6	0.2	6.0				
	<i>Scrophularia californica</i>	24	1.9	0.5	0.2	10.0				
	<i>Polystichum munitum</i>	22	2.3	0.5	0.2	10.0				

***Salix lasiolepis* – *Salix lucida* Association**

**Common Name:** Arroyo Willow – Shining Willow Shrubland

**Alliance:** *Salix lasiolepis* Shrubland Alliance

**Local Vegetation Description**

The Arroyo Willow – Shining Willow Association forms an intermittent to continuous shrub layer. The emergent tree layer is typically sparse to intermittent, and the herbaceous layer is open to intermittent. Dominant and characteristic shrubs include *Salix lasiolepis* and *Rubus ursinus*. Commonly associated emergent trees at sparse cover include *Salix lasiandra* and *Umbellularia californica*. The herbaceous layer often includes *Conium maculatum*, *Marah fabaceus*, and *Urtica dioica*, and herbs that are sometimes present include *Carex* spp., *Equisetum arvense*, *Juncus effusus*, *Oenanthe sarmentosa*, and *Sonchus* spp.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	18.6	4 – 40	10.0	5 – 15
Regenerating or Shrubby Tree	0.9	0 – 7	no data	
Shrub	73.0	55 – 95	2.4	0.5 – 5
Herb	30.8	7 – 45	2.4	0.5 – 5

**Local Environmental Description**

**Elevation:** Mean 36 m, Range 8 – 135 m

**Aspect:** SE (1), NW (1), Flat (1)

**Slope:** Mean 7 degrees, Range 0 – 18 degrees

**Macro Topography:** Bottom (2), Edge of basin/wetland (1)

**Large Rock:** Mean 3.3%, Range 0.0 – 10.0%

**Small Rock:** Mean 5.0%, Range 0.0 – 15.0%

**Fines Cover:** no data

**Litter Cover:** Mean 24.0%, Range 5.0 – 50%

**Soil Texture (field assessed):** Coarse, loamy sand (1), Medium silt loam (1), Medium to very fine, sandy loam (1)

**Geology (field or map data):** Alluvium (2), Franciscan melange (2), Granitic (generic) (1), Mixed alluvium (1), Sandstone and other sedimentary (1)

**Marin County Watersheds:** Lagunitas Creek (4), Bolinas (2), Walker Creek (1)

**Site Impacts**

This association has low non-native plant cover (average 3.6%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Conium maculatum*, *Rubus armeniacus*, and *Sonchus* spp.

**Classification Comments**

*Salix lasiandra* and *S. lucida* are synonyms.

**References:** Keeler-Wolf et al. 2003a, Stillwater Sciences and URS 2007

**Global Rarity Rank:** G3

**State Rarity Rank:** S3?

**State Rare:** Y

**Surveys Used for Description**

**Total: N=8; Marin County (n=8):** PGA1510, PGA1687, PGA3998, PGA4475, PGA8222, PORE090, PORE161, PORE192

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Salix lasiandra</i>	100	79.0	13.0	4.0	25.0	X	X		X
	<i>Umbellularia californica</i>	25	15.6	5.0	10.0	30.0				
<b>Shrub</b>										
	<i>Salix lasiolepis</i>	100	74.0	56.8	40.0	75.2	X	X		X
	<i>Rubus ursinus</i>	88	14.2	13.5	0.2	40.0	X			X
	<i>Rubus parviflorus</i>	38	4.3	3.8	0.2	20.0				
	<i>Sambucus racemosa</i>	38	2.6	2.7	0.2	20.0				
	<i>Toxicodendron diversilobum</i>	38	0.7	0.8	0.2	6.0				
	<i>Rubus armeniacus</i>	25	2.0	1.4	3.0	8.0				
	<i>Lonicera involucrata</i>	25	0.1	0.1	0.2	0.2				
<b>Herb</b>										
	<i>Conium maculatum</i>	63	9.2	1.6	0.2	7.0				X
	<i>Urtica dioica</i>	50	12.0	3.4	0.2	12.0				X
	<i>Marah fabaceus</i>	50	14.7	1.7	0.2	10.0				X
	<i>Carex</i> spp.	38	0.3	0.1	0.2	0.2				
	<i>Equisetum arvense</i>	25	7.4	2.8	7.0	15.0				
	<i>Juncus effusus</i>	25	3.5	0.7	0.2	5.0				
	<i>Oenanthe sarmentosa</i>	25	1.5	0.2	0.2	1.0				
	<i>Sonchus</i> spp.	25	0.2	0.1	0.2	0.2				

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## ***Toxicodendron diversilobum* Shrubland Alliance**

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**Common Name:** Poison oak scrub

**NVC Alliance Code:** A2610. *Toxicodendron diversilobum* Scrub Alliance

### **Statewide Description**

*Toxicodendron diversilobum* is dominant in the shrub canopy with *Artemisia californica*, *Baccharis pilularis*, *Diplacus aurantiacus*, *Heteromeles arbutifolia*, *Keckiella cordifolia*, *Malosma laurina*, *Philadelphus lewisii*, *Rhamnus ilicifolia*, *Rubus parviflorus*, *Salvia leucophylla*, *Salvia mellifera*, and *Sambucus nigra*. Emergent trees may be present at low cover, including *Juglans californica* or *Quercus agrifolia*.

Sampling in this alliance requires care. Nonetheless, people have sampled it in a variety of settings in southern and central California, from the immediate coastline to dry inland foothills of the Sierra Nevada. Some coastal stands are nearly pure, persistent, and have relatively low diversity. However, some stands are likely to be a consequence of past and frequent fire disturbance, and these can have a high diversity of native herbs and emergent trees. *Toxicodendron diversilobum* grows throughout cismontane California and is found in many low-elevation alliances.

### **Local Vegetation Description**

The Poison oak scrub Alliance forms an intermittent to continuous shrub layer. The emergent tree layer is typically sparse to open, and the herbaceous layer is sparse to continuous. Dominant and characteristic shrubs include *Toxicodendron diversilobum* and *Baccharis pilularis*, and those that are often present include *Rubus ursinus*. The herbs that are sometimes present include *Holcus lanatus*, *Polystichum munitum* and *Pteridium aquilinum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	1.0	0 – 12	27.5	20 – 35
Hardwood	1.3	0 – 10	6.2	2 – 10
Regenerating or Shrubby Tree	1.0	0 – 15	4.2	1 – 10
Shrub	75.4	45 – 100	2.5	0 – 5
Herb	22.2	0 – 80	0.8	0 – 5

### **Local Membership Rule**

*Toxicodendron diversilobum* dominates, sometimes intermixing with sub-dominant *Baccharis pilularis* and *Rubus* spp. If *B. pilularis* is present and greater than 50% relative cover, key to the *Baccharis pilularis* Alliance. For this project, stands were encountered close to the coast, although they are likely to occur inland as well.

### **Local Environmental Description**

**Elevation:** Mean 103 m, Range 23 – 382 m

**Aspect:** NE (3), SE (1), Flat (1), NW (1)

**Slope:** Mean 17 degrees, Range 0 – 33 degrees

**Macro Topography:** Lower 1/3 of slope (2), Upper 1/3 of slope (2), Bottom (1), Other (1)

**Large Rock:** Mean 0.1%, Range 0.0 – 0.2%

**Small Rock:** Mean 7.1%, Range 0.0 – 25.0%

**Fines Cover:** Mean 38.5%, Range 4.0 – 74.0%

**Litter Cover:** Mean 37.8%, Range 5.0 – 85%

**Soil Texture (field assessed):** Fine sandy clay (1), Moderately coarse, sandy loam (1), Moderately fine clay loam (1), Moderately fine sandy clay loam (1), Moderately fine silty clay loam (1), Not recorded (1)

**Geology (field or map data):** Sandstone and other sedimentary (6), Volcanic and metavolcanic rocks (3), Blueschist and semi-schist (2), Sandstone (1), Granitic (1), Franciscan melange (1), Ultramafic rocks, mostly serpentine (1)

**Marin County Watersheds:** Bolinas (5), Point Reyes (5), Lagunitas Creek (2), Novato (2), San Rafael (1)

### **Site Impacts**

This alliance has low non-native plant cover (average 11.4%) relative to native cover. Non-native species with highest frequency and abundance include *Holcus lanatus*.

### **Associations in Marin County**

*Toxicodendron diversilobum* – (*Baccharis pilularis*)

### **Classification Comments**

None.

**References:** Keeler-Wolf et al. 2003a, Klein et al. 2015

**Global Rarity Rank:** G4

**State Rarity Rank:** S4

### **Surveys Used for Description**

**Total: N=16; Marin County (n=16):** MOSD0089, MOSD0106, MOSD0207, MOSD0214, PGA10613, PGA10756, PGA1727, PGA243, PGA350, PGA3962, PGA448A, PGA5710, PGA589, PGA82, PORE102, WRBL011

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	100	69.3	52.2	10.0	99.0	X	X		X
	<i>Baccharis pilularis</i>	81	13.3	9.8	0.2	25.0	X			X
	<i>Rubus ursinus</i>	56	9.2	7.3	0.2	40.0				X
<b>Herb</b>										
	<i>Pteridium aquilinum</i>	44	7.9	1.3	0.2	7.0				
	<i>Holcus lanatus</i>	31	4.1	2.3	3.0	20.0				
	<i>Polystichum munitum</i>	31	5.4	1.8	0.2	20.0				

***Toxicodendron diversilobum – (Baccharis pilularis) Association***

**Common Name:** Poison-oak – (Coyote Brush) Shrubland

**Alliance:** *Toxicodendron diversilobum* Shrubland Alliance

**Classification Comments**

The association circumscription is the same as that of the alliance. See above for detailed description.

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** N



## HERBACEOUS VEGETATION

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### *Abronia latifolia* – *Ambrosia chamissonis* Herbaceous Alliance

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**Common Name:** Dune mat

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

#### **Statewide Description**

*Abronia latifolia*, *Ambrosia chamissonis*, and/or other diagnostics mix with perennial herbs, grasses, and low shrubs to form a low canopy including *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*, *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*, *Eriogonum parvifolium*, *Lupinus arboreus*, or *Lupinus chamissonis*.

Plants of the 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*, *Calystegia* spp., *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.



### **Local Vegetation Description**

The Dune mat Alliance forms an open to continuous herbaceous layer, where species dominance shifts both temporally and spatially because of environmental conditions such as salt spray and shifting sand. The shrub layer is sparse and the tree layer is absent. Characteristic to dominant herbs include *Ambrosia chamissonis* and *Poa douglasii*, and those herbs often present include *Abronia latifolia*, *Cakile maritima*, *Calystegia soldanella*, *Camissonia cheiranthifolia*, *Carpobrotus edulis*, *Lathyrus littoralis*, *Lupinus tidestromii*, and *Monardella undulata*. Herbs that are sometimes present include *Agoseris apargioides*, *Artemisia pycnocephala*, and *Erysimum concinnum*. Commonly associated emergent shrubs at sparse cover include *Ericameria ericoides* and *Lupinus chamissonis*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	1.5	0 – 8	0.3	0 – 0.5
Herb	28.8	12 – 70	0.3	0 – 0.5

### **Local Membership Rule**

*Abronia latifolia*, *Ambrosia chamissonis*, *Calystegia soldanella*, *Lathyrus littoralis*, *Poa douglasii* and/or other herbs of beach dunes and mats are characteristically present to dominant with *Armeria maritima*, *Camissonia cheiranthifolia*, *Cardionema ramosissimum*, *Lupinus tidestromii*, or *Polygonum paronychia* sometimes to often occurring as associated species. Non-native species such as *Cakile maritima*, *Carpobrotus* spp., and *Ammophila arenaria* may also be present.

### **Local Environmental Description**

**Elevation:** Mean 13 m, Range 7 – 30 m

**Aspect:** SE (3), Variable (2), NW (1)

**Slope:** Mean 8 degrees, Range 0 – 19 degrees

**Macro Topography:** Lower 1/3 of slope (4), Bottom to Lower 1/3 of slope (1), Bottom (1)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** Mean 97.7%, Range 96.0 – 99.0%

**Litter Cover:** Mean 1.4%, Range 0.2 – 3%

**Soil Texture (field assessed):** Sand, (class unknown) (6)

**Geology (field or map data):** Sandstone (3), Sandstone and other sedimentary (2), Marine and nonmarine sand deposits (1)

**Marin County Watersheds:** Point Reyes (6)

### **Site Impacts**

This alliance has very low non-native plant cover (average 0.8%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Cakile maritima* and *Carpobrotus edulis*.

### **Associations in Marin County**

*Abronia latifolia* – *Calystegia soldanella* – *Lathyrus littoralis*  
*Ambrosia chamissonis*

### **Classification Comments**

None.

**References:** Biondi and Casavecchia 2001, Bluestone 1981, Buck-Diaz et al. 2019, Klein et al. 2015

Global Rarity Rank: G3

State Rarity Rank: S3

**Surveys Used for Description**

**Total: N=6; Marin County (n=6):** MARIN081, MARIN138, MARIN151, MARIN152, MARIN153, MARIN154

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Ericameria ericoides</i>	33	24.8	0.8	1.0	4.0				
	<i>Lupinus chamissonis</i>	33	17.1	0.1	0.2	0.2				
<b>Herb</b>										
	<b><i>Ambrosia chamissonis</i></b>	<b>83</b>	<b>46.0</b>	<b>20.6</b>	<b>0.2</b>	<b>70.0</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<i>Poa douglasii</i>	83	10.0	1.9	0.2	5.0	<b>X</b>			<b>X</b>
	<i>Calystegia soldanella</i>	67	8.0	1.2	1.0	4.0				<b>X</b>
	<b><i>Abronia latifolia</i></b>	<b>67</b>	<b>1.5</b>	<b>0.3</b>	<b>0.2</b>	<b>1.0</b>				<b>X</b>
	<i>Camissonia cheiranthifolia</i>	67	0.7	0.1	0.2	0.2				<b>X</b>
	<i>Lathyrus littoralis</i>	50	15.9	2.7	0.2	11.0				<b>X</b>
	<i>Lupinus tidestromii</i>	50	13.1	1.8	1.0	7.0				<b>X</b>
	<i>Monardella undulata</i>	50	0.6	0.1	0.2	0.2				<b>X</b>
	<i>Cakile maritima</i>	50	0.3	0.1	0.2	0.2				<b>X</b>
	<i>Carpobrotus edulis</i>	50	0.4	0.1	0.1	0.2				<b>X</b>
	<i>Artemisia pycnocephala</i>	33	2.3	0.4	0.2	2.0				
	<i>Erysimum concinnum</i>	33	0.5	0.1	0.2	0.2				
	<i>Agoseris apargioides</i>	33	0.4	0.1	0.2	0.2				

***Abronia latifolia* – *Calystegia soldanella* – *Lathyrus littoralis* Association**

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**Common Name:** Coastal Sand-Verbena – Beach Morning Glory – Beach Pea Dune Mat

**Alliance:** *Abronia latifolia* – *Ambrosia chamissonis* Herbaceous Alliance

**Local Vegetation Description**

The Coastal Sand-Verbena – Beach Morning Glory – Beach Pea Dune Mat Association forms an open to intermittent herbaceous layer. The shrub layer is sparse and the tree layer is absent. Characteristic herbs include *Abronia latifolia*, *Ambrosia chamissonis*, *Artemisia pycnocephala*, and *Calystegia soldanella*. Those herbs often present include *Cakile maritima*, *Carpobrotus edulis*, *Lathyrus littoralis*, and *Poa douglasii*, and herbs that are sometimes present include *Camissonia cheiranthifolia*, *Erysimum concinnum*, *Lupinus tidestromii*, and *Monardella undulata*. Cover and abundance of herbs is quite variable in the dune environment.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	1.8	0.0 – 8	0.3	0 – 0.5
Herb	21.8	5 – 60	0.3	0 – 0.5

**Local Environmental Description**

**Elevation:** Mean 9 m, Range 7 – 13 m

**Aspect:** Variable (2), SE (2), SW (1)

**Slope:** Mean 7 degrees, Range 0 – 15 degrees

**Macro Topography:** Lower 1/3 of slope (3), Bottom to Lower 1/3 of slope (1), Bottom (1)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** Mean 93.6%, Range 78.0 – 99.0%

**Litter Cover:** Mean 5.2%, Range 0.2 – 20%

**Soil Texture (field assessed):** Sand, (class unknown) (4), Fine sand (1)

**Geology (field or map data):** Sandstone (2), Sandstone and other sedimentary (2), Sand dunes (1)

**Marin County Watersheds:** Point Reyes (3)

**Other Watersheds, San Mateo Co.:** Ano Nuevo (1), Pescadero Creek (1)

**Site Impacts**

This association has low non-native plant cover (average 5.9%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Cakile maritima* and *Carpobrotus edulis*.

**Classification Comments**

Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** Bluestone 1981, Klein et al. 2015

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

### Surveys Used for Description

Total: N=5; Marin County (n=3): MARIN151, MARIN152, MARIN153

San Mateo County (n=2): SMAT0327, SMAT0659

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Shrub	<i>Lupinus chamissonis</i>	40	20.5	0.1	0.2	0.2				
Herb	<b><i>Calystegia soldanella</i></b>	<b>100</b>	<b>23.1</b>	<b>6.6</b>	<b>1.0</b>	<b>25.0</b>	<b>X</b>			<b>X</b>
	<b><i>Abronia latifolia</i></b>	<b>80</b>	<b>8.5</b>	<b>1.2</b>	<b>0.2</b>	<b>3.0</b>	<b>X</b>			<b>X</b>
	<i>Artemisia pycnocephala</i>	80	6.5	1.0	0.2	2.0	<b>X</b>			<b>X</b>
	<i>Ambrosia chamissonis</i>	80	1.2	0.2	0.2	0.2	<b>X</b>			<b>X</b>
	<b><i>Lathyrus littoralis</i></b>	<b>60</b>	<b>27.2</b>	<b>8.2</b>	<b>5.0</b>	<b>25.0</b>				<b>X</b>
	<i>Poa douglasii</i>	60	9.8	1.6	0.2	5.0				<b>X</b>
	<i>Carpobrotus edulis</i>	60	2.1	1.1	0.1	5.0				<b>X</b>
	<i>Cakile maritima</i>	60	3.3	0.3	0.2	1.0				<b>X</b>
	<i>Lupinus tidestromii</i>	40	14.9	2.0	3.0	7.0				
	<i>Camissonia cheiranthifolia</i>	40	0.6	0.1	0.2	0.2				
	<i>Erysimum concinnum</i>	40	0.6	0.1	0.2	0.2				
	<i>Monardella undulata</i>	40	0.6	0.1	0.2	0.2				

## ***Ambrosia chamissonis* Association**

**Common Name:** Beach bursage Dune Mat

**Alliance:** *Abronia latifolia* – *Ambrosia chamissonis* Herbaceous Alliance

### **Local Vegetation Description**

The Beach bursage Dune Mat Association forms a sparse to continuous herbaceous layer. The shrub layer is sparse and the tree layer is absent. Dominant herbs include *Ambrosia chamissonis*, and characteristic herbs include *Cakile maritima*. Those herbs often present include *Abronia latifolia*, and herbs that are sometimes present include *Ammophila arenaria*, *Camissonia cheiranthifolia*, *Carpobrotus edulis*, *Poa douglasii*, and *Sonchus asper*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.4	0.0 – 2	0.3	0– 0.5
Herb	22.6	1 – 70	0.3	0–0.5

### **Local Environmental Description**

**Elevation:** Mean 11 m, Range 2 – 30 m

**Aspect:** SE (3), SW (2), Flat (1), NW (1), Variable (1)

**Slope:** Mean 4 degrees, Range 0 – 19 degrees

**Macro Topography:** Lower 1/3 of slope (4), Bottom (3), Bottom to Lower 1/3 of slope (1)

**Large Rock:** Mean 0.2%, Range 0.0 – 1.2%

**Small Rock:** Mean 9.5%, Range 0.0 – 66.2%

**Fines Cover:** Mean 87.1%, Range 26.0 – 99.0%

**Litter Cover:** Mean 2.8%, Range 0.2 – 7%

**Soil Texture (field assessed):** Sand, (class unknown) (6)

**Geology (field or map data):** Alluvium (2), Sandstone (2), Sandstone and other sedimentary (2), Marine and nonmarine sand deposits (1), Sand dunes (1)

**Marin County Watersheds:** Point Reyes (3)

**Other Watersheds, San Mateo Co.:** Ano Nuevo (1); **Sonoma Co.:** Bodega Harbor (2), Gualala River (1), Lower Russian River (1)

### **Site Impacts**

This association has moderate non-native plant cover (average 25.3%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Ammophila arenaria*, *Cakile maritima*, *Carpobrotus edulis*, and *Sonchus asper*.

### **Classification Comments**

Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** Buck-Diaz et al. 2019, Klein et al. 2015

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

### Surveys Used for Description

Total: N=8; Marin County (n=3): MARIN081, MARIN138, MARIN154

San Mateo County (n=1): WRBL115

Sonoma County (n=4): SONO0033, SONO0036, SONO0753, SONO0754

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Herb	<i>Ambrosia chamissonis</i>	100	53.8	17.4	1.0	70.0	X	X		X
	<i>Cakile maritima</i>	88	18.0	2.2	0.2	13.0	X			X
	<i>Abronia latifolia</i>	50	12.1	1.4	0.2	10.0				X
	<i>Camissonia cheiranthifolia</i>	38	0.5	0.1	0.2	0.4				
	<i>Poa douglasii</i>	25	1.4	0.4	1.0	2.0				
	<i>Ammophila arenaria</i>	25	1.8	0.3	0.2	2.0				
	<i>Carpobrotus edulis</i>	25	0.9	0.1	0.2	0.2				
	<i>Sonchus asper</i>	25	1.1	0.1	0.2	0.2				

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## ***Ammophila arenaria* Herbaceous Semi-Natural Alliance**

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**Common Name:** European beach grass swards

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

### **Statewide Description**

*Ammophila arenaria* is dominant in the herbaceous layer. Emergent shrubs may be present at low to intermittent 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* ssp. *eurekaense* and *Layia carnos*a, both listed as California rare plants with a rank of 1B.1).

### **Local Vegetation Description**

The European beach grass swards Alliance forms an intermittent to continuous herbaceous layer. The shrub layer is open to intermittent, and the tree layer is absent. The dominant herb is *Ammophila arenaria*, in which its tough creeping rhizomes enable it to grow in areas where sand shifts and actively buries plants. Those herbs often present include *Carpobrotus edulis*. Commonly associated emergent shrubs at open cover include *Baccharis pilularis* and *Lupinus arboreus*. The shrub layer may be above 10% though the predominance of *Ammophila* in the sand dune environment is diagnostic for this alliance.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	20.4	5.0 – 35.0	0.6	0 – 2
Herb	72.3	60 – 90	0.6	0 – 2

### **Local Membership Rule**

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

### **Local Environmental Description**

**Elevation:** Mean 23 m, Range 9 – 41 m

**Aspect:** NW (2)

**Slope:** Mean 11 degrees, Range 4 – 18 degrees

**Macro Topography:** Dune/sandfield (2)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** no data

**Litter Cover:** Mean 50.0%, Range 40.0 – 60%

**Soil Texture (field assessed):** Medium sand (1), Sand, (class unknown) (1)

**Geology (field or map data):** Sandstone and other sedimentary (9), Marine and nonmarine sand deposits (3), Sand dunes (2)

**Marin County Watersheds:** Point Reyes (13)

### **Site Impacts**

This alliance has greater cover of exotics than natives, with high non-native plant cover (average 72.1%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Ammophila arenaria* and *Carpobrotus edulis*.

### **Associations in Marin County**

*Ammophila arenaria*

*Baccharis pilularis* / *Ammophila arenaria*

### **Classification Comments**

Sometimes, the shrub cover of *Baccharis pilularis* is above 10% cover, though the ecological setting of dunes being stabilized with relatively high *Ammophila arenaria* defines the alliance.

**References:** Buck-Diaz et al. 2019, Duebendorfer 1989, Klein et al. 2015, LaBanca 1993

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

### **Surveys Used for Description**

**Total: N=16; Marin County (n=16):** PGA1073, PGA1102, PGA114, PGA179, PGA198, PGA204, PGA218, PGA259A, PGA378, PGA380, PGA396, PGA477, PGA487, PGA6175, PORE054, PORE110



### Alliance Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

<b>Layer</b>	<b>Taxon</b>	<b>Con</b>	<b>Rel</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>	<b>Ch</b>	<b>D</b>	<b>cD</b>	<b>Oft</b>
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	94	75.7	16.9	0.2	37.5	X	X		X
	<i>Lupinus arboreus</i>	56	16.6	1.9	0.2	9.0				X
	<i>Lupinus chamissonis</i>	25	6.4	1.3	1.0	9.0				
<b>Herb</b>										
	<b><i>Ammophila arenaria</i></b>	<b>100</b>	<b>77.5</b>	<b>54.6</b>	<b>15.0</b>	<b>87.5</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Carpobrotus edulis</i>	50	11.6	9.2	0.2	55.0				X

## *Ammophila arenaria* Semi-natural Association

**Common Name:** Beachgrass Swards

**Alliance:** *Ammophila arenaria* Herbaceous Semi-Natural Alliance

### Local Vegetation Description

The Beachgrass Association forms an intermittent to continuous herbaceous layer. The shrub layer is open and the tree layer is absent. The dominant herb is *Ammophila arenaria*. Those herbs often present include *Carpobrotus edulis*. Commonly associated emergent shrubs at sparse cover include *Baccharis pilularis* and *Lupinus arboreus*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	9.6	5.0 – 15	0.9	0– 2
Herb	78.2	51 – 90	1.3	0.5 –2

### Local Environmental Description

**Elevation:** Mean 23 m, Range 14 – 31 m

**Aspect:** NW (1)

**Slope:** Mean 4 degrees, Range 4 – 4 degrees

**Macro Topography:** Dune/sandfield (1)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** 60%

**Litter Cover:** 40%

**Soil Texture (field assessed):** Sand, (class unknown) (1)

**Geology (field or map data):** Marine and nonmarine sand deposits (2), Sand dunes (1), Sandstone and other sedimentary (1)

**Marin County Watersheds:** Point Reyes (3)

### Site Impacts

This association has greater cover of exotics (average 83.4%) than natives. Non-native species that occur with highest frequency and abundance include *Ammophila arenaria* and *Carpobrotus edulis*.

### Classification Comments

None.

**References:** Buck-Diaz et al. 2019, Duebendorfer 1989, Klein et al. 2015, LaBanca 1993

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

**State Rare:** N

### Surveys Used for Description

**Total: N=6; Marin County (n=6):** PGA1102, PGA179, PGA204, PGA396, PGA477, PORE110

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	83	61.5	5.9	0.2	10.0	X	X		X
	<i>Lupinus arboreus</i>	83	36.8	2.9	0.2	9.0	X		X	X
<b>Herb</b>										
	<b><i>Ammophila arenaria</i></b>	<b>100</b>	<b>85.1</b>	<b>63.8</b>	<b>25.0</b>	<b>87.5</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Carpobrotus edulis</i>	50	3.7	3.2	0.2	16.0				X

***Baccharis pilularis* / *Ammophila arenaria* Semi-natural Association**

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**Common Name:** Coyote Brush / European Beachgrass swards

**Alliance:** *Ammophila arenaria* Herbaceous Semi-natural Alliance

**Local Vegetation Description**

The Coyote Brush / European Beachgrass Association forms an open to intermittent shrub layer. The emergent tree layer is typically absent, and the herbaceous layer is intermittent to continuous. Dominant and characteristic shrubs include *Baccharis pilularis*. The herbaceous layer typically includes *Ammophila arenaria*, and herbs that are often present include *Carpobrotus edulis*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	26.3	15.0 – 35	0.3	0– 0.5
Herb	66.0	60 – 85	0.3	0–0.5

**Local Environmental Description**

**Elevation:** Mean 23 m, Range 9 – 41 m

**Aspect:** NW (1)

**Slope:** 18 degrees

**Macro Topography:** Dune/sandfield (1)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** no data

**Litter Cover:** 60%

**Soil Texture (field assessed):** Medium sand (1)

**Geology (field or map data):** Sandstone and other sedimentary (8), Marine and nonmarine sand deposits (1), Sand dunes (1)

**Marin County Watersheds:** Point Reyes (10)

**Site Impacts**

This association has greater cover of exotics (average 65.3%) than natives. Non-native species that occur with highest frequency and abundance include *Ammophila arenaria* and *Carpobrotus edulis*.

**Classification Comments**

This association was originally placed in the *Baccharis pilularis* Alliance. While the shrub cover can be above 10%, the predominance of *Ammophila* is diagnostic for this association on sand dunes being stabilized by this invasive plant. As dunes become stabilized, shrubs such as *Baccharis* also encroach

**References:** Parker 1974

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** N

**Surveys Used for Description**

**Total: N=10; Marin County (n=10):** PGA1073, PGA114, PGA198, PGA218, PGA259A, PGA378, PGA380, PGA487, PGA6175, PORE054

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

<b>Layer</b>	<b>Taxon</b>	<b>Con</b>	<b>Rel</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>	<b>Ch</b>	<b>D</b>	<b>cD</b>	<b>Oft</b>
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	100	84.2	23.5	11.0	37.5	X	X		X
	<i>Lupinus arboreus</i>	40	4.4	1.3	1.0	5.0				
	<i>Lupinus chamissonis</i>	30	9.3	1.9	2.0	9.0				
<b>Herb</b>										
	<i>Ammophila arenaria</i>	100	73.0	49.1	15.0	86.0	X	X		X
	<i>Carpobrotus edulis</i>	50	16.4	12.8	3.0	55.0				X

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

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**Common Name:** Fiddleneck - Phacelia Fields

**NVC Alliance Code:** A4182. *Amsinckia menziesii* - *Amsinckia tessellata* - *Phacelia* spp. Meadow Alliance

### **Statewide Description**

*Amsinckia menziesii*, *Amsinckia tessellata* and/or *Phacelia* spp. or other *Amsinckia* sp. is seasonally co-dominant in the herbaceous layer with *Amblyopappus pusillus*, *Astragalus didymocarpus*, *Atriplex californica*, *Avena* spp., *Bromus diandrus*, *Bromus hordeaceus*, *Bromus rubens*, *Castilleja exserta*, *Centromadia pungens*, *Croton setigerus*, *Deinandra fasciculata*, *Dichelostemma capitatum*, *Erodium* spp., *Guillenia lasiophylla*, *Hordeum murinum*, *Lasthenia californica*, *Lasthenia gracilis*, *Lotus wrangelianus*, *Lupinus bicolor*, *Plagiobothrys canescens*, *Plagiobothrys collinus* and *Vulpia bromoides*. Emergent shrubs may be present at low cover, including *Adenostoma fasciculatum*, *Artemisia californica*, *Eastwoodia elegans*, *Encelia farinosa*, *Ericamerica palmeri*, *Eriogonum fasciculatum*, *Isocoma menziesii* or *Lupinus albifrons*.

The alliance's cover and abundance of native taxa fluctuate depending on the amount and timing of precipitation. As with other annual vegetation, stand appearance and size may vary from year to year. We need further sampling and analysis to understand the relationships of this alliance with non-native *Bromus* spp. and with other native herb alliances, including the *Plagiobothrys nothofulvus* alliance.

### **Local Vegetation Description**

The Fiddleneck - Phacelia Fields Alliance forms a continuous herbaceous layer. The shrub layer is open and the tree layer is absent. In the one stand sampled, *Bromus diandrus* was co-dominant with the characteristic herbs of *Phacelia distans* and *Amsinckia spectabilis*. Other herbs present in this one stand sampled include *Abronia latifolia*, *Achillea millefolium*, *Anagallis arvensis*, *Bromus maritimus*, *Cardionema ramosissimum*, *Carpobrotus edulis*, *Cirsium andrewsii*, *Claytonia perfoliata*, *Erigeron glaucus*, *Eriophyllum stoechadifolium*, *Erodium cicutarium*, *Eschscholzia californica*, *Galium californicum*, *Layia carnosae*, *Marah fabaceus*, *Raphanus sativus*, *Rumex acetosella*, *Solanum* spp., *Sonchus* spp., *Stachys ajugoides*,

*Stellaria media*, and *Tetragonia tetragonioides*. The associated emergent shrub at open cover includes *Lupinus arboreus*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	3.2	3.2 – 3.2	no data	
Herb	80	80 – 80	no data	

### **Local Membership Rule**

*Amsinckia* spp. and/or *Phacelia* spp. dominate and characterize stands with a variety of native and non-native forbs and grasses.

### **Local Environmental Description**

**Elevation:** 46 m

**Aspect:** SW (1)

**Slope:** 30 degrees

**Macro Topography:** Entire slope (1)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** no data

**Litter Cover:** 10%

**Soil Texture (field assessed):** Sand, (class unknown) (1)

**Geology (field or map data):** Granitic (generic) (1)

**Marin County Watersheds:** Point Reyes (1)

### **Site Impacts**

This alliance has greater cover of exotics than natives, non-native plant cover (average 55.8%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Anagallis arvensis*, *Bromus diandrus*, *Carpobrotus edulis*, *Erodium cicutarium*, *Raphanus sativus*, *Rumex acetosella*, *Stellaria media*, and *Tetragonia tetragonioides*.

### **Associations in Marin County**

None

### **Classification Comments**

The single survey was previously classified as a non-native grassland, and now is classified as this alliance; however, it may also be better classed as a phase of a sandy bluff or dune type like *Eriophyllum staechadifolium* – *Erigeron glaucus* – *Eriogonum latifolium* or *Abronia latifolia* – *Ambrosia chamissonis* Alliance. It occurs in small patches in areas with disturbance, including shifting sand and human trails.

**References:** VegCAMP 2015a

**Global Rarity Rank:** G5

**State Rarity Rank:** S5

### **Surveys Used for Description**

**Total: N=1; Marin County (n=1):** PORE084

### Alliance Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Lupinus arboreus</i>	100	100.0	3.2	3.2	3.2	X	X		X
<b>Herb</b>										
	<i>Bromus diandrus</i>	100	30.0	35.0	35.0	35.0	X		X	X
	<b><i>Phacelia distans</i></b>	<b>100</b>	<b>17.2</b>	<b>20.0</b>	<b>20.0</b>	<b>20.0</b>	X			X
	<b><i>Amsinckia</i> spp.</b>	<b>100</b>	<b>12.9</b>	<b>15.0</b>	<b>15.0</b>	<b>15.0</b>	X			X
	<i>Carpobrotus edulis</i>	100	12.9	15.0	15.0	15.0	X			X
	<i>Tetragonia tetragonioides</i>	100	6.9	8.0	8.0	8.0	X			X
	<i>Claytonia perfoliata</i>	100	4.3	5.0	5.0	5.0	X			X
	<i>Raphanus sativus</i>	100	4.3	5.0	5.0	5.0	X			X
	<i>Eschscholzia californica</i>	100	2.6	3.0	3.0	3.0	X			X
	<i>Stellaria media</i>	100	2.6	3.0	3.0	3.0	X			X
	<i>Eriophyllum stoechadifolium</i>	100	1.7	2.0	2.0	2.0	X			X
	<i>Achillea millefolium</i>	100	1.7	2.0	2.0	2.0	X			X
	<i>Bromus maritimus</i>	100	0.9	1.0	1.0	1.0	X			X
	<i>Marah fabaceus</i>	100	0.2	0.2	0.2	0.2	X			X
	<i>Sonchus</i> spp.	100	0.2	0.2	0.2	0.2	X			X
	<i>Erigeron glaucus</i>	100	0.2	0.2	0.2	0.2	X			X
	<i>Cirsium andrewsii</i>	100	0.2	0.2	0.2	0.2	X			X
	<i>Galium californicum</i>	100	0.2	0.2	0.2	0.2	X			X
	<i>Layia carnososa</i>	100	0.2	0.2	0.2	0.2	X			X
	<i>Solanum</i> spp.	100	0.2	0.2	0.2	0.2	X			X
	<i>Stachys ajugoides</i>	100	0.2	0.2	0.2	0.2	X			X
	<i>Abronia latifolia</i>	100	0.2	0.2	0.2	0.2	X			X
	<i>Anagallis arvensis</i>	100	0.2	0.2	0.2	0.2	X			X
	<i>Erodium cicutarium</i>	100	0.2	0.2	0.2	0.2	X			X
	<i>Rumex acetosella</i>	100	0.2	0.2	0.2	0.2	X			X
	<i>Cardionema ramosissimum</i>	100	0.2	0.2	0.2	0.2	X			X



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## ***Atriplex prostrata* – *Cotula coronopifolia* Herbaceous Semi-Natural Alliance**

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**Common Name:** Fields of fat hen and brass buttons

**NVC Alliance Code:** N/A.

### **Statewide Description**

*Atriplex prostrata* and/or *Cotula coronopifolia* is dominant or co-dominant in the herbaceous layer. Both species are indicative of disturbed conditions in alkaline or saline wetlands. They readily colonize bare mud and sand and can produce copious seed. Both are early seral plants; they may be abundant to sparse from year to year depending on the disturbance regime of unpredictable flooding and salinity. Thus, we place them into this one vegetation type which constitutes an ephemeral, seasonally flooded marsh type at intermediate tidal elevations with relatively high salinities (Keeler-Wolf and Vaghti 2000, Pickart 2006). Stands occur usually in relatively narrow bands along the upper margins of brackish or salt marshes, and sometimes as extensive monocultures (Pickart 2006). Ecologically, the most closely related native types may be the *Distichlis spicata* and *Frankeniania salina* alliances. As a result of flooding, stands of the *Typha* (*angustifolia*, *domingensis*, *latifolia*) alliance and other freshwater plants may occur adjacent to or replace them.

### **Local Vegetation Description**

The Fields of fat hen and brass buttons Alliance forms an intermittent herbaceous layer. The shrub layer is absent and the tree layer is absent. The dominant herb in the one stand sampled in a low-lying slough in Marin Co. includes *Cotula coronopifolia*, and characteristic herbs include *Polypogon monspeliensis* and *Rumex crispus*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	NA	no data	
Hardwood	0.0	NA	no data	
Regenerating or Shrubby Tree	0.0	NA	no data	
Shrub	0.0	NA	no data	
Herb	40.0	NA	0.3	0 – 0.5

### Local Membership Rule

Non-native species such as *Cotula coronopifolia*, *Polypogon monspeliensis*, and/or *Atriplex prostrata* dominate in low-lying sloughs and other disturbed alkaline or saline wetlands.

### Local Environmental Description

**Elevation:** 3 m

**Aspect:** Flat (1)

**Slope:** 0 degrees

**Macro Topography:** Bottom to Lower 1/3 of slope (1)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** 69.0%

**Litter Cover:** 30%

**Soil Texture (field assessed):** Muck (1)

**Geology (field or map data):** Alluvium (1)

**Marin County Watersheds:** Novato (1)

### Site Impacts

This alliance has greater cover of exotics than natives, non-native plant cover (average 100.0%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Cotula coronopifolia*, *Polypogon monspeliensis*, and *Rumex crispus*.

### Associations in Marin County

*Cotula coronopifolia*

### Classification Comments

None.

**References:** Keeler-Wolf and Vaghti 2000, Pickart 2006

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

### Surveys Used for Description

**Total: N=1; Marin County (n=1):** MARIN266

### Alliance Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Herb	<i>Cotula coronopifolia</i>	100	82.1	33.0	33.0	33.0	X	X		X
	<i>Polypogon monspeliensis</i>	100	17.4	7.0	7.0	7.0	X			X
	<i>Rumex crispus</i>	100	0.5	0.2	0.2	0.2	X			X

***Cotula coronopifolia* Semi-natural Association**

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**Common Name:** Brass Buttons Mats

**Alliance:** *Atriplex prostrata* – *Cotula coronopifolia* Herbaceous Semi-Natural Alliance

**Classification Comments**

The association circumscription is the same as that of the alliance. See above for detailed description.

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

**State Rare:** N

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

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**Common Name:** Wild oats and Annual brome grasslands

**NVC Alliance Code:** A3870. *Avena fatua* - *Bromus* spp. Ruderal Annual Grassland Alliance

### **Statewide Description**

*Avena barbata*, *Avena fatua*, *Brachypodium distachyon*, *Bromus diandrus*, and/or *Bromus hordeaceus* dominate or co-dominate in the herbaceous layer. Emergent trees and shrubs may be present at low cover.

Until recently, this type was recognized as two separate alliances. However, the yearly shift of species dominance and the overlap of many non-native *Bromus*, *Avena*, and related non-native grass species suggests a broader, more inclusive treatment. This alliance is identified by high, persistent cover of non-native grasses, but may have high cover of early spring non-native herbs such as *Erodium* spp. as well.

### **Local Vegetation Description**

The Wild oats and Annual brome grasslands Alliance forms an open to continuous herbaceous layer. The shrub layer is sparse to open and the tree layer is sparse. Characteristic herbs include *Avena barbata*. Those herbs often present include *Brachypodium distachyon*, *Briza maxima*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Erodium botrys*, *Lolium perenne*, and *Nassella pulchra*, and herbs that are sometimes present include *Anagallis arvensis*, *Chlorogalum pomeridianum*, *Cynosurus echinatus*, *Eschscholzia californica*, *Hypochaeris glabra*, *Hypochaeris radicata*, *Lupinus nanus*, *Plantago lanceolata*, *Rumex acetosella*, *Sidalcea malviflora*, *Silene gallica*, *Trifolium dubium*, *Trifolium hirtum*, *Vicia sativa*, and *Vulpia bromoides*. Commonly associated emergent shrubs at sparse cover include *Baccharis pilularis*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.1	0 – 2	3.5	2 – 5
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.8	0.0 – 10.2	0.7	0 – 2
Herb	63.9	20 – 100	0.3	0 – 1

### **Local Membership Rule**

*Avena*, *Brachypodium*, *Briza*, *Bromus*, *Erodium* and/or *Hypochaeris* dominate individually or in combination. If *Elymus caput-medusae* is co-dominant with *Avena* and/or *Bromus* spp., those stands can also key here. If *Lolium perenne* is co-dominant key to that alliance.

### **Local Environmental Description**

**Elevation:** Mean 236 m, Range 13 – 645 m

**Aspect:** SW (23), SE (17), NE (8), W (2), NW (1), S (1), Flat (1)

**Slope:** Mean 17 degrees, Range 1 – 34 degrees

**Macro Topography:** Upper 1/3 of slope (23), Middle 1/3 of slope (17), Lower 1/3 of slope (10), Bottom (1), Ridge top (1)

**Large Rock:** Mean 0.6%, Range 0.0 – 8.0%

**Small Rock:** Mean 7.6%, Range 0.0 – 86.0%

**Fines Cover:** Mean 15.0%, Range 0.0 – 93.0%

**Litter Cover:** Mean 67.0%, Range 0.2 – 100%

**Soil Texture (field assessed):** Moderately fine sandy clay loam (8), Not recorded (7), Medium to very fine, sandy loam (5), Moderately fine clay loam (5), Fine sandy clay (4), Fine clay (4), Moderately coarse, sandy loam (4), Moderately fine silty clay loam (4), Medium loam (3), Medium silt (2), (1), Unknown (1), Coarse, loamy sand (1), Loam, (class unknown) (1)

**Geology (field or map data):** Franciscan melange (20), Sandstone and other sedimentary (9), Volcanic and metavolcanic rocks (7), Large landslides (5), Blueschist and semi-schist (5), Volcanic flow rocks (4), Greenstone (1), Sandstone (1), Ultramafic rocks, mostly serpentine (1), Chert (1), Alluvium (1)

**Marin County Watersheds:** Novato (14), Bolinas (14), San Rafael (10), Lagunitas Creek (8), Petaluma River (5), Walker Creek (4)

### **Site Impacts**

This alliance has greater cover of exotics than natives, with high non-native plant cover (average 93.7%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Anagallis arvensis*, *Brachypodium distachyon*, *Briza maxima*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Cynosurus echinatus*, *Erodium botrys*, *Hypochaeris glabra*, *Hypochaeris radicata*, *Plantago lanceolata*, *Rumex acetosella*, *Silene gallica*, *Trifolium dubium*, *Trifolium hirtum*, *Vicia sativa*, and *Vulpia bromoides*.

### **Associations in Marin County**

*Avena barbata* – *Avena fatua*

*Brachypodium distachyon*

*Briza maxima*

*Bromus diandrus*

*Bromus hordeaceus* – *Erodium botrys*

*Hypochaeris glabra* – *Vulpia bromoides*

### **Classification Comments**

None.



**References:** AECOM 2013, Buck and Evens 2010, Buck-Diaz et al. 2011, Buck-Diaz et al. 2012, Buck-Diaz et al. 2013, Evens and San 2004, Jimerson et al. 2000, Keeler-Wolf and Evens 2006, Keeler-Wolf et al. 2003a, Klein et al. 2015, Parsons and Stohlgren 1989, Rodriguez 2015, Rodriguez et al. 2017, Schlising and Sanders 1982, Solomeshch and Barbour 2006, Sproul et al. 2011, Verdone and Evens 2010

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

**Surveys Used for Description**

**Total: N=58; Marin County (n=58):** GGNRA274, GGNRA282, HEAD0025, HEAD0026, HEAD0029, HEAD0030, HEAD0032, HEAD0036, HEAD0037, HEAD0082, HEAD0122, HEAD0126, HEAD0130, HEAD0131, HEAD0132, HEAD0133, HEAD0136, HEAD0147, HEAD0170, HEAD0171, HEAD0220, HEAD0223, HEAD0228, HEAD0245, HEAD0375, MARIN232, MMWD0009, MMWD0012, MMWD0014, MMWD0029, MMWD0032, MMWD0605, MMWD0613, MOSD0194, MOSD0212, MOSD0264, MOSD0266, MOSD0281, MOSD0291, MOSD0293, MOSD0304, MOSD0314, MOSD0342, MOSD0343, MOSD0348, MOSD0376, MOSD0378, MOSD0383, MTBP010, PGA1663, PGA1710, PGA542, TAMG001C, TAMG002C, TAMG009C, TAMG015C, TAMG028N, TAMG035M

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	22	19.3	0.5	0.1	10.0				
<b>Herb</b>										
	<b><i>Avena</i> spp.</b>	<b>90</b>	<b>28.9</b>	<b>23.6</b>	<b>0.2</b>	<b>80.0</b>	<b>X</b>			<b>X</b>
	<b><i>Bromus diandrus</i></b>	<b>68</b>	<b>9.9</b>	<b>7.8</b>	<b>0.2</b>	<b>68.0</b>				<b>X</b>
	<i>Erodium botrys</i>	63	1.9	1.3	0.2	25.0				<b>X</b>
	<i>Brachypodium distachyon</i>	56	15.9	12.4	0.2	90.0				<b>X</b>
	<b><i>Bromus hordeaceus</i></b>	<b>54</b>	<b>5.0</b>	<b>3.6</b>	<b>0.2</b>	<b>36.0</b>				<b>X</b>
	<i>Lolium perenne</i>	54	2.7	2.1	0.2	20.0				<b>X</b>
	<i>Nassella pulchra</i>	54	1.0	0.7	0.2	5.0				<b>X</b>
	<i>Briza maxima</i>	53	7.8	5.6	0.2	75.0				<b>X</b>
	<i>Carduus pycnocephalus</i>	53	1.8	1.7	0.1	38.0				<b>X</b>
	<i>Anagallis arvensis</i>	49	0.3	0.1	0.2	1.0				
	<i>Hypochaeris glabra</i>	47	0.8	0.7	0.1	18.0				
	<i>Eschscholzia californica</i>	44	0.5	0.4	0.2	3.0				
	<i>Trifolium hirtum</i>	39	3.3	2.8	0.2	50.0				
	<i>Cynosurus echinatus</i>	37	1.4	1.4	0.2	40.0				
	<i>Hypochaeris radicata</i>	37	0.7	0.7	0.2	18.0				
	<i>Vulpia bromoides</i>	29	3.2	1.2	0.2	18.0				
	<i>Rumex acetosella</i>	27	0.4	0.3	0.2	8.0				
	<i>Plantago lanceolata</i>	25	0.6	0.6	0.2	18.0				
	<i>Silene gallica</i>	25	0.1	0.1	0.1	3.0				
	<i>Vicia sativa</i>	24	0.1	0.1	0.1	3.0				
	<i>Lupinus nanus</i>	24	0.1	0.1	0.2	0.5				
	<i>Chlorogalum pomeridianum</i>	22	0.2	0.1	0.1	5.0				
	<i>Trifolium dubium</i>	22	0.1	0.1	0.2	3.0				
	<i>Sidalcea malviflora</i>	20	0.1	0.1	0.2	1.0				

## ***Avena barbata* – *Avena fatua* Semi-natural Association**

**Common Name:** Wild Oat Ruderal Grassland

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

### **Local Vegetation Description**

The Wild Oat Ruderal Grassland Association forms an open to continuous herbaceous layer. The shrub layer is sparse and the tree layer is sparse. Dominant or co-dominant herbs include *Avena barbata* and/or *A. fatua*, and characteristic herbs include *Erodium botrys*. Those herbs often present include *Bromus diandrus*, *Carduus pycnocephalus*, *Eschscholzia californica*, *Lolium perenne*, *Nassella pulchra*, and *Trifolium hirtum*, and herbs that are sometimes present include *Anagallis arvensis*, *Brachypodium distachyon*, *Briza maxima*, *Bromus hordeaceus*, *Chlorogalum pomeridianum*, *Cynosurus echinatus*, *Geranium dissectum*, *Hordeum murinum*, *Hypochaeris glabra*, *Hypochaeris radicata*, *Lupinus nanus*, *Plantago lanceolata*, *Sherardia arvensis*, *Sidalcea malviflora*, *Silene gallica*, *Trifolium dubium*, *Vicia sativa*, and *Vulpia bromoides*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.1	0 – 1	3.5	2 – 5
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.3	0 – 5	0.6	0 – 2
Herb	70.0	20 – 100	0.3	0 – 0.5

### **Local Environmental Description**

**Elevation:** Mean 235 m, Range 25 – 579 m

**Aspect:** SW (12), SE (8), NE (2)

**Slope:** Mean 16 degrees, Range 1 – 34 degrees

**Macro Topography:** Upper 1/3 of slope (10), Lower 1/3 of slope (6), Middle 1/3 of slope (6)

**Large Rock:** Mean 0.9%, Range 0.0 – 8.0%

**Small Rock:** Mean 8.0%, Range 0.0 – 86.0%

**Fines Cover:** Mean 6.1%, Range 0.0 – 30.0%

**Litter Cover:** Mean 76.1%, Range 0.2 – 96%

**Soil Texture (field assessed):** Moderately fine sandy clay loam (3), Moderately fine clay loam (4), Moderately fine silty clay loam (3), Medium loam (3), Moderately coarse, sandy loam (2), Medium to very fine, sandy loam (1), Loam, (class unknown) (1), (1), Unknown (1), Medium silt (1), Not recorded (1)

**Geology (field or map data):** Franciscan melange (6), Volcanic flow rocks (4), Blueschist and semi-schist (4), Sandstone and other sedimentary (3), Volcanic and metavolcanic rocks (3), Greenstone (1), Large landslides (1)

**Marin County Watersheds:** Novato (6), San Rafael (7), Bolinas (4), Lagunitas Creek (2), Petaluma River (2), Walker Creek (1)

### **Site Impacts**

This association has greater cover of exotics (average 94.3%) than natives. Non-native species that occur with highest frequency and abundance include *Anagallis arvensis*, *Avena* spp., *Brachypodium distachyon*, *Briza maxima*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Cynosurus echinatus*, *Erodium botrys*, *Geranium dissectum*, *Hordeum murinum*, *Hypochaeris glabra*, *Hypochaeris radicata*, *Lolium perenne*, *Plantago lanceolata*, *Sherardia arvensis*, *Silene gallica*, *Trifolium dubium*, *Trifolium hirtum*, *Vicia sativa*, and *Vulpia bromoides*.

### Classification Comments

None.

**References:** Buck and Evens 2010, Buck-Diaz et al. 2011, Buck-Diaz et al. 2012, Buck-Diaz et al. 2013, Evens and San 2004, Keeler-Wolf and Evens 2006, Klein et al. 2015, Parsons and Stohlgren 1989, Rodriguez 2015, Rodriguez et al. 2017, Sproul et al. 2011, Verdone and Evens 2010

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

**State Rare:** N

### Surveys Used for Description

**Total: N=23; Marin County (n=23):** HEAD0026, HEAD0032, HEAD0036, HEAD0037, HEAD0126, HEAD0131, HEAD0132, HEAD0133, HEAD0136, HEAD0170, HEAD0220, HEAD0245, HEAD0375, MMWD0029, MOSD0291, MOSD0293, MOSD0314, MOSD0342, MOSD0343, MOSD0378, PGA1663, PGA542, TAMG009C

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Herb</b>										
	<b><i>Avena</i> spp.</b>	<b>100</b>	<b>48.6</b>	<b>42.8</b>	<b>7.0</b>	<b>80.0</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<i>Erodium botrys</i>	75	2.4	1.8	0.2	25.0	<b>X</b>			<b>X</b>
	<i>Bromus diandrus</i>	71	2.7	2.7	0.2	38.0				<b>X</b>
	<i>Trifolium hirtum</i>	54	4.0	3.9	0.2	50.0				<b>X</b>
	<i>Lolium perenne</i>	54	3.5	3.1	0.2	20.0				<b>X</b>
	<i>Carduus pycnocephalus</i>	54	0.7	0.5	0.1	3.0				<b>X</b>
	<i>Eschscholzia californica</i>	54	0.3	0.3	0.2	3.0				<b>X</b>
	<i>Nassella pulchra</i>	50	1.1	0.8	0.2	5.0				<b>X</b>
	<i>Vulpia bromoides</i>	46	7.1	2.2	0.2	18.0				
	<i>Bromus hordeaceus</i>	46	1.9	1.9	0.2	18.0				
	<i>Hypochaeris glabra</i>	46	0.5	0.4	0.1	3.0				
	<i>Brachypodium distachyon</i>	42	4.6	4.1	0.2	38.0				
	<i>Briza maxima</i>	42	3.0	3.1	0.2	38.0				
	<i>Hypochaeris radicata</i>	42	0.4	0.4	0.2	8.0				
	<i>Cynosurus echinatus</i>	38	1.6	1.2	0.2	25.0				
	<i>Trifolium dubium</i>	33	0.3	0.2	0.2	3.0				
	<i>Vicia sativa</i>	29	0.2	0.2	0.1	3.0				
	<i>Geranium dissectum</i>	25	0.1	0.2	0.1	3.0				
	<i>Silene gallica</i>	25	0.0	0.1	0.1	0.3				
	<i>Anagallis arvensis</i>	25	0.1	0.1	0.2	0.2				
	<i>Hordeum murinum</i>	21	2.5	1.1	0.2	15.0				
	<i>Plantago lanceolata</i>	21	0.8	0.9	0.2	18.0				
	<i>Chlorogalum pomeridianum</i>	21	0.3	0.2	0.1	5.0				
	<i>Sidalcea malviflora</i>	21	0.1	0.1	0.2	1.0				
	<i>Lupinus nanus</i>	21	0.1	0.0	0.2	0.3				
	<i>Sherardia arvensis</i>	21	0.0	0.0	0.2	0.2				



## ***Brachypodium distachyon* Semi-natural Association**

**Common Name:** Purple False Brome Grassland

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

### **Local Vegetation Description**

The Purple False Brome Association forms an intermittent to continuous herbaceous layer. The shrub layer is sparse to open and the tree layer is sparse. Dominant herbs include *Brachypodium distachyon*, and characteristic herbs include *Avena* spp. Those herbs often present include *Briza maxima*, *Bromus diandrus*, *Carduus pycnocephalus*, *Erodium botrys*, and *Nassella pulchra*, and herbs that are sometimes present include *Anagallis arvensis*, *Bromus carinatus*, *Bromus hordeaceus*, *Calystegia purpurata*, *Centaurea melitensis*, *Chlorogalum pomeridianum*, *Cynosurus echinatus*, *Daucus pusillus*, *Elymus multisetus*, *Eschscholzia californica*, *Hypochaeris glabra*, *Hypochaeris radicata*, *Lolium perenne*, *Lupinus nanus*, *Melica californica*, *Plantago lanceolata*, *Rumex acetosella*, *Sanicula bipinnatifida*, *Sidalcea malviflora*, *Sisyrinchium bellum*, *Trifolium* spp., *Trifolium hirtum*, and *Wyethia angustifolia*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.3	0 – 2	3.5	2 – 5
Regenerating or Shrubby Tree	0.0	0 – 0.2	no data	
Shrub	1.7	0 – 10.2	0.8	0 – 2
Herb	55.6	40 – 85	0.3	0 – 1

### **Local Environmental Description**

**Elevation:** Mean 199 m, Range 55 – 428 m

**Aspect:** SE (4), SW (4), NE (3), Flat (1), S (1), W (1)

**Slope:** Mean 19 degrees, Range 12 – 32 degrees

**Macro Topography:** Upper 1/3 of slope (8), Middle 1/3 of slope (5), Lower 1/3 of slope (1)

**Large Rock:** Mean 0.0%, Range 0.0 – 0.2%

**Small Rock:** Mean 5.5%, Range 0.0 – 40.0%

**Fines Cover:** Mean 27.5%, Range 1.0 – 93.0%

**Litter Cover:** Mean 68.7%, Range 3.0 – 100%

**Soil Texture (field assessed):** Not recorded (3), Fine clay (2), Fine sandy clay (2), Moderately fine sandy clay loam (2), Medium silt (1), Moderately fine clay loam (1), Medium to very fine, sandy loam (1)

**Geology (field or map data):** Sandstone and other sedimentary (3), Franciscan melange (3), Large landslides (2), Ultramafic rocks, mostly serpentine (1), Chert (1), Blueschist and semi-schist (1), Sandstone (1)

**Marin County Watersheds:** Novato (6), Bolinas (3), San Rafael (2), Petaluma River (1)

### **Site Impacts**

This association has greater cover of exotics (average 93.4%) than natives. Non-native species that occur with highest frequency and abundance include *Anagallis arvensis*, *Avena* spp., *Brachypodium distachyon*, *Briza maxima*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Centaurea melitensis*, *Cynosurus echinatus*, *Erodium botrys*, *Hypochaeris glabra*, *Hypochaeris radicata*, *Lolium perenne*, *Plantago lanceolata*, *Rumex acetosella*, and *Trifolium hirtum*.

**Classification Comments**

None.

**References:** Keeler-Wolf et al. 2003a, Klein et al. 2015, Rodriguez et al. 2017, Sproul et al. 2011, Verdone and Evens 2010

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

**State Rare:** N

**Surveys Used for Description**

**Total: N=14; Marin County (n=14):** GGNRA274, GGNRA282, HEAD0130, HEAD0228, MOSD0194, MOSD0212, MOSD0281, MOSD0348, MOSD0376, MOSD0383, MTBP010, TAMG002C, TAMG015C, TAMG028N

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	36	29.6	1.2	0.2	9.0				
	<i>Toxicodendron diversilobum</i>	21	5.0	0.1	0.2	0.3				
<b>Herb</b>										
	<b><i>Brachypodium distachyon</i></b>	<b>100</b>	<b>52.5</b>	<b>40.9</b>	<b>10.0</b>	<b>90.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Avena</i> spp.	100	21.0	16.2	0.3	38.0	<b>X</b>			<b>X</b>
	<i>Briza maxima</i>	64	4.8	2.4	0.2	10.0				<b>X</b>
	<i>Carduus pycnocephalus</i>	64	1.9	2.0	0.2	20.0				<b>X</b>
	<i>Nassella pulchra</i>	64	1.3	0.9	0.2	3.0				<b>X</b>
	<i>Erodium botrys</i>	57	2.2	0.9	0.2	7.0				<b>X</b>
	<i>Bromus diandrus</i>	50	1.9	1.6	1.0	5.0				<b>X</b>
	<i>Plantago lanceolata</i>	43	0.9	0.8	0.2	3.0				
	<i>Hypochaeris radicata</i>	43	0.4	0.3	0.2	3.0				
	<i>Anagallis arvensis</i>	43	0.1	0.2	0.2	1.0				
	<i>Cynosurus echinatus</i>	36	2.2	3.3	0.2	40.0				
	<i>Lolium perenne</i>	36	2.2	1.4	1.0	10.0				
	<i>Hypochaeris glabra</i>	36	0.2	0.2	0.2	1.0				
	<i>Eschscholzia californica</i>	36	0.2	0.1	0.2	1.0				
	<i>Bromus hordeaceus</i>	29	2.3	0.9	0.2	10.0				
	<i>Trifolium hirtum</i>	29	1.1	0.6	0.2	7.0				
	<i>Melica californica</i>	29	0.2	0.3	0.2	3.0				
	<i>Lupinus nanus</i>	29	0.1	0.1	0.2	0.5				
	<i>Sanicula bipinnatifida</i>	29	0.1	0.1	0.1	0.3				
	<i>Bromus carinatus</i>	21	0.2	0.3	0.2	3.0				
	<i>Trifolium</i> spp.	21	0.3	0.2	0.2	3.0				
	<i>Wyethia angustifolia</i>	21	0.2	0.2	0.1	2.0				
	<i>Centaurea melitensis</i>	21	0.1	0.1	0.2	1.0				

## ***Briza maxima* Provisional Semi-natural Association**

**Common Name:** Rattlesnake Grass Grassland

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

### **Local Vegetation Description**

The Rattlesnake Grass Association forms an open to continuous herbaceous layer. The shrub layer is open and the tree layer is sparse. Dominant herbs include *Briza maxima*, and characteristic herbs include *Avena* spp. Those herbs often present include *Anagallis arvensis*, *Brachypodium distachyon*, *Bromus diandrus*, *Bromus hordeaceus*, *Chlorogalum pomeridianum*, *Cynosurus echinatus*, *Hypochaeris radicata*, *Lolium perenne*, *Rumex acetosella*, *Sanicula bipinnatifida*, and *Vicia sativa*, and herbs that are sometimes present include *Carduus pycnocephalus*, *Dichondra donelliana*, *Elymus glaucus*, *Erodium botrys*, *Hypochaeris glabra*, *Iris macrosiphon*, *Nassella pulchra*, *Plantago lanceolata*, *Ranunculus californicus*, *Sanicula crassicaulis*, *Sidalcea malviflora*, and *Vulpia bromoides*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.1	0 – 0.3	no data	
Shrub	2.1	0 – 10	0.5	0 – 1
Herb	53.6	25 – 93	0.3	0 – 0.5

### **Local Environmental Description**

**Elevation:** Mean 112 m, Range 13 – 215 m

**Aspect:** SE (2), NE (1), NW (1)

**Slope:** Mean 21 degrees, Range 15 – 28 degrees

**Macro Topography:** Middle 1/3 of slope (2), Bottom (1), Lower 1/3 of slope (1)

**Large Rock:** Mean 0.3%, Range 0.0 – 1.0%

**Small Rock:** Mean 5.8%, Range 0.2 – 15.0%

**Fines Cover:** Mean 12.3%, Range 2.0 – 25.0%

**Litter Cover:** Mean 78.0%, Range 63.0 – 91%

**Soil Texture (field assessed):** Fine sandy clay (1), Moderately fine clay loam (1), Moderately fine sandy clay loam (1), Fine clay (1)

**Geology (field or map data):** Alluvium (2), Franciscan melange (2), Large landslides (1), Sandstone and other sedimentary (1)

**Marin County Watersheds:** Bolinas (1), Lagunitas Creek (1), Novato (1), Petaluma River (1)

**Other Watersheds, Sonoma Co.:** Salmon Creek (2)

### **Site Impacts**

This association has greater cover of exotics (average 87.8%) than natives. Non-native species that occur with highest frequency and abundance include *Anagallis arvensis*, *Avena* spp., *Brachypodium distachyon*, *Briza maxima*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Cynosurus echinatus*, *Erodium botrys*, *Hypochaeris glabra*, *Hypochaeris radicata*, *Lolium perenne*, *Plantago lanceolata*, *Rumex acetosella*, *Vicia sativa*, and *Vulpia bromoides*.

### **Classification Comments**

This association is considered provisional since it is under-sampled in its expected range. Since the number of surveys of this association in Marin are low, data from nearby counties were included.

References: Klein et al. 2015

Global Rarity Rank: GNA

State Rarity Rank: SNA

State Rare: N

**Surveys Used for Description**

Total: N=6; Marin County (n=4): MMWD0605, MOSD0266, MOSD0304, PGA1710

Sonoma County (n=2): HEAD0111, HEAD0207

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Regenerating or Shrubby Trees</b>										
	<i>Quercus agrifolia</i>	33	33.3	0.1	0.2	0.3				
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	33	22.2	1.7	0.2	10.0				
<b>Herb</b>										
	<b><i>Briza maxima</i></b>	<b>100</b>	<b>62.0</b>	<b>42.2</b>	<b>20.0</b>	<b>75.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Avena</i> spp.	83	3.0	1.9	0.2	10.0	<b>X</b>			<b>X</b>
	<i>Hypochaeris radicata</i>	67	3.7	2.7	0.2	8.0				<b>X</b>
	<i>Bromus diandrus</i>	67	3.2	2.2	0.2	8.0				<b>X</b>
	<i>Lolium perenne</i>	67	0.6	0.4	0.2	2.0				<b>X</b>
	<i>Anagallis arvensis</i>	67	0.3	0.2	0.2	0.3				<b>X</b>
	<i>Rumex acetosella</i>	67	0.2	0.2	0.2	0.3				<b>X</b>
	<i>Brachypodium distachyon</i>	50	9.6	5.5	3.0	20.0				<b>X</b>
	<i>Bromus hordeaceus</i>	50	1.1	0.6	0.2	3.0				<b>X</b>
	<i>Chlorogalum pomeridianum</i>	50	1.1	0.6	0.2	3.0				<b>X</b>
	<i>Cynosurus echinatus</i>	50	0.7	0.4	0.2	1.0				<b>X</b>
	<i>Sanicula bipinnatifida</i>	50	0.2	0.1	0.2	0.3				<b>X</b>
	<i>Vicia sativa</i>	50	0.2	0.1	0.2	0.3				<b>X</b>
	<i>Erodium botrys</i>	33	1.8	1.7	0.2	10.0				
	<i>Hypochaeris glabra</i>	33	0.7	0.5	0.2	3.0				
	<i>Nassella pulchra</i>	33	0.8	0.5	0.2	3.0				
	<i>Ranunculus californicus</i>	33	0.8	0.5	0.2	3.0				
	<i>Sanicula crassicaulis</i>	33	0.9	0.4	0.3	2.0				
	<i>Elymus glaucus</i>	33	0.5	0.4	0.2	2.0				
	<i>Iris macrosiphon</i>	33	0.1	0.1	0.2	0.3				
	<i>Sidalcea malviflora</i>	33	0.1	0.1	0.2	0.3				
	<i>Carduus pycnocephalus</i>	33	0.1	0.1	0.2	0.2				
	<i>Dichondra donelliana</i>	33	0.1	0.1	0.2	0.2				
	<i>Plantago lanceolata</i>	33	0.1	0.1	0.2	0.2				
	<i>Vulpia bromoides</i>	33	0.1	0.1	0.2	0.2				

## ***Bromus diandrus* Semi-natural Association**

**Common Name:** Ripgut Brome Grassland

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

### **Local Vegetation Description**

The Ripgut Brome Association forms an intermittent to continuous herbaceous layer. The shrub layer is sparse and the tree layer is absent. Dominant herbs include *Bromus diandrus*, and characteristic herbs include *Anagallis arvensis*, *Avena* spp., *Briza maxima*, *Bromus hordeaceus*, *Carduus pycnocephalus*, and *Lolium perenne*. Those herbs often present include *Brachypodium distachyon*, *Bromus carinatus*, *Cynosurus echinatus*, *Eschscholzia californica*, *Galium aparine*, *Hypochaeris glabra*, *Nassella pulchra*, *Sonchus asper*, and *Vicia sativa*, and herbs that are sometimes present include *Elymus glaucus*, *Erodium botrys*, *Galium*, *Geranium dissectum*, *Lotus wrangelianus*, *Lupinus bicolor*, *Lupinus nanus*, *Melica californica*, *Pteridium aquilinum*, *Rumex acetosella*, *Silene gallica*, *Silybum marianum*, *Sisyrinchium bellum*, *Trifolium hirtum*, *Trifolium microcephalum*, *Vicia* spp., *Vulpia bromoides*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.5	0 – 1	no data	
Herb	61.5	40 – 85	0.4	0 – 1

### **Local Environmental Description**

**Elevation:** Mean 292 m, Range 45 – 529 m

**Aspect:** SW (4), NE (2), NW (1)

**Slope:** Mean 20 degrees, Range 10 – 32 degrees

**Macro Topography:** Middle 1/3 of slope (3), Upper 1/3 of slope (3), Lower 1/3 of slope (1)

**Large Rock:** Mean 0.3%, Range 0.0 – 1.0%

**Small Rock:** Mean 1.3%, Range 0.2 – 3.0%

**Fines Cover:** Mean 9.1%, Range 1.0 – 35.0%

**Litter Cover:** Mean 76.3%, Range 15.0 – 93%

**Soil Texture (field assessed):** Moderately fine sandy clay loam (2), Fine clay (1), Fine sandy clay (1), Medium to very fine, sandy loam (1), Moderately coarse, sandy loam (1), Not recorded (1)

**Geology (field or map data):** Volcanic and metavolcanic rocks (3), Sandstone and other sedimentary (2), Franciscan melange (2), Large landslides (1)

**Marin County Watersheds:** Bolinas (5), Lagunitas Creek (2), Novato (1)

### **Site Impacts**

This association has greater cover of exotics (average 95.2%) than natives. Non-native species that occur with highest frequency and abundance include *Anagallis arvensis*, *Avena* spp., *Brachypodium distachyon*, *Briza maxima*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Cynosurus echinatus*, *Erodium botrys*, *Geranium dissectum*, *Hypochaeris glabra*, *Lolium perenne*, *Rumex acetosella*, *Silene gallica*, *Silybum marianum*, *Sonchus asper*, *Trifolium hirtum*, *Vicia sativa*, and *Vulpia bromoides*.

### **Classification Comments**

None.

**References:** AECOM 2013, Buck-Diaz et al. 2011, Buck-Diaz et al. 2012, Buck-Diaz et al. 2013, Keeler-Wolf and Evens 2006, Klein et al. 2015, Rodriguez et al. 2017, Solomeshch and Barbour 2006, Sproul et al. 2011

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

**State Rare:** N

**Surveys Used for Description**

**Total: N=8; Marin County (n=8):** HEAD0029, HEAD0122, HEAD0147, HEAD0223, MMWD0009, MMWD0613, MOSD0264, TAMG001C

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>	<i>Baccharis pilularis</i>	38	37.5	0.1	0.2	0.3				
<b>Herb</b>	<b><i>Bromus diandrus</i></b>	<b>100</b>	<b>49.9</b>	<b>40.3</b>	<b>18.0</b>	<b>68.0</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<i>Avena</i> spp.	88	18.3	13.8	1.0	30.0	<b>X</b>			<b>X</b>
	<i>Anagallis arvensis</i>	88	0.3	0.2	0.2	0.5	<b>X</b>			<b>X</b>
	<i>Carduus pycnocephalus</i>	75	7.7	7.6	0.2	38.0	<b>X</b>			<b>X</b>
	<i>Lolium perenne</i>	75	2.7	2.6	0.2	8.0	<b>X</b>			<b>X</b>
	<i>Bromus hordeaceus</i>	75	2.7	1.6	0.2	6.0	<b>X</b>			<b>X</b>
	<i>Briza maxima</i>	75	2.2	1.5	0.3	4.0	<b>X</b>			<b>X</b>
	<i>Galium aparine</i>	63	0.6	0.5	0.2	3.0				<b>X</b>
	<i>Hypochaeris glabra</i>	63	0.7	0.5	0.2	2.0				<b>X</b>
	<i>Brachypodium distachyon</i>	50	2.3	1.4	0.2	8.0				<b>X</b>
	<i>Cynosurus echinatus</i>	50	0.7	0.5	0.2	3.0				<b>X</b>
	<i>Eschscholzia californica</i>	50	0.5	0.5	0.2	3.0				<b>X</b>
	<i>Nassella pulchra</i>	50	0.5	0.4	0.2	2.0				<b>X</b>
	<i>Bromus carinatus</i>	50	0.2	0.2	0.2	0.5				<b>X</b>
	<i>Sonchus asper</i>	50	0.1	0.1	0.2	0.3				<b>X</b>
	<i>Vicia sativa</i>	50	0.1	0.1	0.2	0.3				<b>X</b>
	<i>Trifolium hirtum</i>	38	3.4	2.9	0.3	20.0				
	<i>Geranium dissectum</i>	38	0.9	0.5	0.2	3.0				
	<i>Silybum marianum</i>	38	0.4	0.4	0.2	3.0				
	<i>Melica californica</i>	38	0.1	0.1	0.2	0.3				
	<i>Silene gallica</i>	38	0.1	0.1	0.2	0.3				
	<i>Elymus glaucus</i>	38	0.1	0.1	0.2	0.2				
	<i>Vulpia bromoides</i>	25	1.1	0.8	3.0	3.0				
	<i>Rumex acetosella</i>	25	0.5	0.5	1.0	3.0				
	<i>Erodium botrys</i>	25	0.2	0.2	0.3	1.0				
	<i>Lupinus bicolor</i>	25	0.3	0.2	0.3	1.0				
	<i>Pteridium aquilinum</i>	25	0.2	0.2	0.2	1.0				
	<i>Lotus wrangelianus</i>	25	0.1	0.1	0.3	0.5				
	<i>Trifolium microcephalum</i>	25	0.1	0.1	0.3	0.3				
	<i>Lupinus nanus</i>	25	0.1	0.1	0.2	0.3				

## ***Bromus hordeaceus* – *Erodium botrys* Semi-natural Association**

**Common Name:** Soft Chess – Filaree Grassland

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

### **Local Vegetation Description**

The Soft Chess – Filaree Association forms an intermittent to continuous herbaceous layer. The shrub layer is absent, and the tree layer is absent. Dominant herbs include *Bromus hordeaceus*, and characteristic herbs include *Anagallis arvensis*, *Bromus diandrus*, and *Erodium botrys*. Those herbs often present include *Aira caryophylllea*, *Avena* spp., *Bromus madritensis*, *Carduus pycnocephalus*, *Hypochaeris glabra*, *Logfia gallica*, *Lolium perenne*, *Nassella pulchra*, and *Plantago erecta*, and herbs that are sometimes present include *Briza maxima*, *Briza minor*, *Camissonia ovata*, *Clarkia purpurea*, *Galium aparine*, *Leptosiphon androsaceus*, *Lotus* spp., *Lupinus bicolor*, *Madia gracilis*, *Plantago lanceolata*, *Sherardia arvensis*, *Silene gallica*, *Soliva sessilis*, *Trifolium depauperatum*, *Trifolium dubium*, *Triphysaria pusilla*, and *Vulpia myuros*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.0	0 – 0	no data	
Herb	61.6	35 – 78	0.3	0 – 0.5

### **Local Environmental Description**

**Elevation:** Mean 339 m, Range 62 – 645 m

**Aspect:** SE (3), SW (2), W (1)

**Slope:** Mean 12 degrees, Range 2 – 20 degrees

**Macro Topography:** Lower 1/3 of slope (2), Middle 1/3 of slope (2), Ridge top (1), Upper 1/3 of slope (1)

**Large Rock:** Mean 0.8%, Range 0.0 – 2.0%

**Small Rock:** Mean 12.0%, Range 0.0 – 71.0%

**Fines Cover:** Mean 19.3%, Range 2.0 – 48.5%

**Litter Cover:** Mean 28.6%, Range 2.0 – 83%

**Soil Texture (field assessed):** Medium to very fine, sandy loam (2), Not recorded (2), Moderately coarse, sandy loam (1), Moderately fine silty clay loam (1)

**Geology (field or map data):** Franciscan melange (5), Volcanic and metavolcanic rocks (1)

**Marin County Watersheds:** Lagunitas Creek (3), Bolinas (1), Petaluma River (1), San Rafael (1)

### **Site Impacts**

This association has greater cover of exotics (average 93.7%) than natives. Non-native species that occur with highest frequency and abundance include *Aira caryophylllea*, *Anagallis arvensis*, *Avena* spp., *Briza maxima*, *Briza minor*, *Bromus diandrus*, *Bromus hordeaceus*, *Bromus madritensis*, *Carduus pycnocephalus*, *Erodium botrys*, *Hypochaeris glabra*, *Logfia gallica*, *Lolium perenne*, *Plantago lanceolata*, *Sherardia arvensis*, *Silene gallica*, *Soliva sessilis*, *Trifolium dubium*, and *Vulpia myuros*.

### **Classification Comments**

None.

**References:** Jimerson et al. 2000, Klein et al. 2015, Rodriguez et al. 2017, Schlising and Sanders 1982

Global Rarity Rank: GNA

State Rarity Rank: SNA

State Rare: N

**Surveys Used for Description**

**Total: N=6; Marin County (n=6):** HEAD0025, MARIN232, MMWD0012, MMWD0014, MMWD0032, TAMG035M

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Herb</b>										
	<b><i>Bromus hordeaceus</i></b>	<b>100</b>	<b>30.4</b>	<b>21.7</b>	<b>8.0</b>	<b>36.0</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<i>Bromus diandrus</i>	83	13.0	7.7	0.2	18.0	<b>X</b>			<b>X</b>
	<b><i>Erodium botrys</i></b>	<b>83</b>	<b>0.9</b>	<b>0.6</b>	<b>0.2</b>	<b>1.0</b>	<b>X</b>			<b>X</b>
	<i>Anagallis arvensis</i>	83	0.5	0.3	0.2	1.0	<b>X</b>			<b>X</b>
	<i>Hypochaeris glabra</i>	67	1.3	0.8	0.2	2.0				<b>X</b>
	<i>Nassella pulchra</i>	67	0.6	0.4	0.2	1.0				<b>X</b>
	<i>Aira caryophyllea</i>	67	0.5	0.3	0.2	1.0				<b>X</b>
	<i>Bromus madritensis</i>	50	6.5	4.5	1.0	25.0				<b>X</b>
	<i>Avena</i> spp.	50	4.6	3.4	0.2	17.0				<b>X</b>
	<i>Logfia gallica</i>	50	2.6	1.4	0.2	8.0				<b>X</b>
	<i>Lolium perenne</i>	50	1.5	1.2	0.2	5.0				<b>X</b>
	<i>Plantago erecta</i>	50	0.3	0.3	0.2	1.0				<b>X</b>
	<i>Carduus pycnocephalus</i>	50	0.3	0.2	0.2	1.0				<b>X</b>
	<i>Briza maxima</i>	33	8.9	5.3	10.0	22.0				
	<i>Soliva sessilis</i>	33	1.2	0.9	0.2	5.0				
	<i>Plantago lanceolata</i>	33	0.5	0.4	0.2	2.0				
	<i>Lupinus bicolor</i>	33	0.3	0.2	0.3	1.0				
	<i>Camissonia ovata</i>	33	0.3	0.2	0.2	1.0				
	<i>Trifolium dubium</i>	33	0.2	0.2	0.2	1.0				
	<i>Vulpia myuros</i>	33	0.3	0.2	0.2	1.0				
	<i>Briza minor</i>	33	0.1	0.1	0.2	0.3				
	<i>Clarkia purpurea</i>	33	0.1	0.1	0.2	0.3				
	<i>Leptosiphon androsaceus</i>	33	0.1	0.1	0.2	0.3				
	<i>Madia gracilis</i>	33	0.1	0.1	0.2	0.3				
	<i>Silene gallica</i>	33	0.1	0.1	0.2	0.3				
	<i>Galium aparine</i>	33	0.1	0.1	0.2	0.2				
	<i>Lotus</i> spp.	33	0.1	0.1	0.2	0.2				
	<i>Sherardia arvensis</i>	33	0.1	0.1	0.2	0.2				
	<i>Trifolium depauperatum</i>	33	0.1	0.1	0.2	0.2				
	<i>Triphysaria pusilla</i>	33	0.1	0.1	0.2	0.2				

*Bromus hordeaceus* – *Erodium botrys* Semi-natural Association  
*Avena* spp. – *Bromus* spp. Herbaceous Semi-Natural Alliance



***Hypochaeris glabra* – *Vulpia bromoides* Semi-natural Association**

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**Common Name:** Smooth Cat's Ear – Brome Fescue Forbland

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

**Local Vegetation Description**

The Smooth Cat's Ear – Brome Fescue Association forms an intermittent herbaceous layer. The shrub layer is sparse and the tree layer is absent. Dominant herbs include *Hypochaeris glabra*, and characteristic herbs include *Anagallis arvensis*, *Avena* spp., *Bromus hordeaceus*, *Chlorogalum pomeridianum*, *Cynosurus echinatus*, *Hypochaeris radicata*, *Linum bienne*, *Logfia gallica*, *Rumex acetosella*, *Silene gallica*, and *Vulpia bromoides*. Those herbs often present include *Acaena pinnatifida*, *Brachypodium distachyon*, *Bromus diandrus*, *Castilleja densiflora*, *Croton setigerus*, *Daucus pusillus*, *Erodium botrys*, *Erodium cicutarium*, *Eschscholzia californica*, *Hordeum murinum*, *Leontodon taraxacoides*, *Lolium perenne*, *Lotus micranthus*, *Lupinus nanus*, *Medicago* spp., *Nassella pulchra*, *Sherardia arvensis*, *Trifolium glomeratum*, *Trifolium hirtum*, *Trifolium microcephalum*, *Trifolium microdon*, *Trifolium subterraneum*, and *Vulpia myuros*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.5	0 – 1	no data	
Herb	50.0	40 – 60	no data	

**Local Environmental Description**

**Elevation:** Mean 343 m, Range 258 – 427 m

**Aspect:** SW (2)

**Slope:** Mean 7 degrees, Range 4 – 10 degrees

**Macro Topography:** Upper 1/3 of slope (2)

**Large Rock:** Mean 0.5%, Range 0.0 – 1.0%

**Fines Cover:** Mean 20.0%, Range 10 – 30%

**Small Rock:** Mean 28%, Range 6.0 – 50%

**Litter Cover:** Mean 53.0%, Range 46 – 60%

**Soil Texture (field assessed):** Moderately coarse, sandy loam (1), Moderately fine sandy clay loam (1)

**Geology (field or map data):** Franciscan melange (1), Volcanic and metavolcanic rocks (1)

**Marin County Watersheds:** Walker Creek (1)

**Other Watersheds, Sonoma Co.:** Gualala River (1)

**Site Impacts**

This association has greater cover of exotics (average 97.4%) than natives. Non-native species that occur with highest frequency and abundance include *Anagallis arvensis*, *Avena* spp., *Brachypodium distachyon*, *Bromus diandrus*, *Bromus hordeaceus*, *Cynosurus echinatus*, *Erodium botrys*, *Erodium cicutarium*, *Hordeum murinum*, *Hypochaeris glabra*, *Hypochaeris radicata*, *Leontodon taraxacoides*, *Linum bienne*, *Logfia gallica*, *Lolium perenne*, *Medicago* spp., *Rumex acetosella*, *Sherardia arvensis*, *Silene gallica*, *Trifolium glomeratum*, *Trifolium hirtum*, *Trifolium subterraneum*, *Vulpia bromoides*, and *Vulpia myuros*.

**Classification Comments**

Since the number of surveys of this association in Marin are low, data from nearby counties are included.

**References:** Buck-Diaz et al. 2011, Buck-Diaz et al. 2012, Buck-Diaz et al. 2013, Rodriguez et al. 2017

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

**State Rare:** N

**Surveys Used for Description**

Total: N=2; Marin County (n=1): HEAD0082

Sonoma County (n=1): HEAD0286

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Herb										
	<b><i>Hypochaeris glabra</i></b>	<b>100</b>	<b>35.9</b>	<b>28.0</b>	<b>18.0</b>	<b>38.0</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<i>Avena</i> spp.	100	21.4	23.0	8.0	38.0	<b>X</b>			<b>X</b>
	<i>Hypochaeris radicata</i>	100	13.3	13.0	8.0	18.0	<b>X</b>			<b>X</b>
	<i>Bromus hordeaceus</i>	100	3.4	4.1	0.2	8.0	<b>X</b>			<b>X</b>
	<b><i>Vulpia bromoides</i></b>	<b>100</b>	<b>3.4</b>	<b>4.1</b>	<b>0.2</b>	<b>8.0</b>	<b>X</b>			<b>X</b>
	<i>Logfia gallica</i>	100	3.5	3.0	3.0	3.0	<b>X</b>			<b>X</b>
	<i>Cynosurus echinatus</i>	100	1.4	1.6	0.2	3.0	<b>X</b>			<b>X</b>
	<i>Linum bienne</i>	100	2.3	1.6	0.2	3.0	<b>X</b>			<b>X</b>
	<i>Silene gallica</i>	100	1.4	1.6	0.2	3.0	<b>X</b>			<b>X</b>
	<i>Anagallis arvensis</i>	100	0.2	0.2	0.2	0.2	<b>X</b>			<b>X</b>
	<i>Chlorogalum pomeridianum</i>	100	0.2	0.2	0.2	0.2	<b>X</b>			<b>X</b>
	<i>Rumex acetosella</i>	100	0.2	0.2	0.2	0.2	<b>X</b>			<b>X</b>
	<i>Trifolium subterraneum</i>	50	3.2	4.0	8.0	8.0				<b>X</b>
	<i>Erodium botrys</i>	50	1.2	1.5	3.0	3.0				<b>X</b>
	<i>Eschscholzia californica</i>	50	1.2	1.5	3.0	3.0				<b>X</b>
	<i>Lolium perenne</i>	50	1.2	1.5	3.0	3.0				<b>X</b>
	<i>Trifolium glomeratum</i>	50	1.2	1.5	3.0	3.0				<b>X</b>
	<i>Trifolium hirtum</i>	50	1.2	1.5	3.0	3.0				<b>X</b>
	<i>Vulpia myuros</i>	50	2.3	1.5	3.0	3.0				<b>X</b>
	<i>Brachypodium distachyon</i>	50	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Bromus diandrus</i>	50	0.2	0.1	0.2	0.2				<b>X</b>
	<i>Castilleja densiflora</i>	50	0.2	0.1	0.2	0.2				<b>X</b>
	<i>Croton setigerus</i>	50	0.2	0.1	0.2	0.2				<b>X</b>
	<i>Daucus pusillus</i>	50	0.2	0.1	0.2	0.2				<b>X</b>
	<i>Erodium cicutarium</i>	50	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Hordeum murinum</i>	50	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Leontodon taraxacoides</i>	50	0.2	0.1	0.2	0.2				<b>X</b>
	<i>Lotus micranthus</i>	50	0.2	0.1	0.2	0.2				<b>X</b>
	<i>Lupinus nanus</i>	50	0.2	0.1	0.2	0.2				<b>X</b>
	<i>Medicago</i> spp.	50	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Nassella pulchra</i>	50	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Sherardia arvensis</i>	50	0.2	0.1	0.2	0.2				<b>X</b>
	<i>Trifolium microcephalum</i>	50	0.2	0.1	0.2	0.2				<b>X</b>
	<i>Trifolium microdon</i>	50	0.2	0.1	0.2	0.2				<b>X</b>
	<i>Acaena pinnatifida</i>	50	0.0	0.1	0.1	0.1				<b>X</b>

*Hypochaeris glabra* – *Vulpia bromoides* Semi-natural Association  
*Avena* spp. – *Bromus* spp. Herbaceous Semi-Natural Alliance

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## ***Azolla (filiculoides, microphylla)* Herbaceous Alliance**

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**Common Name:** Mosquito fern mats

**NVC Alliance Code:** A1741. *Azolla filiculoides* - *Azolla microphylla* Aquatic Vegetation Alliance

### **Statewide Description**

*Azolla filiculoides* or *Azolla mexicana* is dominant floating on the water surface or characteristically present in the herbaceous layer with *Egeria densa*, *Lemna minor*, *Spirodela polyrrhiza*, *Wolffia borealis*, and *Wolffiella lingulata*. Emergent plants may be present at low to high cover, including *Myriophyllum aquaticum*.

*Azolla* mats occur throughout California where conditions are favorable. Mats of both *Azolla* and *Lemna* occur under the same conditions, and either can dominate in the same water body. In California, stands are generally simple with only one or two species comprising the majority of cover.

### **Local Vegetation Description**

The Mosquito fern mats Alliance forms a continuous herbaceous layer. The shrub layer is absent and the tree layer is absent. Dominant herbs include *Azolla filiculoides*. Those herbs often present include *Hydrocotyle ranunculoides*, and herbs that are sometimes present include *Alisma lanceolatum*, *Epilobium ciliatum*, *Ludwigia* spp., *Nuphar lutea* ssp. *polysepala*, *Polygonum lapathifolium*, *Polypogon monspeliensis*, and *Sparganium eurycarpum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.0	0 – 0	no data	
Herb	96.0	95 – 99	0.3	0 – 0.5

### **Local Membership Rule**

*Azolla filiculoides* or *Azolla mexicana* (= *A. microphylla*) dominates or characterizes stands on water or wet ground surfaces. If *Lemna* is co-dominant, key to this alliance.

### **Local Environmental Description**

**Elevation:** Mean 105 m, Range 10 – 297 m

**Aspect:** Flat (3), SW (1)

**Slope:** Mean 1 degrees, Range 0 – 2 degrees

**Macro Topography:** Bottom (2), Bottom to Lower 1/3 of slope (1), Middle 1/3 of slope (1)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** Mean 0.5%, Range 0.0 – 2.0%

**Litter Cover:** Mean 0.1%, Range 0.0 – 0.2%

**Soil Texture (field assessed):** Not recorded (3)

**Geology (field or map data):** Sandstone and other sedimentary (2), Marine and nonmarine sand deposits (1), Volcanic flow rocks (1)

**Marin County Watersheds:** Bolinas (1), Lagunitas Creek (1), Walker Creek (1)

**Other Watersheds, Sonoma Co.:** Sonoma Creek (1)

### **Site Impacts**

This alliance has very low non-native plant cover (average 0.1%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Alisma lanceolatum* and *Polypogon monspeliensis*.

### **Associations in Marin County**

*Azolla (filiculoides, microphylla)*

### **Classification Comments**

Since Marin County has fewer than five surveys of this alliance, data from nearby counties were included.

**References:** Buck-Diaz et al. 2012, Hickson and Keeler-Wolf 2007, Klein et al. 2015

**Global Rarity Rank:** G5

**State Rarity Rank:** S5

### **Surveys Used for Description**

**Total: N=4; Marin County (n=3):** MARIN247, MARIN270, MARIN277

Sonoma County (n=1): SONO0019

### Alliance Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Herb	<i>Azolla filiculoides</i>	100	76.8	82.5	71.0	99.0	X	X		X
	<i>Hydrocotyle ranunculoides</i>	50	6.4	6.1	0.2	24.0				X
	<i>Nuphar lutea</i> ssp. <i>polysepala</i>	25	10.3	15.0	60.0	60.0				
	<i>Ludwigia</i> spp.	25	3.4	3.5	14.0	14.0				
	<i>Epilobium ciliatum</i>	25	1.5	1.5	6.0	6.0				
	<i>Sparganium eurycarpum</i>	25	0.9	1.3	5.0	5.0				
	<i>Polygonum lapathifolium</i>	25	0.7	0.8	3.0	3.0				
	<i>Alisma lanceolatum</i>	25	0.0	0.1	0.2	0.2				
	<i>Polypogon monspeliensis</i>	25	0.0	0.1	0.2	0.2				

### ***Azolla (filiculoides, microphylla)* Association**

**Common Name:** Pacific or Mexican Mosquito Fern Aquatic Vegetation

**Alliance:** *Azolla (filiculoides, microphylla)* Herbaceous Alliance

#### **Classification Comments**

The association circumscription is the same as that of the alliance. See above for detailed description. Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**Global Rarity Rank:** G5

**State Rarity Rank:** S5

**State Rare:** N



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

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**Common Name:** Nodding beggarticks – Western goldentop – Marsh seedbox mudflats

**NVC Alliance Code:** A3850. *Bidens cernua* - *Euthamia occidentalis* - *Ludwigia palustris* Intertidal  
Mudflat Alliance

**Statewide Description**

*Artemisia douglasiana*, *Bidens cernua*, *Euthamia occidentalis* and/or *Ludwigia palustris* is dominant or co-dominant in the herbaceous layer with *Amaranthus* spp., *Baccharis douglasii*, *Eleocharis* spp., *Epilobium* spp., *Euphorbia* spp., *Hirschfeldia incana*, *Persicaria hydropiperoides*, *Rumex* spp., *Sagittaria latifolia* or *Urtica dioica*. Emergent trees and shrubs may be present at low cover, including *Rubus ursinus* and *Sambucus nigra*.

This herbaceous alliance is found in the western U.S. and occurs in low-elevation marshes, meadows, and mudflats along low-gradient streams, shallow ponds, and depressional wetlands (NatureServe 2019). It is dominated by a mixture of low-growing herbs, prostrate forbs, drying aquatic plants, and taller perennial herbs. Specifically, these are species that can tolerate early-season flooding and summer drying that expose mudflats with subsurface moisture. Potentially dominant plants include *Amaranthus* ssp., *Artemisia douglasiana*, *Bidens cernua*, *Eleocharis* spp., *Euphorbia* spp., *Euthamia occidentalis*, *Ludwigia palustris*, *Persicaria hydropiperoides*, and *Sagittaria latifolia*, though many more species have been recorded.

### Local Vegetation Description

The Nodding beggarticks – Western goldentop – Marsh seedbox mudflats Alliance forms an intermittent to continuous herbaceous layer. The shrub layer is sparse and the tree layer is absent. Those herbs often present include *Cirsium vulgare* and *Mentha pulegium*, and herbs that are sometimes present include *Achillea millefolium*, *Baccharis glutinosa*, *Bidens frondosa*, *Carduus pycnocephalus*, *Centaureum tenuiflorum*, *Cicuta douglasii*, *Conyza canadensis*, *Cuscuta pentagona*, *Deschampsia cespitosa*, *Dittrichia graveolens*, *Eleocharis macrostachya*, *Epilobium ciliatum*, *Gnaphalium palustre*, *Helenium puberulum*, *Hoita orbicularis*, *Juncus effusus*, *Juncus patens*, *Juncus phaeocephalus*, *Leontodon taraxacoides*, *Lythrum hyssopifolium*, *Madia sativa*, *Matricaria discoidea*, *Phyla nodiflora*, *Picris echioides*, *Polygonum hydropiperoides*, *Polygonum pensylvanicum*, *Polygonum punctatum*, *Polypogon monspeliensis*, *Rumex crispus*, *Rumex salicifolius*, *Senecio hydrophilus*, *Solidago velutina*, *Sonchus asper*, *Stachys ajugoides*, *Typha domingensis*, and *Xanthium strumarium*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.0	0.0 – 0.0	no data	
Herb	76.0	40 – 100	1.0	0 – 2

### Local Membership Rule

*Euthamia occidentalis*, *Hoita orbicularis*, *Bidens* spp., and/or the native herb *Ludwigia palustris* dominates or co-dominates in wetlands with emergent shrubs such as *Rubus ursinus*. *Baccharis glutinosa* (= *B. douglasii*) is often present.

### Local Environmental Description

**Elevation:** Mean 46 m, Range 4 – 92 m

**Aspect:** Flat (2), NE (2)

**Slope:** Mean 1 degrees, Range 0 – 3 degrees

**Macro Topography:** Bottom (2), Lower 1/3 of slope (2)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** Mean 49.5%, Range 0.0 – 97.0%

**Litter Cover:** Mean 48.3%, Range 2.0 – 97%

**Soil Texture (field assessed):** Medium silt loam (2), Medium to very fine, loamy sand (1)

**Geology (field or map data):** Franciscan melange (3), Alluvium (2)

**Marin County Watersheds:** Novato (3)

**Other Watersheds, San Mateo Co.:** San Mateo Bayside (1); **Sonoma Co.:** Middle Russian River (1)

### Site Impacts

This alliance has moderate non-native plant cover (average 22.5%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Carduus pycnocephalus*, *Centaureum tenuiflorum*, *Cirsium vulgare*, *Dittrichia graveolens*, *Leontodon taraxacoides*, *Lythrum hyssopifolium*, *Matricaria discoidea*, *Mentha pulegium*, *Picris echioides*, *Polygonum pensylvanicum*, *Polypogon monspeliensis*, *Rumex crispus*, and *Sonchus asper*.

### Associations in Marin County

*Bidens frondosa*

### Classification Comments

Since Marin County has fewer than five surveys of this alliance, data from nearby counties were included.

References: Christy 2004

Global Rarity Rank: GNR

State Rarity Rank: S4

**Surveys Used for Description**

Total: N=5; Marin County (n=3): MARIN106, MARIN108, MARIN410

San Mateo County (n=1): PWFWM02A

Sonoma County (n=1): SONO0826

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Rubus ursinus</i>	20	10.0	0.0	0.2	0.2				
	<i>Ribes divaricatum</i>	20	10.0	0.0	0.2	0.2				
<b>Herb</b>										
	<i>Mentha pulegium</i>	60	8.7	3.5	0.2	17.0				X
	<i>Cirsium vulgare</i>	60	0.2	0.1	0.2	0.2				X
	<b><i>Bidens frondosa</i></b>	<b>40</b>	<b>38.6</b>	<b>33.0</b>	<b>70.0</b>	<b>95.0</b>				
	<b><i>Gnaphalium palustre</i></b>	<b>40</b>	<b>19.1</b>	<b>14.0</b>	<b>3.0</b>	<b>67.0</b>				
	<i>Centaureum tenuiflorum</i>	40	7.7	3.0	0.2	15.0				
	<i>Phyla nodiflora</i>	40	3.4	2.0	3.0	7.0				
	<i>Picris echioides</i>	40	0.2	0.1	0.2	0.2				
	<i>Rumex crispus</i>	40	0.2	0.1	0.2	0.2				
	<i>Dittrichia graveolens</i>	40	0.2	0.1	0.2	0.2				
	<i>Sonchus asper</i>	40	0.1	0.1	0.2	0.2				
	<i>Leontodon taraxacoides</i>	40	0.2	0.1	0.2	0.2				
	<i>Hoita orbicularis</i>	20	16.9	17.5	87.5	87.5				
	<i>Baccharis glutinosa</i>	20	1.9	2.0	10.0	10.0				
	<i>Polygonum pensylvanicum</i>	20	0.6	0.6	3.0	3.0				
	<i>Typha domingensis</i>	20	0.6	0.6	3.0	3.0				
	<i>Xanthium strumarium</i>	20	0.4	0.4	2.0	2.0				
	<i>Eleocharis macrostachya</i>	20	0.3	0.2	1.0	1.0				
	<i>Achillea millefolium</i>	20	0.0	0.0	0.2	0.2				
	<i>Juncus patens</i>	20	0.0	0.0	0.2	0.2				
	<i>Juncus effusus</i>	20	0.0	0.0	0.2	0.2				
	<i>Helenium puberulum</i>	20	0.0	0.0	0.2	0.2				
	<i>Epilobium ciliatum</i>	20	0.0	0.0	0.2	0.2				
	<i>Cuscuta pentagona</i>	20	0.1	0.0	0.2	0.2				
	<i>Cicuta douglasii</i>	20	0.0	0.0	0.2	0.2				
	<i>Madia sativa</i>	20	0.1	0.0	0.2	0.2				
	<i>Senecio hydrophilus</i>	20	0.0	0.0	0.2	0.2				
	<i>Juncus phaeocephalus</i>	20	0.0	0.0	0.2	0.2				
	<i>Carduus pycnocephalus</i>	20	0.0	0.0	0.2	0.2				
	<i>Polygonum punctatum</i>	20	0.0	0.0	0.2	0.2				



Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<i>Lythrum hyssopifolium</i>	20	0.1	0.0	0.2	0.2				
	<i>Stachys ajugoides</i>	20	0.0	0.0	0.2	0.2				
	<i>Polygonum hydropiperoides</i>	20	0.1	0.0	0.2	0.2				
	<i>Solidago velutina</i>	20	0.1	0.0	0.2	0.2				
	<i>Conyza canadensis</i>	20	0.1	0.0	0.2	0.2				
	<i>Rumex salicifolius</i>	20	0.0	0.0	0.2	0.2				
	<i>Deschampsia cespitosa</i>	20	0.0	0.0	0.2	0.2				
	<i>Matricaria discoidea</i>	20	0.1	0.0	0.2	0.2				
	<i>Polypogon monspeliensis</i>	20	0.1	0.0	0.2	0.2				
<b>Non-vascular</b>										
	Algae	20	20.0	0.0	0.2	0.2				

## ***Bidens frondosa* Provisional Association**

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**Common Name:** Sticktight Forbland

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

### **Local Vegetation Description**

The Sticktight Forbland Association forms a continuous herbaceous layer. The shrub layer is absent, and the tree layer is absent. The dominant herb is *Bidens frondosa*. Those herbs often present include *Cuscuta pentagona*, *Eleocharis macrostachya*, *Polygonum pensylvanicum*, *Polypogon monspeliensis*, and *Xanthium strumarium*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.0	0 – 0	no data	
Herb	85.0	70 – 100	1.5	1 – 2

### **Local Environmental Description**

**Elevation:** Mean 12 m, Range 4 – 19 m

**Aspect:** Flat (2)

**Slope:** 0 degrees

**Macro Topography:** Bottom (2)

**Large Rock:** Mean 0.0%, Range 0.0 – 0.0%

**Small Rock:** Mean 0.0%, Range 0.0 – 0.0%

**Fines Cover:** Mean 2.5%, Range 0.0 – 5.0%

**Litter Cover:** Mean 94.5%, Range 92 – 97%

**Soil Texture (field assessed):** Medium to very fine, loamy sand (1)

**Geology (field or map data):** Alluvium (2)

**Marin County Watersheds:** Novato (1)

**Other Watersheds, Sonoma Co.:** Middle Russian River (1)

### **Site Impacts**

This association has low non-native plant cover (average 1.6%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Polygonum pensylvanicum* and *Polypogon monspeliensis*.

### **Classification Comments**

This provisional association was previously placed in the *Polygonum lapathifolium* – *Xanthium strumarium* Alliance (Klein et al. 2015), but it is now represented in this broad wet forb alliance. Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** Klein et al. 2015

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

### **Surveys Used for Description**

**Total: N=2; Marin County (n=1):** MARIN410

**Sonoma County (n=1):** SONO0826

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Herb</b>										
	<i>Bidens frondosa</i>	100	96.5	82.5	70.0	95.0	X	X		X
	<i>Polygonum pennsylvanicum</i>	50	1.5	1.5	3.0	3.0				X
	<i>Xanthium strumarium</i>	50	1.0	1.0	2.0	2.0				X
	<i>Eleocharis macrostachya</i>	50	0.7	0.5	1.0	1.0				X
	<i>Cuscuta pentagona</i>	50	0.1	0.1	0.2	0.2				X
	<i>Polypogon monspeliensis</i>	50	0.1	0.1	0.2	0.2				X
<b>Non-vascular</b>										
	Algae	50	50.0	0.1	0.2	0.2				X

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## ***Bolboschoenus maritimus* Herbaceous Alliance**

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**Common Name:** Salt marsh bulrush marshes

**NVC Alliance Code:** A3895. *Schoenoplectus americanus* - *Schoenoplectus acutus* - *Schoenoplectus californicus* Marsh Alliance

### **Statewide Description**

*Bolboschoenus maritimus* is dominant or co-dominant in the herbaceous layer with *Agrostis stolonifera*, *Argentina egedii*, *Atriplex prostrata*, *Bolboschoenus robustus*, *Chenopodium foliosum*, *Cotula coronopifolia*, *Distichlis spicata*, *Eleocharis macrostachya*, *Lemna minuta*, *Sarcocornia pacifica*, *Sesuvium verrucosum*, *Spergularia salina*, and *Typha latifolia*.

This alliance occurs in tidal marshes with relatively high salinity, at intermediate tidal elevations with seasonal flooding (Keeler-Wolf and Vaghti 2000, Pickart 2006). Inland marshes in areas with alkali, brackish, or fresh water contain different associates than stands found in coastal marshes.

*Bolboschoenus maritimus* usually dominates in the wetter, tidal, brackish to sub-saline marshes and ditches, including early successional sites of diked marshes within relict swales and depressions (Baye 2000).

### **Local Vegetation Description**

The Salt marsh bulrush marshes Alliance forms an intermittent to continuous herbaceous layer. The shrub layer is absent and the tree layer is sparse. Dominant herbs include *Bolboschoenus maritimus*, and characteristic herbs include *Sarcocornia pacifica*. Those herbs often present include *Cuscuta salina*, and herbs that are sometimes present include *Atriplex prostrata*, *Bolboschoenus robustus*, *Frankenia salina*,

*Grindelia stricta*, *Jaumea carnosa*, *Oenanthe sarmentosa*, *Rumex* spp., and *Spartina foliosa*. Commonly associated emergent trees at sparse cover include *Quercus chrysolepis*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	1.3	0 – 5	3.5	2 – 5
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.0	0.0 – 0.0	no data	
Herb	63.8	33 – 96	1.8	0.5 – 5

### **Local Membership Rule**

*Bolboschoenus maritimus* or *B. robustus* dominates or co-dominates with *Sarcocornia* (= *Salicornia*) *pacifica*.

### **Local Environmental Description**

**Elevation:** Mean 20 m, Range 2 – 65 m

**Aspect:** Flat (2), NW (1)

**Slope:** Mean 0 degrees, Range 0 – 1 degrees

**Macro Topography:** Bottom (2), Lower 1/3 of slope (1)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** Mean 49.0%, Range 5.0 – 92.0%

**Litter Cover:** Mean 15.0%, Range 2.0 – 40%

**Soil Texture (field assessed):** Muck (3)

**Geology (field or map data):** Alluvium (3), Large landslides (1)

**Marin County Watersheds:** Bolinas (1), Novato (1)

**Other Watersheds, San Mateo Co.:** Pescadero Creek (1); **Sonoma Co.:** Sonoma Creek (1)

### **Site Impacts**

This alliance has very low non-native plant cover (average 0.1%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Atriplex prostrata*.

### **Associations in Marin County**

*Bolboschoenus maritimus* – *Sarcocornia pacifica*

### **Classification Comments**

Since Marin County has fewer than five surveys of this alliance, data from nearby counties were included. One stand with *Bolboschoenus robustus* strongly dominant is placed here at the alliance level.

**References:** Keeler-Wolf and Vaghti 2000, Klein et al. 2015, Pickart 2006, Sproul et al. 2011

**Global Rarity Rank:** G4

**State Rarity Rank:** S3

### **Surveys Used for Description**

**Total: N=4; Marin County (n=2):** MARIN019, PGA7728

San Mateo County (n=1): SMAT0045

Sonoma County (n=1): SONO0375

### Alliance Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>	<i>Quercus chrysolepis</i>	25	25.0	1.3	5.0	5.0				
<b>Herb</b>	<b><i>Bolboschoenus maritimus</i></b>	<b>75</b>	<b>41.0</b>	<b>25.0</b>	<b>18.0</b>	<b>60.0</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<i>Sarcocornia pacifica</i>	75	16.1	8.0	2.0	15.0	<b>X</b>			<b>X</b>
	<i>Cuscuta salina</i>	50	0.2	0.1	0.2	0.2				<b>X</b>
	<i>Bolboschoenus robustus</i>	25	23.1	24.0	96.0	96.0				
	<i>Spartina foliosa</i>	25	14.3	8.0	32.0	32.0				
	<i>Oenanthe sarmentosa</i>	25	1.9	2.0	8.0	8.0				
	<i>Frankenia salina</i>	25	1.5	1.3	5.0	5.0				
	<i>Jaumea carnosa</i>	25	1.4	0.5	2.0	2.0				
	<i>Grindelia stricta</i>	25	0.3	0.3	1.0	1.0				
	<i>Atriplex prostrata</i>	25	0.1	0.1	0.2	0.2				
	<i>Rumex</i> spp.	25	0.1	0.1	0.2	0.2				

## ***Bolboschoenus maritimus* – *Sarcocornia pacifica* Association**

**Common Name:** Salt Marsh Bulrush – Pacific Glasswort Marsh

**Alliance:** *Bolboschoenus maritimus* Herbaceous Alliance

### **Local Vegetation Description**

The Salt Marsh Bulrush – Pacific Glasswort Association forms an intermittent to continuous herbaceous layer. The shrub layer is absent and the tree layer is absent. The dominant herb is *Bolboschoenus maritimus*, and *Sarcocornia pacifica* is a characteristic to co-dominant herb. Those herbs often present include *Cuscuta salina*, and herbs that are sometimes present include *Atriplex prostrata*, *Frankenia salina*, *Grindelia stricta*, *Jaumea carnosa*, *Rumex*, and *Spartina foliosa*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.0	0 – 0	no data	
Herb	53.0	33 – 70	1.3	0.5 – 2

### **Local Environmental Description**

**Elevation:** Mean 5 m, Range 2 – 8 m

**Aspect:** Flat (2), NW (1)

**Slope:** Mean 0 degrees, Range 0 – 1 degrees

**Macro Topography:** Bottom (2), Lower 1/3 of slope (1)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** Mean 49.0%, Range 5.0 – 92.0%

**Litter Cover:** Mean 15.0%, Range 2.0 – 40%

**Soil Texture (field assessed):** Muck (3)

**Geology (field or map data):** Alluvium (3)

**Marin County Watersheds:** Novato (1)

**Other Watersheds, San Mateo Co.:** Pescadero Creek (1); **Sonoma Co.:** Sonoma Creek (1)

### **Site Impacts**

This association has very low non-native plant cover (average 0.1%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Atriplex prostrata*.

### **Classification Comments**

Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** Keeler-Wolf and Vaghti 2000, Klein et al. 2015, Sproul et al. 2011

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

### **Surveys Used for Description**

**Total: N=3; Marin County (n=1):** MARIN019

San Mateo County (n=1): SMAT0045

Sonoma County (n=1): SONO0375

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Herb</b>										
	<b><i>Bolboschoenus maritimus</i></b>	<b>100</b>	<b>54.7</b>	<b>33.3</b>	<b>18.0</b>	<b>60.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<b><i>Sarcocornia pacifica</i></b>	<b>100</b>	<b>21.5</b>	<b>10.7</b>	<b>2.0</b>	<b>15.0</b>	<b>X</b>			<b>X</b>
	<i>Cuscuta salina</i>	67	0.3	0.1	0.2	0.2				<b>X</b>
	<i>Spartina foliosa</i>	33	19.0	10.7	32.0	32.0				
	<i>Frankenia salina</i>	33	2.0	1.7	5.0	5.0				
	<i>Jaumea carnosa</i>	33	1.9	0.7	2.0	2.0				
	<i>Grindelia stricta</i>	33	0.4	0.3	1.0	1.0				
	<i>Atriplex prostrata</i>	33	0.1	0.1	0.2	0.2				
	<i>Rumex</i> spp.	33	0.1	0.1	0.2	0.2				



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***Brassica nigra* – *Centaurea (solstitialis, melitensis)* Herbaceous Semi-Natural Alliance**

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**Common Name:** Upland mustards – Yellow star-thistles and other ruderal forbs

**NVC Alliance Code:** A4214. *Brassica nigra* - *Raphanus* spp. Ruderal Annual Forb Meadow Alliance

**Statewide Description**

*Brassica nigra*, *Brassica rapa*, *Carduus pycnocephalus*, *Carthamus lanatus*, *Centaurea melitensis*, *Centaurea solstitialis*, *Cynara cardunculus*, *Euphorbia terracina*, *Hirschfeldia incana*, *Isatis tinctoria* or *Raphanus sativus* or similar ruderal forb is dominant in the herbaceous layer. Emergent trees and shrubs may be present at low cover.

We have included five mustards within this alliance based on their ecological similarities, and we also have updated the alliance to include other non-native invasive forbs including *Cynara cardunculus*, *Euphorbia terracina*, *Carduus pycnocephalus*, *Centaurea solstitialis*, *C. melitensis*, and *C. sulphurea*. As a whole, stands of this alliance form dense colonies that overtop other plants whether they are native or non-native. All respond positively to regular frequent disturbance, whether it be fire, disking, intermittent flooding, or heavy grazing.

**Local Vegetation Description**

The Upland mustards – Yellow star-thistles and other ruderal forbs Alliance forms an open to continuous herbaceous layer. The shrub layer is absent and the tree layer is absent. Dominant or co-dominant herbs include *Brassica nigra*, *Raphanus sativus*, *Carduus pycnocephalus*, *Carthamus lanatus*, and *Centaurea* spp., and characteristic herbs include *Lolium perenne*. Those herbs often present include *Bromus diandrus*, and herbs that are sometimes present include *Avena* spp., *Brachypodium distachyon*, *Cirsium*

*vulgare*, *Claytonia perfoliata*, *Conium maculatum*, *Geranium dissectum*, *Lotus* spp., *Marah fabaceus*, *Nassella pulchra*, *Phalaris aquatica*, *Rumex acetosella*, *Rumex crispus*, *Silybum marianum*, *Stellaria media*, and *Vicia* spp. Commonly associated emergent shrubs at sparse cover include *Baccharis pilularis* and *Lupinus arboreus*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	1.0	0 – 6	0.8	0.5 – 1
Herb	71.8	24 – 95	0.9	0.5 – 2

### **Local Membership Rule**

*Brassica nigra*, *Raphanus sativus*, *Carduus pycnocephalus*, *Carthamus lanatus*, *Centaurea solstitialis*, *Silybum marianum*, or another non-native forb dominates in the herbaceous layer, often in old or active agriculture lands, disturbed fields, and grazed areas.

### **Local Environmental Description**

**Elevation:** Mean 95 m, Range 3 – 359 m

**Aspect:** SW (3), NW (3), Flat (1), NE (1)

**Slope:** Mean 8 degrees, Range 0 – 20 degrees

**Macro Topography:** Lower 1/3 of slope (3), Ridge top (1), Upper 1/3 of slope (1), Bottom (1), Upper 1/3 of slope to Ridgetop (1), Middle 1/3 of slope (1)

**Large Rock:** 0%

**Fines Cover:** Mean 23.6%, Range 2–82%

**Small Rock:** Mean 9.4%, Range 0–75.0%

**Litter Cover:** Mean 71.4%, Range 16–94%

**Soil Texture (field assessed):** Not recorded (3), Medium to very fine, loamy sand (2), Moderately coarse, sandy loam (1), Coarse, loamy sand (1), Medium loam (1)

**Geology (field or map data):** Alluvium (3), Granitic (generic) (2), Volcanic and metavolcanic rocks (1), Sandstone and other sedimentary (1)

**Marin County Watersheds:** Novato (3), Point Reyes (3), Lagunitas Creek (1)

### **Site Impacts**

This alliance has greater cover of exotics than natives, with very high non-native plant cover (average 91.5%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Brachypodium distachyon*, *Bromus diandrus*, *Carduus pycnocephalus*, *Cirsium vulgare*, *Conium maculatum*, *Geranium dissectum*, *Phalaris aquatica*, *Raphanus sativus*, *Rumex acetosella*, *Rumex crispus*, *Silybum marianum*, and *Stellaria media*.

### **Associations in Marin County**

*Brassica nigra*

*Carduus pycnocephalus* – *Silybum marianum*

*Carthamus lanatus* (Mapping Unit)\*

*Raphanus sativus*

### **Classification Comments**

We especially need more data on *Carthamus lanatus* stands, which have been observed and mapped dominating in a few open fields and grassy areas in Marin County.

**References:** Buck-Diaz et al. 2012, Keeler-Wolf and Evens 2006, Keeler-Wolf and Vaghti 2000, Keeler-Wolf et al. 2003a, Klein et al. 2007, Klein et al. 2015, Rodriguez et al. 2017, Sproul et al. 2011

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

**Surveys Used for Description**

**Total: N=8; Marin County (n=8):** GGNRA284, HEAD0176, MARIN267, MARIN268, MARIN280, MARIN407, PORE060, PORE085

**Alliance Stand Table**

Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	25	25.0	0.8	0.2	6.0				
	<i>Lupinus arboreus</i>	25	25.0	0.1	0.2	0.2				
<b>Herb</b>										
	<b><i>Raphanus sativus</i></b>	<b>88</b>	<b>53.4</b>	<b>53.5</b>	<b>0.2</b>	<b>95.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Lolium perenne</i>	75	12.5	8.7	0.2	45.0	<b>X</b>			<b>X</b>
	<i>Bromus diandrus</i>	50	4.3	7.1	0.2	53.0				<b>X</b>
	<i>Stellaria media</i>	38	0.7	1.0	0.2	6.0				
	<i>Rumex acetosella</i>	38	0.4	0.7	0.2	5.0				
	<i>Marah fabaceus</i>	38	0.7	0.7	0.2	5.0				
	<i>Conium maculatum</i>	38	0.4	0.4	0.2	3.0				
	<i>Geranium dissectum</i>	38	0.4	0.4	0.2	2.0				
	<i>Nassella pulchra</i>	38	0.1	0.1	0.2	0.2				
	<b><i>Carduus pycnocephalus</i></b>	<b>25</b>	<b>14.2</b>	<b>8.5</b>	<b>23.0</b>	<b>45.0</b>				
	<i>Avena</i> spp.	25	1.4	2.5	0.2	20.0				
	<i>Phalaris aquatica</i>	25	0.4	0.7	0.2	5.0				
	<i>Claytonia perfoliata</i>	25	0.4	0.6	1.0	4.0				
	<i>Silybum marianum</i>	25	0.4	0.4	0.2	3.0				
	<i>Rumex crispus</i>	25	0.4	0.2	0.2	1.0				
	<i>Brachypodium distachyon</i>	25	0.1	0.1	0.2	0.2				
	<i>Vicia</i> spp.	25	0.0	0.1	0.2	0.2				
	<i>Cirsium vulgare</i>	25	0.0	0.1	0.2	0.2				
	<i>Lotus</i> spp.	25	0.1	0.1	0.2	0.2				

## ***Brassica nigra* Semi-natural Association**

**Common Name:** Black Mustard Forbland

**Alliance:** *Brassica nigra* – *Centaurea (solstitialis, melitensis)* Herbaceous Semi-Natural Alliance

### **Local Vegetation Description**

The Black Mustard Association forms an open to continuous herbaceous layer. The shrub layer is sparse to open and the tree layer is absent. *Brassica nigra* is dominant or co-dominant in the herbaceous layer, and characteristic herbs include *Bromus diandrus* and *Eschscholzia californica*. Those herbs often present include *Agrostis* spp., *Anagallis arvensis*, *Artemisia douglasiana*, *Avena* spp., *Brachypodium distachyon*, *Briza maxima*, *Bromus carinatus*, *Calystegia purpurata*, *Carduus pycnocephalus*, *Centaurea solstitialis*, *Cirsium vulgare*, *Conium maculatum*, *Foeniculum vulgare*, *Heterotheca oregona*, *Lolium perenne*, *Lotus* spp., *Lotus humistratus*, *Melica californica*, *Melilotus* spp., *Mentzelia* spp., *Nassella pulchra*, *Petrorhagia* spp., *Phalaris aquatica*, *Plantago major*, *Pseudognaphalium ramosissimum*, *Raphanus sativus*, *Rumex acetosella*, *Silybum marianum*, *Sonchus oleraceus*, *Verbascum* spp., and *Vulpia* spp. Commonly associated emergent shrubs at sparse cover include *Baccharis pilularis*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	3.0	0 – 6	no data	
Herb	56.5	18 – 95	0.8	0.5 – 1

### **Local Environmental Description**

**Elevation:** Mean 92 m, Range 59 – 125 m

**Aspect:** NE (1), SW (1)

**Slope:** Mean 7 degrees, Range 1 – 12 degrees

**Macro Topography:** Lower 1/3 of slope (1),  
Bottom (1)

**Large Rock:** Mean 0.1%, Range 0 – 0.2%

**Small Rock:** Mean 64%, Range 53 – 75%

**Fines Cover:** Mean 44%, Range 44 – 44%

**Litter Cover:** Mean 43.5%, Range 2 – 85%

**Soil Texture (field assessed):** Coarse, loamy sand (1)

**Geology (field or map data):** Mixed alluvium (1)

**Marin County Watersheds:** Bolinas (1)

**Other Watersheds, Sonoma Co.:** Middle Russian River (1)

### **Site Impacts**

This association has greater cover of exotics (average 71.9%) than natives. Non-native species that occur with highest frequency and abundance include *Anagallis arvensis*, *Avena* spp., *Brachypodium distachyon*, *Brassica nigra*, *Briza maxima*, *Bromus diandrus*, *Carduus pycnocephalus*, *Centaurea solstitialis*, *Cirsium vulgare*, *Conium maculatum*, *Foeniculum vulgare*, *Lolium perenne*, *Melilotus* spp., *Petrorhagia* spp., *Phalaris aquatica*, *Plantago major*, *Raphanus sativus*, *Rumex acetosella*, *Silybum marianum*, *Sonchus oleraceus*, and *Verbascum* spp.

### **Classification Comments**

Since the number of surveys of this association in Marin are low, data from nearby counties are included.

**References:** Buck-Diaz et al. 2012, Keeler-Wolf and Evens 2006, Klein et al. 2015, Rodriguez et al. 2017, Sproul et al. 2011

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

**State Rare:** N

**Surveys Used for Description**

Total: N=2; Marin County (n=1): GGNRA284 Sonoma County (n=1): SONO0782

**Association Stand Table**

Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	50	50.0	3.0	6.0	6.0				X
<b>Herb</b>										
	<b><i>Brassica nigra</i></b>	<b>100</b>	<b>48.4</b>	<b>22.5</b>	<b>15.0</b>	<b>30.0</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<i>Bromus diandrus</i>	100	1.3	1.6	0.2	3.0	<b>X</b>			<b>X</b>
	<i>Eschscholzia californica</i>	100	0.6	0.2	0.2	0.2	<b>X</b>			<b>X</b>
	<i>Vulpia</i> spp.	50	21.5	40.0	80.0	80.0				<b>X</b>
	<i>Carduus pycnocephalus</i>	50	12.1	22.5	45.0	45.0				<b>X</b>
	<i>Avena</i> spp.	50	5.4	10.0	20.0	20.0				<b>X</b>
	<i>Phalaris aquatica</i>	50	1.3	2.5	5.0	5.0				<b>X</b>
	<i>Mentzelia</i> spp.	50	2.7	0.5	1.0	1.0				<b>X</b>
	<i>Agrostis</i> spp.	50	0.5	0.1	0.2	0.2				<b>X</b>
	<i>Anagallis arvensis</i>	50	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Artemisia douglasiana</i>	50	0.5	0.1	0.2	0.2				<b>X</b>
	<i>Brachypodium distachyon</i>	50	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Briza maxima</i>	50	0.5	0.1	0.2	0.2				<b>X</b>
	<i>Bromus carinatus</i>	50	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Calystegia purpurata</i>	50	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Centaurea solstitialis</i>	50	0.5	0.1	0.2	0.2				<b>X</b>
	<i>Cirsium vulgare</i>	50	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Conium maculatum</i>	50	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Foeniculum vulgare</i>	50	0.5	0.1	0.2	0.2				<b>X</b>
	<i>Heterotheca oregona</i>	50	0.5	0.1	0.2	0.2				<b>X</b>
	<i>Lolium perenne</i>	50	0.5	0.1	0.2	0.2				<b>X</b>
	<i>Lotus</i> spp.	50	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Lotus humistratus</i>	50	0.5	0.1	0.2	0.2				<b>X</b>
	<i>Melica californica</i>	50	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Melilotus</i> spp.	50	0.5	0.1	0.2	0.2				<b>X</b>
	<i>Nassella pulchra</i>	50	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Petrorhagia</i> spp.	50	0.5	0.1	0.2	0.2				<b>X</b>
	<i>Plantago major</i>	50	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Pseudognaphalium ramosissimum</i>	50	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Raphanus sativus</i>	50	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Rumex acetosella</i>	50	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Silybum marianum</i>	50	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Sonchus oleraceus</i>	50	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Verbascum</i> spp.	50	0.5	0.1	0.2	0.2				<b>X</b>

***Carduus pycnocephalus* – *Silybum marianum* Provisional Semi-natural Association**

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**Common Name:** Italian Thistle – Milk ThistleForbland

**Alliance:** *Brassica nigra* – *Centaurea (solstitialis, melitensis)* Herbaceous Semi-Natural Alliance

**Local Vegetation Description**

The Italian Thistle – Milk Thistle Association forms an open to continuous herbaceous layer. The shrub layer is absent and the tree layer is absent. *Carduus pycnocephalus* and/or *Silybum marianum* are dominant or co-dominant in the herbaceous layer, and characteristic herbs include *Avena* spp., *Bromus diandrus*, and *Lolium perenne*. Those herbs often present include *Brachypodium distachyon*, *Geranium dissectum*, *Hypochaeris radicata*, and *Sonchus asper*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.0	0 – 0	no data	
Herb	63.0	24 – 95	0.5	0 – 1

**Local Environmental Description**

**Elevation:** Mean 280 m, Range 178 – 359 m

**Aspect:** SE (1), SW (1)

**Slope:** Mean 12 degrees, Range 0 – 20 degrees

**Macro Topography:** Upper 1/3 of slope to Ridgetop (2), Middle 1/3 of slope (1),

**Large Rock:** 0%

**Fines Cover:** Mean 56%, Range 15 – 82%

**Small Rock:** 0%

**Litter Cover:** Mean 39%, Range 16 – 75%

**Soil Texture (field assessed):** Moderately fine clay loam (2), Not recorded (1)

**Geology (field or map data):** Mixed sedimentary (1), Volcanic and metavolcanic rocks (1)

**Marin County Watersheds:** Lagunitas Creek (1)

**Other Watersheds, San Mateo Co.:** San Gregorio Creek (1); **Sonoma Co.:** Estero San Antonio (1)

**Site Impacts**

This association has greater cover of exotics (average 98.4%) than natives. Non-native species that occur with highest frequency and abundance include *Anagallis arvensis*, *Avena* spp., *Brachypodium distachyon*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Conium maculatum*, *Erodium brachycarpum*, *Erodium moschatum*, *Geranium dissectum*, *Hordeum murinum*, *Hypochaeris radicata*, *Linum bienne*, *Lolium perenne*, *Medicago* spp., *Picris echioides*, *Raphanus sativus*, *Rumex acetosella*, *Rumex crispus*, *Rumex pulcher*, *Silene gallica*, *Silybum marianum*, *Sisymbrium officinale*, *Sonchus asper*, *Trifolium subterraneum*, and *Urospermum picroides*.

**Classification Comments**

This association is newly described here and is provisional until further samples are available. Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** none

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

**State Rare:** N

**Surveys Used for Description**

**Total: N=3; Marin County (n=1):** MARIN280

San Mateo County (n=1): SMAT0111 Sonoma County (n=1): HEAD0060

### Association Stand Table

Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Herb	<i>Lolium perenne</i>	100	9.7	12.8	0.2	38.0	X			X
	<i>Bromus diandrus</i>	100	1.7	1.1	0.2	3.0	X			X
	<i>Avena</i> spp.	100	0.8	0.5	0.2	1.0	X			X
	<b><i>Silybum marianum</i></b>	<b>67</b>	<b>23.9</b>	<b>31.0</b>	<b>5.0</b>	<b>88.0</b>				<b>X</b>
	<b><i>Carduus pycnocephalus</i></b>	<b>67</b>	<b>52.9</b>	<b>24.3</b>	<b>23.0</b>	<b>50.0</b>				<b>X</b>
	<i>Geranium dissectum</i>	67	1.6	1.1	0.2	3.0				X
	<i>Sonchus asper</i>	67	1.8	0.7	1.0	1.0				X
	<i>Brachypodium distachyon</i>	67	0.4	0.1	0.2	0.2				X
	<i>Hypochaeris radicata</i>	67	0.4	0.1	0.2	0.2				X
	<i>Hordeum murinum</i>	33	2.0	2.7	8.0	8.0				
	<i>Bromus hordeaceus</i>	33	1.4	1.0	3.0	3.0				
	<i>Medicago</i> spp.	33	0.9	0.7	2.0	2.0				
	<i>Juncus patens</i>	33	0.5	0.3	1.0	1.0				
	<i>Vicia gigantea</i>	33	0.5	0.3	1.0	1.0				
	<i>Amsinckia</i> spp.	33	0.0	0.1	0.2	0.2				
	<i>Anagallis arvensis</i>	33	0.1	0.1	0.2	0.2				
	<i>Calystegia</i> spp.	33	0.0	0.1	0.2	0.2				
	<i>Conium maculatum</i>	33	0.1	0.1	0.2	0.2				
	<i>Erodium brachycarpum</i>	33	0.0	0.1	0.2	0.2				
	<i>Erodium moschatum</i>	33	0.0	0.1	0.2	0.2				
	<i>Juncus bufonius</i>	33	0.1	0.1	0.2	0.2				
	<i>Linum bienne</i>	33	0.1	0.1	0.2	0.2				
	<i>Marah fabaceus</i>	33	0.3	0.1	0.2	0.2				
	<i>Nassella pulchra</i>	33	0.3	0.1	0.2	0.2				
	<i>Picris echioides</i>	33	0.1	0.1	0.2	0.2				
	<i>Raphanus sativus</i>	33	0.0	0.1	0.2	0.2				
	<i>Rumex acetosella</i>	33	0.0	0.1	0.2	0.2				
	<i>Rumex crispus</i>	33	0.1	0.1	0.2	0.2				
	<i>Rumex pulcher</i>	33	0.0	0.1	0.2	0.2				
	<i>Silene gallica</i>	33	0.3	0.1	0.2	0.2				
	<i>Sisymbrium officinale</i>	33	0.0	0.1	0.2	0.2				
	<i>Trifolium subterraneum</i>	33	0.0	0.1	0.2	0.2				
	<i>Urospermum picroides</i>	33	0.1	0.1	0.2	0.2				



### ***Carthamus lanatus* Provisional Semi-natural Association**

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**Common Name:** Woolly distaff thistle Forbland

**Alliance:** *Brassica nigra* – *Centaurea (solstitialis, melitensis)* Herbaceous Semi-Natural Alliance

**Local Vegetation Description**

The Woolly distaff thistle Association was not adequately sampled in Marin County, but field verification and fine-scale mapping validate its existence including in open fields and grassy areas. Stands in this association are strongly dominated by *Carthamus lanatus* along with other non-natives.

**References:** none

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

**State Rare:** N

### ***Raphanus sativus* Semi-natural Association**

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**Common Name:** Radish Forbland

**Alliance:** *Brassica nigra* – *Centaurea (solstitialis, melitensis)* Herbaceous Semi-Natural Alliance

**Local Vegetation Description**

The Radish Association forms an open to continuous herbaceous layer. The shrub layer is sparse and the tree layer is absent. *Raphanus sativus* is dominant or co-dominant in the herbaceous layer, and characteristic herbs include *Lolium perenne*. Those herbs often present include *Stellaria media*, and herbs that are sometimes present include *Bromus diandrus*, *Claytonia perfoliata*, *Geranium dissectum*, *Marah fabaceus*, *Rumex acetosella*, *Rumex crispus*, and *Vicia* spp.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.0	0.0 – 0.2	0.8	0.5 – 1
Herb	78	32 – 95	1.0	0.5 – 2

**Local Environmental Description**

**Elevation:** Mean 46 m, Range 3 – 120 m

**Aspect:** NW (3), Flat (1), SW (1), NE (1)

**Slope:** Mean 5 degrees, Range 0 – 9 degrees

**Macro Topography:** Lower 1/3 of slope (2), Ridge top (1), Upper 1/3 of slope (1), Middle 1/3 of slope (1)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** Mean 9.0%, Range 2.0 – 18.0%

**Litter Cover:** Mean 78.3%, Range 50.0 – 94%

**Soil Texture (field assessed):** Medium to very fine, loamy sand (2), Medium loam (1), Moderately coarse, sandy loam (1)

**Geology (field or map data):** Alluvium (3), Granitic (generic) (2), Sandstone and other sedimentary (1)

**Marin County Watersheds:** Point Reyes (3), Novato (3)



### Site Impacts

This association has greater cover of exotics (average 97.9%) than natives. Non-native species that occur with highest frequency and abundance include *Bromus diandrus*, *Conium maculatum*, *Geranium dissectum*, *Lolium perenne*, *Raphanus sativus*, *Rumex acetosella*, *Rumex crispus*, and *Stellaria media*.

### Classification Comments

None.

**References:** Keeler-Wolf and Vaghti 2000, Keeler-Wolf et al. 2003a, Klein et al. 2015

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

**State Rare:** N

### Surveys Used for Description

**Total: N=6; Marin County (n=6):** HEAD0176, MARIN267, MARIN268, MARIN407, PORE060, PORE085

### Association Stand Table

Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Lupinus arboreus</i>	33	33.3	0.1	0.2	0.2				
<b>Herb</b>										
	<b><i>Raphanus sativus</i></b>	<b>100</b>	<b>71.2</b>	<b>71.3</b>	<b>14.0</b>	<b>95.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Lolium perenne</i>	83	16.5	11.6	0.2	45.0	<b>X</b>			<b>X</b>
	<i>Stellaria media</i>	50	0.9	1.4	0.2	6.0				<b>X</b>
	<i>Bromus diandrus</i>	33	5.3	8.9	0.2	53.0				
	<i>Marah fabaceus</i>	33	0.8	0.9	0.2	5.0				
	<i>Rumex acetosella</i>	33	0.5	0.9	0.2	5.0				
	<i>Claytonia perfoliata</i>	33	0.6	0.8	1.0	4.0				
	<i>Conium maculatum</i>	33	0.5	0.5	0.2	3.0				
	<i>Geranium dissectum</i>	33	0.4	0.5	1.0	2.0				
	<i>Rumex crispus</i>	33	0.5	0.2	0.2	1.0				
	<i>Vicia</i> spp.	33	0.1	0.1	0.2	0.2				

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## ***Bromus carinatus* – *Elymus glaucus* Herbaceous Alliance**

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**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*, *Pteridium aquilinum* and/or *Thermopsis californica* 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 oxymersis*, *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.

Sawyer et al. (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 in lower elevations of California. Mixes of *Bromus carinatus* or *Elymus glaucus* with a high cover of *Pteridium* are placed in the *Pteridium aquilinum* Association.

### Local Vegetation Description

The California brome – Blue wildrye prairie Alliance forms an intermittent to continuous herbaceous layer. The shrub layer is sparse and the tree layer is sparse. Those herbs often present include *Achillea millefolium*, *Avena* spp., *Bromus carinatus*, *Bromus hordeaceus*, *Cynosurus echinatus*, *Elymus glaucus*, *Pteridium aquilinum*, and *Lolium perenne*, and herbs that are sometimes present include *Aira caryophylla*, *Anagallis arvensis*, *Brachypodium distachyon*, *Briza maxima*, *Bromus diandrus*, *Carduus pycnocephalus*, *Chlorogalum pomeridianum*, *Cirsium vulgare*, *Danthonia californica*, *Dichelostemma capitatum*, *Dichelostemma congestum*, *Eschscholzia californica*, *Festuca idahoensis*, *Galium aparine*, *Geranium dissectum*, *Holcus lanatus*, *Hypochaeris glabra*, *Hypochaeris radicata*, *Nassella pulchra*, *Plantago lanceolata*, *Ranunculus californicus*, *Rumex acetosella*, *Sidalcea malviflora*, *Sisyrinchium bellum*, *Sonchus asper*, *Stachys ajugoides*, *Triteleia laxa*, *Vicia sativa*, *Vulpia bromoides*, and *Wyethia angustifolia*. Commonly associated emergent shrubs at sparse cover include *Baccharis pilularis*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	0.3	0 – 0.5
Shrub	1.7	0 – 15	0.7	0 – 2
Herb	76.4	38 – 99	0.4	0 – 2

### Local Membership Rule

*Bromus carinatus*, *Bromus maritimus*, *Elymus glaucus*, *Pteridium aquilinum* and/or *Thermopsis californica* dominate or co-dominate near meadows, in forested openings, and on elevated flats. *Achillea millefolium*, *Bromus hordeaceus*, *Geranium dissectum*, *Rumex acetosella*, and *Vulpia bromoides* are often present.

### Local Environmental Description

**Elevation:** Mean 262 m, Range 31 – 735 m

**Aspect:** NE (22), NW (9), SW (6), SE (3), W (3), Flat (1), N (1)

**Slope:** Mean 17 degrees, Range 0 – 40 degrees

**Macro Topography:** Upper 1/3 of slope (26), Middle 1/3 of slope (11), Lower 1/3 of slope (4), Ridge top (2), Upper 1/3 of slope to Ridgetop (1), Middle to Upper 1/3 of slope (1)

**Large Rock:** Mean 1.1%, Range 0.0 – 26.0%

**Small Rock:** Mean 1.2%, Range 0.0 – 15.0%

**Fines Cover:** Mean 14.8%, Range 0.0 – 88.0%

**Litter Cover:** Mean 62.1%, Range 2.0 – 97%

**Soil Texture (field assessed):** Not recorded (15), Moderately fine silty clay loam (5), Moderately fine clay loam (5), Medium to very fine, sandy loam (4), Moderately coarse, sandy loam (3), Medium to very fine, loamy sand (2), Fine sandy clay (2), Fine silty clay (2), Medium loam (1), Loam, (class unknown) (1), Moderately fine sandy clay loam (1), Fine clay (1), Coarse, loamy sand (1), Medium silt (1)

**Geology (field or map data):** Franciscan melange (20), Sandstone and other sedimentary (9), Granitic (6), Blueschist and semi-schist (5), Large landslides (3), Volcanic and metavolcanic rocks (2), Greenstone (2), Sandstone, shale, and conglomerate (1), Ultramafic (type unknown) (1), Ultramafic rocks, mostly serpentine (1), Volcanic flow rocks (1), Granitic (generic) (1)

**Marin County Watersheds:** Lagunitas Creek (17), Novato (7), Petaluma River (6), Point Reyes (6), San Rafael (5), Bolinas (4), Inverness (4), Walker Creek (3)

### **Site Impacts**

This alliance has greater cover of exotics than natives, non-native plant cover (average 50.1%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*, *Anagallis arvensis*, *Brachypodium distachyon*, *Briza maxima*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Cirsium vulgare*, *Cynosurus echinatus*, *Geranium dissectum*, *Holcus lanatus*, *Hypochaeris glabra*, *Hypochaeris radicata*, *Plantago lanceolata*, *Rumex acetosella*, *Sonchus asper*, *Vicia sativa*, and *Vulpia bromoides*.

### **Associations in Marin County**

*Bromus carinatus*  
*Elymus glaucus*  
*Pteridium aquilinum* – Grass  
*Thermopsis californica* – *Bromus carinatus* – Annual Brome

### **Classification Comments**

None.

**References:** Buck and Evens 2010, Buck-Diaz et al. 2011, Buck-Diaz et al. 2012, Buck-Diaz et al. 2013, Buck-Diaz et al. 2019, Evens and Kentner 2006, Klein et al. 2015, Rodriguez et al. 2017

**Global Rarity Rank:** G3

**State Rarity Rank:** S3

### **Surveys Used for Description**

**Total: N=52; Marin County (n=52):** HEAD0033, HEAD0045, HEAD0123, HEAD0129, HEAD0135, HEAD0169, HEAD0173, HEAD0174, HEAD0175, HEAD0227, HEAD0320, MARIN222, MARIN240, MARIN254, MARIN258, MARIN264, MARIN294, MARIN312, MARIN316, MMWD0013, MMWD0033, MMWD0035, MMWD0048, MMWD0086, MMWD0088, MMWD0101, MMWD0602, MMWD0612, MOSD0149, MOSD0210, MOSD0278, MOSD0279, MOSD0280, MOSD0324, MOSD0380, MOSD0386, MOSD0392, PGA1403, PGA200, PGA27, PGA492A, PGA502, PGA561, PORE153, TAMG011N, TAMG012N, TAMG017N, TAMG031M, TAMG036M, TAMG038M, TAMG040M, WRBL009

## Alliance Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	47	30.5	0.7	0.2	8.0				
<b>Herb</b>										
	<i>Avena</i> spp.	68	5.4	4.5	0.2	38.0				X
	<b><i>Bromus carinatus</i></b>	<b>66</b>	<b>9.6</b>	<b>8.3</b>	<b>0.2</b>	<b>38.0</b>				<b>X</b>
	<i>Achillea millefolium</i>	64	1.3	1.3	0.2	15.0				X
	<i>Lolium perenne</i>	62	9.4	9.3	0.2	62.5				X
	<i>Bromus hordeaceus</i>	62	3.6	2.8	0.2	30.0				X
	<i>Cynosurus echinatus</i>	57	2.2	1.9	0.2	38.0				X
	<i>Briza maxima</i>	49	6.3	4.8	0.2	38.0				
	<i>Bromus diandrus</i>	49	2.4	2.2	0.2	35.0				
	<i>Pteridium aquilinum</i>	47	10.6	8.0	0.2	40.0				
	<b><i>Elymus glaucus</i></b>	<b>47</b>	<b>2.1</b>	<b>2.0</b>	<b>0.2</b>	<b>22.0</b>				
	<i>Carduus pycnocephalus</i>	47	0.6	0.5	0.2	8.0				
	<i>Nassella pulchra</i>	45	2.1	1.7	0.1	20.0				
	<i>Rumex acetosella</i>	45	0.8	0.9	0.2	15.0				
	<i>Geranium dissectum</i>	42	0.4	0.4	0.2	12.0				
	<i>Hypochaeris radicata</i>	40	1.0	0.7	0.2	10.0				
	<i>Chlorogalum pomeridianum</i>	38	0.9	1.0	0.2	38.0				
	<i>Eschscholzia californica</i>	38	0.2	0.2	0.2	3.0				
	<i>Sisyrinchium bellum</i>	38	0.2	0.1	0.2	2.0				
	<i>Anagallis arvensis</i>	36	0.1	0.1	0.2	0.3				
	<i>Vulpia bromoides</i>	34	1.4	1.5	0.2	18.0				
	<i>Stachys ajugoides</i>	34	0.9	0.9	0.2	20.0				
	<i>Aira caryophyllea</i>	32	0.5	0.5	0.2	8.0				
	<i>Plantago lanceolata</i>	30	1.1	1.2	0.2	18.0				
	<i>Hypochaeris glabra</i>	30	0.5	0.4	0.2	8.0				
	<i>Brachypodium distachyon</i>	26	5.5	4.4	0.2	40.0				
	<i>Ranunculus californicus</i>	26	0.1	0.1	0.2	2.0				
	<i>Vicia sativa</i>	25	0.2	0.3	0.2	8.2				
	<i>Sidalcea malviflora</i>	25	0.1	0.1	0.2	2.0				
	<i>Galium aparine</i>	25	0.1	0.1	0.2	1.0				
	<i>Danthonia californica</i>	23	0.9	0.7	0.2	12.0				
	<i>Triteleia laxa</i>	23	0.1	0.1	0.2	1.0				
	<i>Sonchus asper</i>	23	0.1	0.1	0.1	0.3				
	<i>Holcus lanatus</i>	21	3.6	3.5	0.2	68.0				
	<i>Festuca idahoensis</i>	21	1.6	1.1	0.2	25.0				
	<i>Cirsium vulgare</i>	21	0.2	0.2	0.2	5.0				
	<i>Wyethia angustifolia</i>	21	0.1	0.1	0.1	1.0				
	<i>Dichelostemma congestum</i>	21	0.1	0.0	0.2	0.3				
	<i>Dichelostemma capitatum</i>	21	0.1	0.0	0.1	0.3				

## ***Bromus carinatus* Association**

**Common Name:** California Brome Mesic Meadow

**Alliance:** *Bromus carinatus* – *Elymus glaucus* Herbaceous Alliance

### **Local Vegetation Description**

The California Brome Mesic Meadow Association forms an intermittent to continuous herbaceous layer. The shrub layer is sparse and the tree layer is absent. Characteristic herbs include *Bromus carinatus* and *Lolium perenne*. Those herbs often present include *Achillea millefolium*, *Avena* spp., *Briza maxima*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Cynosurus echinatus*, *Elymus glaucus*, *Geranium dissectum*, *Hypochaeris radicata*, *Nassella pulchra*, and *Rumex acetosella*. Commonly associated emergent shrubs at sparse cover include *Baccharis pilularis*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	1.3	0.0 – 10	1.0	0 – 2
Herb	80.2	50 – 99	0.4	0 – 2

### **Local Environmental Description**

**Elevation:** Mean 236 m, Range 31 – 522 m

**Aspect:** NE (15), NW (4), W (3), SW (1), Flat (1), N (1)

**Slope:** Mean 14 degrees, Range 0 – 40 degrees

**Macro Topography:** Upper 1/3 of slope (13), Middle 1/3 of slope (7), Lower 1/3 of slope (3), Ridge top (1), Upper 1/3 of slope to Ridgetop (1)

**Large Rock:** Mean 0.1%, Range 0.0 – 1.0%

**Small Rock:** Mean 0.7%, Range 0.0 – 6.0%

**Fines Cover:** Mean 12.5%, Range 0.0 – 65.0%

**Litter Cover:** Mean 71.5%, Range 2.0 – 95%

**Soil Texture (field assessed):** Not recorded (10), Medium to very fine, loamy sand (2), Moderately fine silty clay loam (2), Moderately coarse, sandy loam (2), Fine silty clay (2), Medium to very fine, sandy loam (1), Moderately fine clay loam (1), Coarse, loamy sand (1), Fine clay (1), Medium loam (1), Moderately fine sandy clay loam (1)

**Geology (field or map data):** Franciscan melange (11), Sandstone and other sedimentary (5), Granitic (5), Blueschist and semi-schist (3), Greenstone (2), Volcanic and metavolcanic rocks (1)

**Marin County Watersheds:** Lagunitas Creek (9), Novato (5), Inverness (3), Point Reyes (3), San Rafael (3), Bolinas (2), Petaluma River (1), Walker Creek (1)

### **Site Impacts**

This association has moderate non-native plant cover (average 48.9%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*, *Anagallis arvensis*, *Avena* spp., *Briza maxima*, *Briza minor*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Cynosurus echinatus*, *Erodium cicutarium*, *Geranium dissectum*, *Holcus lanatus*, *Hypochaeris glabra*, *Hypochaeris radicata*, *Lolium perenne*, *Plantago lanceolata*, *Rumex acetosella*, *Sherardia arvensis*, *Sonchus asper*, *Torilis arvensis*, *Trifolium dubium*, *Vicia sativa*, *Vicia villosa*, and *Vulpia bromoides*.

**Classification Comments**

None.

**References:** Buck and Evens 2010, Buck-Diaz et al. 2011, Buck-Diaz et al. 2013, Klein et al. 2015, Rodriguez et al. 2017

**Global Rarity Rank:** G3

**State Rarity Rank:** S3

**State Rare:** Y

**Surveys Used for Description**

**Total: N=27; Marin County (n=27):** HEAD0033, HEAD0123, HEAD0129, HEAD0169, HEAD0173, HEAD0174, HEAD0175, HEAD0227, HEAD0320, MARIN222, MARIN264, MARIN312, MMWD0086, MMWD0088, MMWD0602, MOSD0380, MOSD0386, MOSD0392, PGA27, PGA502, TAMG011N, TAMG012N, TAMG017N, TAMG031M, TAMG036M, TAMG038M, TAMG040M

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Shrub	<i>Baccharis pilularis</i>	50	32.0	0.7	0.2	8.0				X
	<i>Rubus ursinus</i>	21	9.5	0.3	0.2	3.0				
Herb	<b><i>Bromus carinatus</i></b>	<b>96</b>	<b>16.8</b>	<b>14.9</b>	<b>0.2</b>	<b>38.0</b>	<b>X</b>			<b>X</b>
	<i>Lolium perenne</i>	82	11.7	11.3	0.2	62.5	X			X
	<i>Cynosurus echinatus</i>	71	3.1	2.8	0.2	38.0				X
	<i>Bromus hordeaceus</i>	71	1.8	1.6	0.2	11.0				X
	<i>Avena</i> spp.	68	5.0	4.1	0.2	25.0				X
	<i>Elymus glaucus</i>	64	3.4	3.3	0.2	22.0				X
	<i>Achillea millefolium</i>	64	1.5	1.4	0.2	12.0				X
	<i>Rumex acetosella</i>	64	0.9	0.9	0.2	8.0				X
	<i>Geranium dissectum</i>	61	0.5	0.4	0.2	3.0				X
	<i>Carduus pycnocephalus</i>	57	0.5	0.4	0.2	3.0				X
	<i>Briza maxima</i>	50	7.6	6.2	0.2	38.0				X
	<i>Nassella pulchra</i>	50	3.2	2.6	0.2	20.0				X
	<i>Bromus diandrus</i>	50	1.5	1.4	0.2	11.0				X
	<i>Hypochaeris radicata</i>	50	0.5	0.4	0.2	3.0				X
	<i>Vulpia bromoides</i>	43	1.3	1.5	0.2	18.0				
	<i>Aira caryophyllea</i>	43	0.5	0.5	0.2	8.0				
	<i>Vicia sativa</i>	43	0.4	0.5	0.2	8.2				
	<i>Sisyrinchium bellum</i>	43	0.2	0.2	0.2	2.0				
	<i>Sidalcea malviflora</i>	43	0.2	0.2	0.2	2.0				
	<i>Stachys ajugoides</i>	39	1.3	1.3	0.2	20.0				
	<i>Danthonia californica</i>	39	1.2	1.0	0.2	8.0				
	<i>Chlorogalum pomeridianum</i>	39	0.4	0.3	0.2	3.0				
	<i>Anagallis arvensis</i>	39	0.1	0.1	0.2	0.3				
<i>Plantago lanceolata</i>	36	0.9	1.1	0.2	18.0					
<i>Hypochaeris glabra</i>	36	0.3	0.3	0.2	3.0					
<i>Eschscholzia californica</i>	36	0.2	0.2	0.2	3.0					

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<i>Ranunculus californicus</i>	36	0.2	0.2	0.2	2.0				
	<i>Pteridium aquilinum</i>	32	3.0	2.8	0.2	25.0				
	<i>Galium aparine</i>	32	0.1	0.1	0.2	0.3				
	<i>Sonchus asper</i>	32	0.1	0.1	0.1	0.3				
	<i>Holcus lanatus</i>	29	3.8	3.9	0.2	68.0				
	<i>Wyethia angustifolia</i>	29	0.1	0.1	0.2	1.0				
	<i>Daucus pusillus</i>	29	0.1	0.1	0.2	0.3				
	<i>Triteleia laxa</i>	25	0.1	0.1	0.2	1.0				
	<i>Vicia villosa</i>	21	2.5	2.1	0.2	45.0				
	<i>Festuca idahoensis</i>	21	2.3	1.6	0.2	25.0				
	<i>Torilis arvensis</i>	21	0.1	0.1	0.2	0.5				
	<i>Trifolium dubium</i>	21	0.1	0.1	0.2	0.3				
	<i>Briza minor</i>	21	0.1	0.1	0.2	0.3				
	<i>Dichelostemma congestum</i>	21	0.1	0.1	0.2	0.3				
	<i>Erodium cicutarium</i>	21	0.1	0.1	0.2	0.3				
	<i>Sherardia arvensis</i>	21	0.1	0.1	0.2	0.3				



## ***Elymus glaucus* Association**

**Common Name:** Blue Wildrye Grassland

**Alliance:** *Bromus carinatus* – *Elymus glaucus* Herbaceous Alliance

### **Local Vegetation Description**

The Blue Wildrye Association forms an open to continuous herbaceous layer. The shrub layer is sparse and the tree layer is absent. *Elymus glaucus* is dominant, co-dominant or characteristically present in the herbaceous layer. Those herbs often present include *Briza maxima*, *Bromus diandrus*, *Bromus hordeaceus*, *Geranium dissectum*, *Rumex acetosella*, *Sisyrinchium bellum*, and *Vulpia bromoides*, and herbs that are sometimes present include *Achillea millefolium*, *Agoseris grandiflora*, *Aira caryophyllea*, *Anagallis arvensis*, *Avena* spp., *Bromus carinatus*, *Carduus pycnocephalus*, *Chlorogalum pomeridianum*, *Cirsium quercetorum*, *Cirsium vulgare*, *Cynosurus echinatus*, *Eschscholzia californica*, *Galium aparine*, *Holcus lanatus*, *Hypochaeris radicata*, *Lactuca serriola*, *Lolium perenne*, *Nassella pulchra*, *Pteridium aquilinum*, *Ranunculus californicus*, *Sidalcea malviflora*, *Sonchus asper*, *Torilis arvensis*, and *Vicia sativa*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Shrub	1.5	0 – 10	0.4	0– 1
Herb	55.9	25 – 97	0.5	0 –1

### **Local Environmental Description**

**Elevation:** Mean 374 m, Range 57 – 750 m

**Aspect:** NE (4), SE (3), NW (3), SW (1), W (1)

**Slope:** Mean 11 degrees, Range 3 – 20 degrees

**Macro Topography:** Upper 1/3 of slope (7), Ridge top (2), Lower 1/3 of slope (1), Middle to Upper 1/3 of slope (1), Middle 1/3 of slope (1)

**Large Rock:** Mean 0.0%, Range 0 – 0.2%

**Fines Cover:** Mean 6.9%, Range 0.2 – 40%

**Small Rock:** Mean 8.3%, Range 0 – 50%

**Litter Cover:** Mean 49.0%, Range 0.2 – 96%

**Soil Texture (field assessed):** Moderately fine clay loam (3), Fine clay (2), Moderately fine sandy clay loam (1), Moderately coarse, sandy loam (1)

**Geology (field or map data):** Franciscan melange (5), Sandstone, shale, and conglomerate (3), Sandstone and other sedimentary (3), Granitic (2)

**Marin County Watersheds:** Point Reyes (1)

**Other Watersheds, San Mateo Co.:** Pescadero Creek (2), San Gregorio Creek (1), San Mateo Bayside (1); **Sonoma Co.:** Middle Russian River (3), Lower Russian River (2), Bodega Harbor (1), Gualala River (1), Salmon Creek (1)

### **Site Impacts**

This association has greater cover of exotics (average 51.4%) than native cover. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*, *Anagallis arvensis*, *Avena* spp., *Briza maxima*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Cirsium vulgare*, *Cynosurus echinatus*, *Geranium dissectum*, *Holcus lanatus*, *Hypochaeris radicata*, *Lactuca serriola*, *Lolium perenne*, *Rumex acetosella*, *Sonchus asper*, *Torilis arvensis*, *Vicia sativa*, and *Vulpia bromoides*.

### **Classification Comments**

Since the number of surveys of this association in Marin are low, data from nearby counties are included.

**References:** Buck-Diaz et al. 2012, Klein et al. 2015

**Global Rarity Rank:** G3

**State Rarity Rank:** S3

**State Rare:** Y

**Surveys Used for Description**

Total: N=13; Marin County (n=1): PGA1403

San Mateo County (n=4): CORT073, CORT074, CORT076, CORT099 Sonoma County (n=8): HEAD0093, HEAD0218, MILOB101, SONO0345, SONO0349, SONO0467, SONO0533, SONO0932

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	46	33.3	0.5	0.1	4.0				
<b>Herb</b>										
	<b><i>Elymus glaucus</i></b>	<b>100</b>	<b>25.4</b>	<b>27.5</b>	<b>3.0</b>	<b>84.0</b>	<b>X</b>			<b>X</b>
	<i>Rumex acetosella</i>	69	3.8	5.7	0.2	20.0				<b>X</b>
	<i>Bromus hordeaceus</i>	62	7.0	4.9	0.2	18.0				<b>X</b>
	<i>Sisyrinchium bellum</i>	62	2.6	1.1	0.2	6.0				<b>X</b>
	<i>Vulpia bromoides</i>	54	7.9	10.9	2.0	52.0				<b>X</b>
	<i>Briza maxima</i>	54	7.3	6.9	0.2	68.0				<b>X</b>
	<i>Geranium dissectum</i>	54	1.0	1.7	0.2	12.0				<b>X</b>
	<i>Bromus diandrus</i>	54	2.8	1.3	0.1	8.0				<b>X</b>
	<i>Aira caryophyllea</i>	46	4.3	8.9	0.2	45.0				
	<i>Cirsium vulgare</i>	46	0.6	0.7	0.2	5.0				
	<i>Vicia sativa</i>	46	0.9	0.7	0.2	4.0				
	<i>Lolium perenne</i>	38	5.6	8.2	3.0	45.0				
	<i>Cynosurus echinatus</i>	38	3.3	3.6	0.2	38.0				
	<i>Avena</i> spp.	38	0.7	1.2	0.2	5.0				
	<i>Ranunculus californicus</i>	38	0.1	0.1	0.2	0.2				
	<i>Bromus carinatus</i>	31	1.0	1.8	0.2	20.0				
	<i>Nassella pulchra</i>	31	1.8	1.6	0.2	16.0				
	<i>Achillea millefolium</i>	31	1.0	0.7	0.2	5.0				
	<i>Hypochaeris radicata</i>	31	0.3	0.5	0.2	3.0				
	<i>Eschscholzia californica</i>	31	0.1	0.2	0.2	2.0				
	<i>Lactuca serriola</i>	31	0.1	0.1	0.2	0.2				
	<i>Pteridium aquilinum</i>	23	2.0	1.2	3.0	8.0				
	<i>Chlorogalum pomeridianum</i>	23	2.2	1.1	0.2	14.0				
	<i>Carduus pycnocephalus</i>	23	0.5	0.6	0.2	8.0				
	<i>Holcus lanatus</i>	23	0.6	0.6	0.2	8.0				
	<i>Sonchus asper</i>	23	0.4	0.6	0.2	5.0				
	<i>Cirsium quercetorum</i>	23	0.4	0.6	0.2	4.0				
	<i>Agoseris grandiflora</i>	23	0.1	0.2	0.2	1.0				
	<i>Sidalcea malviflora</i>	23	0.1	0.1	0.2	1.0				
	<i>Anagallis arvensis</i>	23	0.1	0.0	0.2	0.2				
	<i>Galium aparine</i>	23	0.1	0.0	0.2	0.2				
<b>Non-vascular</b>										
	Moss	38	38.5	1.6	0.2	20.0				

## ***Pteridium aquilinum* – Grass Association**

**Common Name:** Bracken fern – grass Patches

**Alliance:** *Bromus carinatus* – *Elymus glaucus* Herbaceous Alliance

### **Local Vegetation Description**

The Bracken fern – grass Association forms an intermittent to continuous herbaceous layer. The shrub layer is sparse and the tree layer is sparse. Characteristic herbs include *Pteridium aquilinum*. Those herbs often present include *Achillea millefolium*, *Avena* spp., *Brachypodium distachyon*, *Briza maxima*, and *Eschscholzia californica*, and herbs that are sometimes present include *Anagallis arvensis*, *Bromus carinatus*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Chlorogalum pomeridianum*, *Clarkia purpurea*, *Cynosurus echinatus*, *Dichelostemma capitatum*, *Dichelostemma congestum*, *Erodium botrys*, *Hypochaeris radicata*, *Iris macrosiphon*, *Lolium perenne*, *Nassella pulchra*, *Plantago lanceolata*, *Rumex acetosella*, *Sisyrinchium bellum*, *Trifolium willdenovii*, *Triteleia laxa*, and *Vulpia bromoides*. Commonly associated emergent shrubs at sparse cover include *Baccharis pilularis*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0.2	0.3	0 – 0.5
Shrub	1.2	0 – 5	0.5	0 – 1
Herb	67.2	38 – 95	0.4	0 – 1

### **Local Environmental Description**

**Elevation:** Mean 295 m, Range 35 – 625 m

**Aspect:** NE (4), SW (4), SE (3), NW (2)

**Slope:** Mean 25 degrees, Range 1 – 40 degrees

**Macro Topography:** Upper 1/3 of slope (8), Middle 1/3 of slope (3), Middle to Upper 1/3 of slope (1), Ridge top (1)

**Large Rock:** Mean 2.4%, Range 0.0 – 26.0%

**Small Rock:** Mean 2.6%, Range 0.0 – 15.0%

**Fines Cover:** Mean 22.8%, Range 0.0 – 88.0%

**Litter Cover:** Mean 50.4%, Range 5.0 – 97%

**Soil Texture (field assessed):** Not recorded (3), Moderately fine silty clay loam (3), Medium to very fine, sandy loam (2), Fine sandy clay (2), Moderately coarse, sandy loam (1), Loam, (class unknown) (1), Moderately fine clay loam (1)

**Geology (field or map data):** Franciscan melange (5), Large landslides (3), Sandstone and other sedimentary (3), Granitic (generic) (1), Blueschist and semi-schist (1), Volcanic and metavolcanic rocks (1), Volcanic flow rocks (1), Ultramafic (type unknown) (1)

**Marin County Watersheds:** Petaluma River (5), Lagunitas Creek (4), Bolinas (2), Walker Creek (2), Inverness (1), Novato (1), Point Reyes (1)

### **Site Impacts**

This association has greater cover of exotics (average 52.4%) than natives. Non-native species that occur with highest frequency and abundance include *Anagallis arvensis*, *Avena* spp., *Brachypodium distachyon*, *Briza maxima*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Cynosurus echinatus*, *Erodium botrys*, *Hypochaeris radicata*, *Lolium perenne*, *Plantago lanceolata*, *Rumex acetosella*, and *Vulpia bromoides*.

**Classification Comments**

None.

**References:** Buck and Evens 2010, Buck-Diaz et al. 2019, Klein et al. 2015, Rodriguez et al. 2017

**Global Rarity Rank:** G3

**State Rarity Rank:** S3

**State Rare:** Y

**Surveys Used for Description**

**Total: N=16; Marin County (n=16):** HEAD0135, MARIN240, MARIN258, MARIN294, MMWD0013, MMWD0035, MMWD0612, MOSD0149, MOSD0210, MOSD0278, MOSD0279, MOSD0280, PGA200, PGA561, PORE153, WRBL009

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Shrub	<i>Baccharis pilularis</i>	50	33.5	0.6	0.2	3.0				X
Herb	<i>Pteridium aquilinum</i>	100	29.9	21.6	6.0	40.0	X			X
	<i>Avena</i> spp.	69	5.9	4.3	0.2	25.0				X
	<i>Brachypodium distachyon</i>	56	14.6	10.3	0.2	40.0				X
	<i>Briza maxima</i>	56	5.2	3.5	0.2	14.0				X
	<i>Achillea millefolium</i>	56	0.5	0.5	0.2	5.0				X
	<i>Eschscholzia californica</i>	50	0.3	0.2	0.2	2.0				X
	<i>Bromus diandrus</i>	44	4.2	4.0	0.2	35.0				
	<i>Bromus hordeaceus</i>	44	3.0	2.1	0.2	10.0				
	<i>Nassella pulchra</i>	44	1.1	0.9	0.1	10.0				
	<i>Cynosurus echinatus</i>	44	0.9	0.9	0.2	8.0				
	<i>Chlorogalum pomeridianum</i>	44	0.6	0.4	0.2	3.0				
	<i>Carduus pycnocephalus</i>	38	0.3	0.2	0.2	2.0				
	<i>Sisyrinchium bellum</i>	38	0.1	0.1	0.2	0.2				
	<i>Lolium perenne</i>	31	2.9	3.0	0.2	30.0				
	<i>Rumex acetosella</i>	31	0.8	1.2	0.2	15.0				
	<i>Iris macrosiphon</i>	31	0.1	0.1	0.2	0.3				
	<i>Anagallis arvensis</i>	31	0.1	0.1	0.2	0.2				
	<i>Dichelostemma capitatum</i>	31	0.1	0.1	0.1	0.2				
	<i>Hypochaeris radicata</i>	25	2.3	1.3	0.2	10.0				
	<i>Vulpia bromoides</i>	25	1.4	1.3	0.2	15.0				
	<i>Erodium botrys</i>	25	1.0	0.9	0.2	8.0				
	<i>Bromus carinatus</i>	25	1.1	0.8	0.2	8.0				
	<i>Plantago lanceolata</i>	25	0.9	0.7	0.2	10.0				
	<i>Trifolium willdenovii</i>	25	0.4	0.2	0.2	3.0				
	<i>Clarkia purpurea</i>	25	0.1	0.1	0.2	0.3				
	<i>Dichelostemma congestum</i>	25	0.1	0.1	0.2	0.2				
	<i>Triteleia laxa</i>	25	0.1	0.1	0.2	0.2				

## ***Thermopsis californica* – *Bromus carinatus* – Annual Brome Association**

**Common Name:** California Goldenbanner – California Brome – Annual Brome Grassland

**Alliance:** *Bromus carinatus* – *Elymus glaucus* Herbaceous Alliance

### **Local Vegetation Description**

The California Goldenbanner – California Brome – Annual Brome Association forms a continuous herbaceous layer. The shrub layer is sparse, and the tree layer is absent. *Thermopsis californica* is dominant or co-dominant in the herbaceous layer, and characteristic herbs include *Avena* spp. and *Bromus hordeaceus*. Those herbs often present include *Bromus carinatus* along with *Achillea millefolium*, and *Bromus diandrus*, and herbs that are sometimes present include *Aira caryophyllea*, *Anagallis arvensis*, *Briza maxima*, *Carduus pycnocephalus*, *Chlorogalum pomeridianum*, *Cirsium vulgare*, *Claytonia perfoliata*, *Cynosurus echinatus*, *Elymus glaucus*, *Festuca idahoensis*, *Galium aparine*, *Geranium dissectum*, *Hypochaeris glabra*, *Hypochaeris radicata*, *Lolium perenne*, *Melica californica*, *Nassella pulchra*, *Sisyrinchium bellum*, *Sonchus oleraceus*, *Stachys ajugoides*, *Vulpia bromoides*, and *Vulpia myuros*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.5	0 – 2	0.8	0.5 – 1
Herb	79.3	67 – 90	0.4	0 – 1

### **Local Environmental Description**

**Elevation:** Mean 319 m, Range 77 – 735 m

**Aspect:** NW (3), NE (3), SW (1)

**Slope:** Mean 13 degrees, Range 7 – 25 degrees

**Macro Topography:** Upper 1/3 of slope (5), Lower 1/3 of slope (1), Middle 1/3 of slope (1)

**Large Rock:** Mean 2.7%, Range 0.0 – 11.0%

**Small Rock:** Mean 0.7%, Range 0.0 – 3.0%

**Fines Cover:** Mean 10.4%, Range 0.0 – 27.0%

**Litter Cover:** Mean 50.0%, Range 3.0 – 92%

**Soil Texture (field assessed):** Moderately fine clay loam (3), Not recorded (2), Medium silt (1), Medium to very fine, sandy loam (1)

**Geology (field or map data):** Franciscan melange (4), Ultramafic rocks, mostly serpentinite (1), Blueschist and semi-schist (1), Sandstone and other sedimentary (1)

**Marin County Watersheds:** Lagunitas Creek (4), San Rafael (2), Novato (1)

### **Site Impacts**

This association has moderate non-native plant cover (average 46.8%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*, *Anagallis arvensis*, *Avena* spp., *Briza maxima*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Cirsium vulgare*, *Cynosurus echinatus*, *Geranium dissectum*, *Hypochaeris glabra*, *Hypochaeris radicata*, *Lolium perenne*, *Sonchus oleraceus*, *Vulpia bromoides*, and *Vulpia myuros*.

### **Classification Comments**

None.

References: Evens and Kentner 2006

Global Rarity Rank: G3

State Rarity Rank: S3

State Rare: Y

**Surveys Used for Description**

Total: N=7; Marin County (n=7): HEAD0045, MARIN254, MARIN316, MMWD0033, MMWD0048, MMWD0101, MOSD0324

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Toxicodendron diversilobum</i>	43	34.4	0.3	0.2	2.0				
	<i>Baccharis pilularis</i>	29	21.4	0.1	0.2	0.2				
<b>Herb</b>										
	<b><i>Thermopsis californica</i></b>	<b>86</b>	<b>34.1</b>	<b>25.6</b>	<b>12.0</b>	<b>60.0</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<b><i>Bromus hordeaceus</i></b>	<b>86</b>	<b>13.2</b>	<b>9.9</b>	<b>0.2</b>	<b>30.0</b>	<b>X</b>			<b>X</b>
	<i>Avena</i> spp.	86	7.7	8.3	0.2	38.0	<b>X</b>			<b>X</b>
	<i>Achillea millefolium</i>	71	0.2	0.1	0.2	0.2				<b>X</b>
	<b><i>Bromus carinatus</i></b>	<b>57</b>	<b>2.6</b>	<b>1.9</b>	<b>0.2</b>	<b>6.0</b>				<b>X</b>
	<b><i>Bromus diandrus</i></b>	<b>57</b>	<b>2.2</b>	<b>1.6</b>	<b>0.2</b>	<b>9.0</b>				<b>X</b>
	<i>Lolium perenne</i>	43	4.8	4.9	8.0	18.0				
	<i>Briza maxima</i>	43	5.9	3.3	0.2	20.0				
	<i>Cynosurus echinatus</i>	43	2.2	1.5	0.2	9.0				
	<i>Carduus pycnocephalus</i>	43	1.8	1.3	0.2	8.0				
	<i>Hypochaeris glabra</i>	43	0.5	0.3	0.2	2.0				
	<i>Nassella pulchra</i>	43	0.6	0.3	0.2	2.0				
	<i>Melica californica</i>	43	0.3	0.2	0.2	1.0				
	<i>Stachys ajugoides</i>	43	0.3	0.2	0.2	1.0				
	<i>Anagallis arvensis</i>	43	0.1	0.1	0.2	0.2				
	<i>Chlorogalum pomeridianum</i>	29	3.8	5.6	1.0	38.0				
	<i>Vulpia bromoides</i>	29	2.5	2.6	0.2	18.0				
	<i>Festuca idahoensis</i>	29	2.2	1.5	0.2	10.0				
	<i>Vulpia myuros</i>	29	1.3	1.0	2.0	5.0				
	<i>Elymus glaucus</i>	29	0.6	0.6	0.2	4.0				
	<i>Aira caryophyllea</i>	29	0.2	0.2	0.2	1.0				
	<i>Claytonia perfoliata</i>	29	0.2	0.2	0.2	1.0				
	<i>Galium aparine</i>	29	0.2	0.2	0.2	1.0				
	<i>Geranium dissectum</i>	29	0.2	0.2	0.2	1.0				
	<i>Cirsium vulgare</i>	29	0.1	0.1	0.2	0.2				
	<i>Hypochaeris radicata</i>	29	0.1	0.1	0.2	0.2				
	<i>Sisyrinchium bellum</i>	29	0.1	0.1	0.2	0.2				
	<i>Sonchus oleraceus</i>	29	0.0	0.1	0.2	0.2				

*Thermopsis californica* – *Bromus carinatus* – Annual Brome Association  
*Bromus carinatus* – *Elymus glaucus* Herbaceous Alliance

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## ***Cakile (edentula, maritima)* Herbaceous Provisional Semi-Natural Alliance**

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**Common Name:** Sea rocket sands

**NVC Alliance Code:** N/A.

### **Statewide Description**

*Cakile edentula* or *Cakile maritima* is dominant often at sparse to open cover in the herbaceous layer.

The National Vegetation Classification (NatureServe 2007a) recognizes a sparsely vegetated alliance in the United States and in Europe. *C. edentula* and *C. maritima* are not natives in California, and they are two of a very short list of species that thrive along the leading edge of the beach. Both species have similar reproductive output, but *C. maritima* has higher survivorship and more seed output on nearshore dunes, where it might live for several years. *C. maritima* is replacing *C. edentula* at southern beaches of California, whereas the more severe winter conditions at northern areas allow for their coexistence (Boyd and Barbour 1993). *Layia carnosa* and *Abronia umbellata* ssp. *breviflora* (CNPS list 1B.1 plants) grow with these species on upper beaches and landward edges of the nearshore dunes.

### **Local Vegetation Description**

The Sea rocket sands Alliance forms an open herbaceous layer. The shrub layer is absent and the tree layer is sparse. *Cakile maritima* or *C. edentula* is dominant in the herbaceous layer, and other characteristic herbs include *Ambrosia chamissonis* and *Elymus mollis*. Those herbs often present include *Ammophila arenaria*, *Atriplex prostrata*, and *Tetragonia tetragonioides*. Commonly associated regenerating or shrubby trees at sparse cover include *Umbellularia californica*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.1	0 – 0.2	0.3	0 – 0.5
Shrub	0.0	0 – 0	no data	
Herb	13.0	11 – 15	0.3	0 – 0.5

### **Local Membership Rule**

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

### **Local Environmental Description**

**Elevation:** Mean 3 m, Range 0 – 5 m

**Aspect:** Flat (1), SW (1)

**Slope:** Mean 3 degrees, Range 0 – 5 degrees

**Macro Topography:** Bottom to Lower 1/3 of slope (1), Bottom (1)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** Mean 92.0%, Range 85.0 – 99.0%

**Litter Cover:** Mean 8.0%, Range 1.0 – 15%

**Soil Texture (field assessed):** Fine sand (1), Sand, (class unknown) (1)

**Geology (field or map data):** Sand dunes (2)

**Marin County Watersheds:** Tomales Bay (1)

**Other Watersheds, San Mateo Co.:** San Gregorio Creek (1)

### **Site Impacts**

This alliance has greater cover of exotics than natives, with high non-native plant cover (average 93.8%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Ammophila arenaria*, *Atriplex prostrata*, *Cakile maritima*, and *Tetragonia tetragonioides*.

### **Associations in Marin County**

*Cakile (edentula, maritima)*

### **Classification Comments**

Since Marin County has fewer than five surveys of this alliance, data from nearby counties were included.

**References:** Williams and Potter 1972

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

### **Surveys Used for Description**

**Total: N=2; Marin County (n=1):** MARIN271

San Mateo County (n=1): SMAT0264



**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Regenerating or Shrubby Trees</b>										
	<i>Umbellularia californica</i>	50	50.0	0.1	0.2	0.2				X
<b>Herb</b>										
	<b><i>Cakile maritima</i></b>	<b>100</b>	<b>84.2</b>	<b>11.5</b>	<b>9.0</b>	<b>14.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Ambrosia chamissonis</i>	100	4.1	0.6	0.2	1.0	X			X
	<i>Elymus mollis</i>	100	1.5	0.2	0.2	0.2	X			X
	<i>Ammophila arenaria</i>	50	8.6	1.0	2.0	2.0				X
	<i>Atriplex prostrata</i>	50	0.9	0.1	0.2	0.2				X
	<i>Tetragonia tetragonioides</i>	50	0.6	0.1	0.2	0.2				X

***Cakile (edentula, maritima) Provisional Semi-natural Association***

**Common Name:** Sea Rocket Sands

**Alliance:** *Cakile (edentula, maritima)* Herbaceous Provisional Semi-Natural Alliance

**Classification Comments**

The association circumscription is the same as that of the alliance. See above for detailed description. This association is considered provisional since it is under-sampled in its expected range. Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

**State Rare:** N

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## ***Calamagrostis nutkaensis* Herbaceous Alliance**

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**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 *Festuca idahoensis* – *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.

### **Local Vegetation Description**

The Pacific reed grass meadows Alliance forms an intermittent to continuous herbaceous layer. The shrub layer is open to intermittent and the tree layer is absent. *Calamagrostis nutkaensis* is dominant or co-dominant in the herbaceous layer. Those herbs often present include *Carex obnupta* and *Holcus*

*lanatus*, and herbs that are sometimes present include *Achillea millefolium*, *Deschampsia cespitosa*, *Hypochaeris radicata*, *Iris douglasiana*, *Juncus effusus*, *Oenanthe sarmentosa*, *Plantago lanceolata*, *Pteridium aquilinum*, and *Stachys ajugoides*. Commonly associated emergent shrubs at sparse cover include *Rubus ursinus* and *Baccharis pilularis*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	13.4	0 – 65	0.7	0 – 5
Herb	89.6	55 – 100	0.9	0 – 5

### **Local Membership Rule**

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

### **Local Environmental Description**

**Elevation:** Mean 50 m, Range 8 – 155 m

**Aspect:** NW (7), NE (5), SW (2)

**Slope:** Mean 9 degrees, Range 1 – 28 degrees

**Macro Topography:** Middle 1/3 of slope (4), Upper 1/3 of slope (3), Bottom (2), Edge of basin/wetland (2), Ridge top (1), Lower 1/3 of slope (1)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** Mean 1.2%, Range 0.0 – 2.0%

**Litter Cover:** Mean 42.6%, Range 0.0 – 86%

**Soil Texture (field assessed):** Moderately fine sandy clay loam (4), Moderately fine silty clay loam (2), Medium to very fine, sandy loam (2), Moderately coarse, sandy loam (1), Moderately fine clay loam (1), Coarse, loamy sand (1), Medium loam (1), Medium silt loam (1)

**Geology (field or map data):** Sandstone and other sedimentary (32), Granitic (5), Siltstone (3), Granitic (generic) (2), Sandstone, shale, and conglomerate (2), Sedimentary (type unknown) (1), Shale (1)

**Marin County Watersheds:** Point Reyes (43), Inverness (2), Bolinas (1)

### **Site Impacts**

This alliance has low non-native plant cover (average 15.7%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Holcus lanatus*, *Hypochaeris radicata*, and *Plantago lanceolata*.

### **Associations in Marin County**

*Calamagrostis nutkaensis*

*Calamagrostis nutkaensis* – *Carex (obnupta)* – *Juncus (patens)*

*Calamagrostis nutkaensis* / *Baccharis pilularis*

### **Classification Comments**

None.

**References:** Buck-Diaz et al. 2019, Hektner and Foin 1977, Keeler-Wolf et al. 2003a, Klein et al. 2015

**Global Rarity Rank:** G4

**State Rarity Rank:** S2

**Surveys Used for Description**

**Total: N=51; Marin County (n=51):** GGNRA310, HEAD0078, HEAD0270, HEAD0306, HEAD0330, HEAD0357, PGA1070, PGA109, PGA1094, PGA111, PGA126, PGA139, PGA150, PGA154, PGA163a, PGA180, PGA183, PGA189, PGA203, PGA205, PGA207, PGA213, PGA215, PGA217A, PGA2208, PGA2418, PGA2616, PGA2805, PGA287, PGA3173, PGA3430, PGA352, PGA3708, PGA3760, PGA465, PGA493, PGA496, PGA501, PGA5106, PGA5278, PGA69, PGA95, PGA97, PORE017, PORE026, PORE049, PORE056, PORE071, PORE097, PORE122, SFANF04

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Rubus ursinus</i>	84	47.0	7.6	0.2	36.8	X		X	X
	<i>Baccharis pilularis</i>	53	24.7	5.8	0.2	35.0				X
<b>Herb</b>										
	<b><i>Calamagrostis nutkaensis</i></b>	<b>100</b>	<b>36.8</b>	<b>37.5</b>	<b>5.0</b>	<b>75.0</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<i>Holcus lanatus</i>	63	10.9	12.1	0.2	60.0				X
	<i>Carex obnupta</i>	55	10.0	10.3	2.0	56.7				X
	<i>Pteridium aquilinum</i>	47	3.5	3.8	0.2	43.3				
	<i>Juncus effusus</i>	45	6.9	7.3	0.2	35.0				
	<i>Iris douglasiana</i>	37	1.7	2.1	0.2	15.0				
	<i>Achillea millefolium</i>	35	0.5	0.6	0.2	7.0				
	<i>Stachys ajugoides</i>	33	0.8	0.9	0.2	15.0				
	<i>Deschampsia cespitosa</i>	22	1.2	1.6	0.2	45.0				
	<i>Hypochaeris radicata</i>	22	0.8	1.0	0.1	20.0				
	<i>Oenanthe sarmentosa</i>	22	0.8	1.0	0.1	20.0				
	<i>Plantago lanceolata</i>	22	0.6	0.8	0.1	12.0				

## **Calamagrostis nutkaensis Association**

**Common Name:** Pacific reed grass association

**Alliance:** *Calamagrostis nutkaensis* Herbaceous Alliance

### **Local Vegetation Description**

The Pacific reed grass association Association forms an intermittent to continuous herbaceous layer. The shrub layer is open and the tree layer is absent. Dominant herbs include *Calamagrostis nutkaensis*, and characteristic herbs include *Achillea millefolium* and *Pteridium aquilinum*. Those herbs often present include *Rumex acetosella*, and herbs that are sometimes present include *Aira caryophyllea*, *Angelica hendersonii*, *Briza maxima*, *Deschampsia cespitosa*, *Dudleya farinosa*, *Erigeron glaucus*, *Eriophyllum stoechadifolium*, *Holcus lanatus*, *Hypochaeris radicata*, *Iris douglasiana*, *Plantago lanceolata*, *Sedum spathulifolium*, and *Stachys ajugoides*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	7.8	0 – 18	0.5	0 – 1
Herb	76.5	58 – 98	0.5	0 – 1

### **Local Environmental Description**

**Elevation:** Mean 124 m, Range 26 – 328 m

**Aspect:** NE (1), SW (1)

**Slope:** Mean 18 degrees, Range 10 – 25 degrees

**Macro Topography:** Lower to Middle 1/3 of slope (1), Ridge top (1)

**Large Rock:** 0.0%

**Small Rock:** 0.2%

**Fines Cover:** 2.0%

**Litter Cover:** Mean 46.6%, Range 0.2 – 93%

**Soil Texture (field assessed):** Medium to very fine, loamy sand (1)

**Geology (field or map data):** Sandstone, shale, and conglomerate (3), Conglomerate (1), Sandstone and other sedimentary (1)

**Marin County Watersheds:** Point Reyes (3)

**Other Watersheds, San Mateo Co.:** San Mateo Bayside (1); **Sonoma Co.:** Bodega Harbor (1)

### **Site Impacts**

This association has moderate non-native plant cover (average 28.0%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*, *Briza maxima*, *Holcus lanatus*, *Hypochaeris radicata*, *Plantago lanceolata*, and *Rumex acetosella*.

### **Classification Comments**

Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** Hektner and Foin 1977

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

Total: N=5; Marin County (n=3): PGA207, PGA493, PGA501

San Mateo County (n=1): CORT080

Sonoma County (n=1): BDGA0006

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Vaccinium ovatum</i>	60	21.5	4.2	0.2	15.0				X
	<i>Rubus ursinus</i>	40	13.5	2.8	4.0	10.0				
	<i>Gaultheria shallon</i>	40	19.5	1.2	1.0	5.0				
<b>Herb</b>										
	<b><i>Calamagrostis nutkaensis</i></b>	<b>100</b>	<b>48.1</b>	<b>35.0</b>	<b>20.0</b>	<b>55.0</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<i>Pteridium aquilinum</i>	80	2.9	2.4	0.2	5.0	<b>X</b>			<b>X</b>
	<i>Achillea millefolium</i>	80	1.3	0.9	0.2	2.0	<b>X</b>			<b>X</b>
	<i>Rumex acetosella</i>	60	0.7	0.5	0.2	2.0				<b>X</b>
	<i>Holcus lanatus</i>	40	16.7	14.0	30.0	40.0				
	<i>Briza maxima</i>	40	6.7	6.0	0.2	30.0				
	<i>Hypochaeris radicata</i>	40	3.1	2.8	0.2	14.0				
	<i>Eriophyllum stoechadifolium</i>	40	4.3	2.4	5.0	7.0				
	<i>Iris douglasiana</i>	40	2.7	1.8	4.0	5.0				
	<i>Erigeron glaucus</i>	40	2.1	1.4	0.2	7.0				
	<i>Plantago lanceolata</i>	40	1.3	1.2	0.2	6.0				
	<i>Aira caryophyllea</i>	40	1.2	0.8	0.2	4.0				
	<i>Sedum spathulifolium</i>	40	1.5	0.8	1.0	3.0				
	<i>Dudleya farinosa</i>	40	1.3	0.6	0.2	3.0				
	<i>Angelica hendersonii</i>	40	0.1	0.1	0.2	0.2				
	<i>Deschampsia cespitosa</i>	40	0.1	0.1	0.2	0.2				
	<i>Stachys ajugoides</i>	40	0.1	0.1	0.2	0.2				

***Calamagrostis nutkaensis* – *Carex (obnupta)* – *Juncus (patens)* Association**

**Common Name:** Pacific reedgrass – slough sedge – rush Patches

**Alliance:** *Calamagrostis nutkaensis* Herbaceous Alliance

**Local Vegetation Description**

The Pacific reedgrass – slough sedge – rush Association forms a continuous herbaceous layer. The shrub layer is open and the tree layer is absent. Dominant herbs include *Calamagrostis nutkaensis*, and characteristic herbs include *Carex obnupta*. Those herbs often present include *Holcus lanatus* and *Juncus effusus*, and herbs that are sometimes present include *Achillea millefolium*, *Athyrium filix-femina*, *Campanula californica*, *Carex* spp., *Erechtites minimus*, *Iris douglasiana*, *Juncus patens*, *Juncus phaeocephalus*, *Mimulus guttatus*, *Oenanthe sarmentosa*, *Potentilla anserina*, *Pteridium aquilinum*, and *Scirpus microcarpus*. Commonly associated emergent shrubs at open cover include *Rubus ursinus*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	9.3	0 – 30	0.8	0 – 5
Herb	95.0	75 – 100	1.1	0 – 5

**Local Environmental Description**

**Elevation:** Mean 40 m, Range 8 – 129 m

**Aspect:** NW (4), SW (2), NE (1)

**Slope:** Mean 3 degrees, Range 1 – 7 degrees

**Macro Topography:** Bottom (2), Edge of basin/wetland (2), Lower 1/3 of slope (1), Middle 1/3 of slope (1)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** Mean 1.5%, Range 1.0 – 2.0%

**Litter Cover:** Mean 35.4%, Range 0.0 – 74%

**Soil Texture (field assessed):** Moderately fine sandy clay loam (2), Medium silt loam (1), Moderately fine silty clay loam (1), Medium to very fine, sandy loam (1), Moderately coarse, sandy loam (1)

**Geology (field or map data):** Sandstone and other sedimentary (24), Granitic (3), Granitic (generic) (1), Sedimentary (type unknown) (1), Shale (1), Siltstone (1)

**Marin County Watersheds:** Point Reyes (30), Bolinas (1)

**Site Impacts**

This association has low non-native plant cover (average 14.4%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Erechtites minimus* and *Holcus lanatus*.

**Classification Comments**

None.

**References:** Buck-Diaz et al. 2019, Keeler-Wolf et al. 2003a, Klein et al. 2015

**Global Rarity Rank:** G2

**State Rarity Rank:** S2.1

**State Rare:** Y

**Surveys Used for Description**

**Total: N=33; Marin County (n=33):** GGNRA310, HEAD0306, HEAD0330, PGA1070, PGA109, PGA1094, PGA111, PGA126, PGA139, PGA150, PGA154, PGA183, PGA189, PGA203, PGA205, PGA213, PGA215, PGA217A, PGA2208, PGA2418, PGA2616, PGA2805, PGA3430, PGA352, PGA3708, PGA3760, PGA5106, PGA95, PGA97, PORE017, PORE049, PORE122, SFANF04

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Rubus ursinus</i>	85	61.4	7.7	0.2	30.0	X	X		X
	<i>Baccharis pilularis</i>	36	12.4	1.5	0.2	14.0				
<b>Herb</b>										
	<b><i>Calamagrostis nutkaensis</i></b>	<b>100</b>	<b>32.9</b>	<b>36.0</b>	<b>12.0</b>	<b>75.0</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<b><i>Carex obnupta</i></b>	<b>79</b>	<b>14.8</b>	<b>15.5</b>	<b>2.0</b>	<b>56.7</b>	<b>X</b>			<b>X</b>
	<i>Holcus lanatus</i>	67	12.9	15.0	0.2	60.0				X
	<b><i>Juncus effusus</i></b>	<b>67</b>	<b>10.4</b>	<b>11.2</b>	<b>0.2</b>	<b>35.0</b>				<b>X</b>
	<i>Potentilla anserina</i>	30	2.4	2.9	3.0	18.0				
	<i>Pteridium aquilinum</i>	30	1.5	2.4	0.2	43.3				
	<i>Oenanthe sarmentosa</i>	30	1.2	1.5	0.2	20.0				
	<i>Athyrium filix-femina</i>	27	2.2	2.9	0.2	38.0				
	<b><i>Juncus phaeocephalus</i></b>	<b>27</b>	<b>1.4</b>	<b>1.5</b>	<b>0.2</b>	<b>15.0</b>				
	<i>Erechtites minimus</i>	24	0.5	0.6	0.2	7.0				
	<i>Mimulus guttatus</i>	24	0.2	0.3	0.2	5.3				
	<i>Campanula californica</i>	24	0.1	0.2	0.2	3.3				
	<i>Scirpus microcarpus</i>	21	3.2	3.0	2.0	40.0				
	<b><i>Juncus patens</i></b>	<b>21</b>	<b>1.6</b>	<b>1.6</b>	<b>0.4</b>	<b>20.0</b>				
	<i>Iris douglasiana</i>	21	1.0	1.5	0.2	15.0				
	<b><i>Carex</i> spp.</b>	<b>21</b>	<b>0.6</b>	<b>0.9</b>	<b>0.2</b>	<b>15.0</b>				
	<i>Achillea millefolium</i>	21	0.1	0.1	0.2	2.0				



***Calamagrostis nutkaensis* / *Baccharis pilularis* Association**

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**Common Name:** Pacific Reedgrass – Coyote Brush Grassland

**Alliance:** *Calamagrostis nutkaensis* Herbaceous Alliance

**Local Vegetation Description**

The Pacific Reedgrass – Coyote Brush Association forms an intermittent to continuous herbaceous layer. The shrub layer is open to intermittent and the tree layer is absent. Dominant herbs include *Calamagrostis nutkaensis*, and characteristic herbs include *Pteridium aquilinum*. Those herbs often present include *Achillea millefolium*, *Aira caryophyllea*, *Cirsium quercetorum*, *Deschampsia cespitosa*, *Holcus lanatus*, *Iris douglasiana*, and *Stachys ajugoides*, and herbs that are sometimes present include *Agrostis* spp., *Anagallis arvensis*, *Anaphalis margaritacea*, *Bromus carinatus*, *Chlorogalum pomeridianum*, *Cirsium vulgare*, *Danthonia californica*, *Fragaria chiloensis*, *Heracleum maximum*, *Hypochaeris radicata*, *Lolium perenne*, *Plantago lanceolata*, *Polystichum munitum*, *Prunella vulgaris*, *Rumex acetosella*, *Sisyrinchium bellum*, and *Vulpia* spp. Commonly associated emergent shrubs at open to intermittent cover include *Baccharis pilularis* and *Rubus ursinus*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	30.6	6.0 – 65	0.8	0 – 2
Herb	77.9	55 – 98	0.7	0 – 2

**Local Environmental Description**

**Elevation:** Mean 66 m, Range 14 – 129 m

**Aspect:** NE (4), NW (3)

**Slope:** Mean 15 degrees, Range 1 – 28 degrees

**Macro Topography:** Middle 1/3 of slope (3), Upper 1/3 of slope (3), Ridge top (1)

**Large Rock:** 0.0%

**Fines Cover:** Mean 1%, Range 0 – 2%

**Small Rock:** 0.0%

**Litter Cover:** Mean 48.7%, Range 2 – 86%

**Soil Texture (field assessed):** Moderately fine sandy clay loam (2), Coarse, loamy sand (1), Moderately fine silty clay loam (1), Moderately fine clay loam (1), Medium loam (1), Medium to very fine, sandy loam (1)

**Geology (field or map data):** Sandstone and other sedimentary (7), Siltstone (2), Granitic (2), Granitic (generic) (1)

**Marin County Watersheds:** Point Reyes (10), Inverness (2)

**Site Impacts**

This association has low non-native plant cover (average 15.3%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*, *Anagallis arvensis*, *Cirsium vulgare*, *Holcus lanatus*, *Hypochaeris radicata*, *Lolium perenne*, *Plantago lanceolata*, *Rumex acetosella*.

**Classification Comments**

Since *Baccharis pilularis* and *Rubus ursinus* can fluctuate in cover in coastal prairie environments, a broad range of cover is allowed in this association, while *Calamagrostis nutkaensis* is diagnostic.

**References:** Keeler-Wolf et al. 2003a, Klein et al. 2015

Global Rarity Rank: G2

State Rarity Rank: S1.2

State Rare: Y

**Surveys Used for Description**

**Total: N=15; Marin County (n=15):** HEAD0078, HEAD0270, HEAD0357, PGA163a, PGA180, PGA287, PGA3173, PGA465, PGA496, PGA5278, PGA69, PORE026, PORE056, PORE071, PORE097

**Association Stand Table** \*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	100	56.6	16.5	5.0	35.0	X	X		X
	<i>Rubus ursinus</i>	93	23.4	9.2	0.2	34.0	X			X
	<i>Gaultheria shallon</i>	47	8.6	4.0	0.2	18.0				
	<i>Toxicodendron diversilobum</i>	40	4.7	1.6	0.2	10.0				
	<i>Frangula californica</i>	40	1.8	0.8	0.2	5.0				
	<i>Vaccinium ovatum</i>	33	4.1	1.8	0.2	18.0				
<b>Herb</b>										
	<i>Calamagrostis nutkaensis</i>	100	43.8	41.4	5.0	70.0	X		X	X
	<i>Pteridium aquilinum</i>	80	8.1	7.1	2.0	22.0	X			X
	<i>Iris douglasiana</i>	67	2.8	3.2	0.2	15.0				X
	<i>Holcus lanatus</i>	60	5.7	5.4	0.2	18.0				X
	<i>Deschampsia cespitosa</i>	60	3.6	5.0	0.2	45.0				X
	<i>Stachys ajugoides</i>	60	1.4	1.8	0.2	15.0				X
	<i>Achillea millefolium</i>	60	1.4	1.6	0.2	7.0				X
	<i>Aira caryophyllea</i>	53	0.7	0.7	0.1	5.0				X
	<i>Cirsium quercetorum</i>	53	0.6	0.7	0.2	3.0				X
	<i>Lolium perenne</i>	40	6.3	5.7	0.2	70.0				
	<i>Danthonia californica</i>	40	3.4	3.2	0.2	20.0				
	<i>Plantago lanceolata</i>	40	1.2	1.7	0.1	12.0				
	<i>Heracleum maximum</i>	40	0.9	1.0	0.2	5.0				
	<i>Rumex acetosella</i>	40	0.5	0.7	0.2	3.0				
	<i>Hypochaeris radicata</i>	40	0.2	0.3	0.1	3.0				
	<i>Vulpia</i> spp.	33	2.5	1.9	0.2	20.0				
	<i>Bromus carinatus</i>	33	0.2	0.3	0.2	3.0				
	<i>Sisyrinchium bellum</i>	33	0.1	0.1	0.1	1.0				
	<i>Polystichum munitum</i>	27	1.4	0.9	0.2	10.0				
	<i>Cirsium vulgare</i>	27	0.7	0.7	0.2	7.0				
	<i>Fragaria chiloensis</i>	27	0.6	0.6	0.2	8.0				
	<i>Anaphalis margaritacea</i>	27	0.4	0.4	0.2	3.0				
	<i>Agrostis</i> spp.	27	0.3	0.4	0.2	3.0				
	<i>Prunella vulgaris</i>	27	0.1	0.2	0.2	3.0				
	<i>Anagallis arvensis</i>	27	0.0	0.1	0.2	0.2				
	<i>Chlorogalum pomeridianum</i>	27	0.1	0.1	0.2	0.2				

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## Carex barbarae Herbaceous Alliance

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**Common Name:** White-root beds

**NVC Alliance Code:** N/A.

### **Statewide Description**

*Carex barbarae* is dominant or co-dominant in the herbaceous layer with *Asclepias fascicularis*, *Carex praegracilis*, *Epilobium ciliatum*, *Euthamia occidentalis*, *Perideridia kelloggii*, *Senecio minimus*, *Solidago* spp., and *Urtica dioica*. Emergent trees and shrubs may be present at low cover, including trees: *Fraxinus latifolia*, *Platanus racemosa*, *Quercus agrifolia* or *Quercus lobata*, and shrubs: *Cephalanthus occidentalis* or *Rubus* spp.

*Carex barbarae* is tolerant of shade and occurs in winter-deciduous gallery woodlands (Holland 1986). In the Central Valley and central Coast Ranges, *Carex barbarae* occurs regularly as an understory in *Quercus lobata* stands, but it also forms stands without tree canopies. In many areas, *Carex barbarae* is replaced by aggressive non-native woody species, such as *Rubus armeniacus*. In settings where soil moisture is similar to that found in a woodland understory, *Carex barbarae* can be found away from trees. Stands of *C. barbarae* may also remain where trees have been cleared.

### **Local Vegetation Description**

The White-root beds Alliance forms a continuous herbaceous layer. The shrub layer is sparse and the tree layer is sparse. The dominant herbs is *Carex barbarae*. Herbs that are sometimes present include *Anthoxanthum odoratum*, *Briza minor*, *Bromus carinatus*, *Carduus pycnocephalus*, *Conium maculatum*, *Deschampsia danthonioides*, *Eleocharis acicularis*, *Eleocharis macrostachya*, *Elymus triticoides*, *Erechtites minimus*, *Galium aparine*, *Juncus arcticus*, *Juncus bufonius*, *Juncus effusus*, *Juncus*

*phaeocephalus*, *Lactuca serriola*, *Lolium perenne*, *Mentha pulegium*, *Phalaris aquatica*, *Raphanus sativus*, *Rumex conglomeratus*, *Rumex pulcher*, and *Sparganium eurycarpum*. Commonly associated emergent trees at sparse cover include *Quercus lobata*. Commonly associated emergent shrubs at sparse cover include *Crataegus douglasii* and *Rubus ursinus*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.5	0 – 2	7.5	5 – 10
Regenerating or Shrubby Tree	0.3	0 – 1	3.5	2 – 5
Shrub	1.3	0 – 5	3.5	2 – 5
Herb	91.0	75 – 99	0.8	0.5 – 1

### **Local Membership Rule**

*Carex barbarae* dominates in seasonally or intermittently saturated wetlands.

### **Local Environmental Description**

**Elevation:** Mean 162 m, Range 10 – 605 m

**Aspect:** Flat (1), NE (1), NW (1), Variable (1)

**Slope:** Mean 1 degrees, Range 0 – 3 degrees

**Macro Topography:** Bottom (2), Bottom to Lower 1/3 of slope (1), Lower 1/3 of slope (1)

**Large Rock:** 0.0%

**Small Rock:** Mean 0.1%, Range 0.0 – 0.2%

**Fines Cover:** Mean 8.1%, Range 0.2 – 27.0%

**Litter Cover:** Mean 70.0%, Range 20.0 – 96%

**Soil Texture (field assessed):** Medium loam (1), Medium to very fine, sandy loam (1), Muck (1), Fine silty clay (1)

**Geology (field or map data):** Sandstone and other sedimentary (2), Franciscan melange (1), Mixed alluvium (1)

**Marin County Watersheds:** Lagunitas Creek (2), Novato (1)

**Other Watersheds, Sonoma Co.:** Middle Russian River (1)

### **Site Impacts**

This alliance has low non-native plant cover (average 1.9%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Anthoxanthum odoratum*, *Briza minor*, *Carduus pycnocephalus*, *Conium maculatum*, *Erechtites minimus*, *Lactuca serriola*, *Mentha pulegium*, *Phalaris aquatica*, *Raphanus sativus*, *Rubus armeniacus*, *Rumex conglomeratus*, and *Rumex pulcher*.

### **Associations in Marin County**

*Carex barbarae*

### **Classification Comments**

Since Marin County has fewer than five surveys of this alliance, data from nearby counties were included.

**References:** Buck-Diaz et al. 2012, Evens and Kentner 2006, Klein et al. 2007, Klein et al. 2015

**Global Rarity Rank:** G2?

**State Rarity Rank:** S2?

### **Surveys Used for Description**

**Total: N=4; Marin County (n=3):** MARIN020, MARIN057, MMWD0060

Sonoma County (n=1): SONO0231

## Alliance Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Quercus lobata</i>	25	25.0	0.5	2.0	2.0				
<b>Regenerating or Shrubby Trees</b>										
	<i>Quercus lobata</i> *	25	25.0	0.3	1.0	1.0				
<b>Shrub</b>										
	<i>Crataegus douglasii</i>	25	17.9	1.0	4.0	4.0				
	<i>Rubus ursinus</i>	25	4.5	0.3	1.0	1.0				
	<i>Toxicodendron diversilobum</i>	25	0.9	0.1	0.2	0.2				
	<i>Rubus armeniacus</i>	25	0.9	0.1	0.2	0.2				
	<i>Baccharis pilularis</i>	25	0.9	0.1	0.2	0.2				
<b>Herb</b>										
	<b><i>Carex barbarae</i></b>	<b>100</b>	<b>97.2</b>	<b>88.8</b>	<b>75.0</b>	<b>95.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Anthoxanthum odoratum</i>	25	1.3	1.3	5.0	5.0				
	<i>Deschampsia danthonioides</i>	25	0.3	0.3	1.0	1.0				
	<i>Lolium perenne</i>	25	0.3	0.3	1.0	1.0				
	<i>Erechtites minimus</i>	25	0.1	0.1	0.2	0.2				
	<i>Juncus effusus</i>	25	0.1	0.1	0.2	0.2				
	<i>Briza minor</i>	25	0.1	0.1	0.2	0.2				
	<i>Bromus carinatus</i>	25	0.1	0.1	0.2	0.2				
	<i>Carduus pycnocephalus</i>	25	0.1	0.1	0.2	0.2				
	<i>Conium maculatum</i>	25	0.1	0.1	0.2	0.2				
	<i>Eleocharis acicularis</i>	25	0.1	0.1	0.2	0.2				
	<i>Elymus triticoides</i>	25	0.1	0.1	0.2	0.2				
	<i>Galium aparine</i>	25	0.1	0.1	0.2	0.2				
	<i>Sparganium eurycarpum</i>	25	0.1	0.1	0.2	0.2				
	<i>Eleocharis macrostachya</i>	25	0.1	0.1	0.2	0.2				
	<i>Juncus arcticus</i>	25	0.1	0.1	0.2	0.2				
	<i>Juncus bufonius</i>	25	0.1	0.1	0.2	0.2				
	<i>Rumex pulcher</i>	25	0.1	0.1	0.2	0.2				
	<i>Rumex conglomeratus</i>	25	0.1	0.1	0.2	0.2				
	<i>Raphanus sativus</i>	25	0.1	0.1	0.2	0.2				
	<i>Phalaris aquatica</i>	25	0.1	0.1	0.2	0.2				
	<i>Mentha pulegium</i>	25	0.1	0.1	0.2	0.2				
	<i>Lactuca serriola</i>	25	0.1	0.1	0.2	0.2				
	<i>Juncus phaeocephalus</i>	25	0.1	0.1	0.2	0.2				

### ***Carex barbarae* Association**

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**Common Name:** Valley Sedge Patches

**Alliance:** *Carex barbarae* Herbaceous Alliance

**Classification Comments**

The association circumscription is the same as that of the alliance. See above for detailed description. Since the number of surveys of this association in Marin, data from nearby counties were included.

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y



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## Carex nudata Herbaceous Alliance

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**Common Name:** Torrent sedge patches

**NVC Alliance Code:** N/A.

### Statewide Description

*Carex nudata* is dominant in the herbaceous layer with *Artemisia douglasiana*, *Artemisia ludoviciana*, *Carex praeegracilis*, *Carex senta*, *Carex serratodens*, *Cyperus eragrostis*, *Darmera peltata*, *Datisca glomerata*, *Equisetum arvense*, *Equisetum hyemale*, *Mimulus guttatus*, *Paspalum dilatatum*, *Poa pratensis*, and *Stachys stricta*. Emergent riparian trees may be present at low cover, especially *Alnus* spp., *Fraxinus latifolia*, *Populus* spp. or *Salix* spp.

The *Carex nudata* Alliance occurs along perennially and seasonally flooded streams in California. Flooding from either winter or spring snowmelt creates regular mechanical impact to boulder and cobble beds creating the characteristic substrate associated with this alliance. Highly scoured reaches of streams flowing through bedrock do not typically harbor the sedge. *Carex senta*, another tufted streambed species, grows in situations similar to *Carex nudata*; it might warrant inclusion in this alliance with further investigation. *Carex nudata* stands are frequently associated with stands of the *Alnus rhombifolia* Alliance and *C. nudata* may occur as an understory beneath open *A. rhombifolia* stands, depending upon flooding frequency and intensity.

### Local Vegetation Description

The Torrent sedge patches Alliance was not adequately sampled in Marin County, but it is likely to occur based on plant observations. The alliance forms an intermittent herbaceous layer in the single survey available from a nearby county. The shrub layer is sparse and the tree layer is absent. Dominant herbs include *Carex nudata*, and characteristic herbs include *Cirsium vulgare*, *Equisetum* spp., *Fragaria vesca*,

*Galium aparine*, *Helenium puberulum*, *Petasites frigidus*, *Scirpus microcarpus*, *Trifolium subterraneum*, *Urtica dioica*, and *Woodwardia fimbriata*. Commonly associated regenerating or shrubby trees at sparse cover include *Alnus rhombifolia*, *Acer macrophyllum*, and *Sequoia sempervirens*. Commonly associated emergent shrubs at sparse cover include *Cornus sericea*, *Salix lasiolepis*, and *Toxicodendron diversilobum*. Commonly associated non-vascular plants include Moss.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	NA	no data	
Hardwood	0.0	NA	no data	
Regenerating or Shrubby Tree	2.4	NA	3.5	2 – 5
Shrub	2.2	NA	1.5	1 – 2
Herb	36.0	NA	0.3	0 – 0.5

### **Local Membership Rule**

*Carex nudata* dominates with other herbs lower in cover including *Equisetum* spp. and *Woodwardia fimbriata* along rocky streams and streambanks.

### **Local Environmental Description**

**Elevation:** 118 m

**Aspect:** Flat (1)

**Slope:** 2 degrees

**Macro Topography:** Bottom (1)

**Large Rock:** 10.0%

**Small Rock:** 70.0%

**Fines Cover:** 12.0%

**Litter Cover:** 5%

**Soil Texture (field assessed):** Fine sand (1)

**Geology (field or map data):** Mixed alluvium (1)

**San Mateo County Watersheds:** Pescadero Creek (1)

### **Site Impacts**

This alliance has low non-native plant cover (average 1.0%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Cirsium vulgare* and *Trifolium subterraneum*.

### **Associations in Marin County**

*Carex nudata*\*

### **Classification Comments**

Though no stands were surveyed in Marin County, this alliance is known from nearby counties with sample data, and it is likely to occur here in small stands such as along San Geronimo and Lagunitas Creeks.

**References:** Evens et al. 2004, Klein et al. 2007, Klein et al. 2015, Potter 2005

**Global Rarity Rank:** G3

**State Rarity Rank:** S3

### **Surveys Used for Description**

**Total: N=1; Marin County (n=0)**

San Mateo County (n=1): SMAT0279



**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Regenerating or Shrubby Trees</b>										
	<i>Alnus rhombifolia</i>	100	83.3	2.0	2.0	2.0	X	X		X
	<i>Acer macrophyllum</i>	100	8.3	0.2	0.2	0.2	X			X
	<i>Sequoia sempervirens</i>	100	8.3	0.2	0.2	0.2	X			X
<b>Shrub</b>										
	<i>Salix lasiolepis</i>	100	45.5	1.0	1.0	1.0	X		X	X
	<i>Cornus sericea</i>	100	45.5	1.0	1.0	1.0	X		X	X
	<i>Toxicodendron diversilobum</i>	100	9.1	0.2	0.2	0.2	X			X
<b>Herb</b>										
	<b><i>Carex nudata</i></b>	<b>100</b>	<b>86.2</b>	<b>30.0</b>	<b>30.0</b>	<b>30.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Equisetum</i> spp.	100	8.6	3.0	3.0	3.0	X			X
	<i>Cirsium vulgare</i>	100	0.6	0.2	0.2	0.2	X			X
	<i>Galium aparine</i>	100	0.6	0.2	0.2	0.2	X			X
	<i>Helenium puberulum</i>	100	0.6	0.2	0.2	0.2	X			X
	<i>Scirpus microcarpus</i>	100	0.6	0.2	0.2	0.2	X			X
	<i>Fragaria vesca</i>	100	0.6	0.2	0.2	0.2	X			X
	<i>Woodwardia fimbriata</i>	100	0.6	0.2	0.2	0.2	X			X
	<i>Trifolium subterraneum</i>	100	0.6	0.2	0.2	0.2	X			X
	<i>Urtica dioica</i>	100	0.6	0.2	0.2	0.2	X			X
	<i>Petasites frigidus</i>	100	0.6	0.2	0.2	0.2	X			X
<b>Non-vascular</b>										
	Moss	100	100.0	0.2	0.2	0.2	X	X		X

**Carex nudata Association**

**Common Name:** Torrent Sedge Patches

**Alliance:** *Carex nudata* Herbaceous Alliance

**Classification Comments**

The association circumscription is the same as that of the alliance for the county. See above for detailed description. Since we do not have sampling of this association in Marin County, data from a nearby county was included.

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

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

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**Common Name:** Slough sedge – water-parsley – small-fruited bulrush marsh

**NVC Alliance Code:** A4414.

**Statewide Description**

*Carex obnupta*, *Oenanthe sarmentosa*, *Argentina egedii*, *Juncus lescurii*, and/or *Scirpus microcarpus* is dominant or co-dominant in the herbaceous layer with *Agrostis stolonifera*, *Athyrium filix-femina*, *Carex* spp., *Cynosurus echinatus*, *Eleocharis macrostachya*, *Epilobium* spp., *Festuca arundinacea*, *Galium triflorum*, *Geum macrophyllum*, *Glyceria elata*, *Holcus lanatus*, *Hydrocotyle ranunculoides*, *Juncus patens*, *Lemna minuta*, *Luzula comosa*, *Lysichiton americanus*, *Oxypolis occidentalis*, *Rumex conglomeratus*, *Schoenoplectus pungens*, *Scirpus congdonii*, *Sidalcea malviflora*, *Symphotrichum chilense*, *Typha* spp. and *Viola macloskeyi*. Emergent trees or shrubs may be present at low cover, including trees: *Alnus rubra*, and shrubs: *Baccharis pilularis*, *Morella californica*, *Rubus* spp., *Salix hookeriana*, and *S. lasiolepis*.

This alliance includes several previously separate alliances, in which the concept has been broadened to include a suite of diagnostic wetland herbs based on their overlapping environmental and floristic features (NatureServe 2021). Stands in California occur in saturated swales, edges of coastal lagoons, tidally influenced wetlands, and other areas where fresh and brackish water meet. Plants often form dense, continuous stands that lack or may occur under shrub or forest canopies. Open stands lacking or having only a few emergent shrubs or trees are included in this alliance. Stands with *C. obnupta*, *Oenanthe sarmentosa*, and/or *Scirpus microcarpus* understories are 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 stands due to the longer inundation period and exposure to strong salt-laden winds. In wet but more sheltered settings, tree development is favored.

At Humboldt Bay National Refuge, stands with *Oenanthe sarmentosa* and *Scirpus microcarpus* occur in semipermanently-flooded freshwater to slightly brackish marshes, and stands may retain standing water through the summer (Pickart 2006). In general, they are seasonally flooded, freshwater to brackish marshes, which are inundated with water for the majority of the year.

**Local Vegetation Description**

The Slough sedge – water-parsley – small-fruited bulrush marsh Alliance often forms a continuous herbaceous layer. The shrub layer is open to continuous and the tree layer is sparse. The most constantly present species is *Carex obnupta*, while other species such as *Argentina egedii*, *Juncus lescurii*, *Oenanthe sarmentosa*, and *Scirpus microcarpus* may dominate or co-dominate in various combinations. Commonly associated emergent shrubs at sparse to continuous cover include *Rubus ursinus* and *Baccharis pilularis*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 2	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	13.0	0 – 80	no data	
Herb	93.3	75– 100	no data	

**Local Membership Rule**

*Argentina egedii*, *Carex obnupta*, *Juncus lescurii*, *Oenanthe sarmentosa*, and/or *Scirpus microcarpus* dominates or co-dominates with other shrubs and herbs including *Baccharis pilularis*, *Calamagrostis nutkaensis*, *Distichlis spicata*, *Holcus lanatus*, *Juncus effusus*, *J. patens*, and *Rubus ursinus* across a variety of freshwater and brackish settings near the coast.

**Local Environmental Description**

**Elevation:** Mean 39 m, Range 4 – 633 m

**Aspect:** SW (9), NW (9), SE (4), Flat (2), NE (1)

**Slope:** Mean 2 degrees, Range 0 – 5 degrees

**Macro Topography:** Lower 1/3 of slope (8), Edge of basin/wetland (5), Bottom (2), Upper 1/3 of slope (2), Middle 1/3 of slope (1), Bottom to Lower 1/3 of slope (1)

**Large Rock:** 0.0%

**Fines Cover:** Mean 21.0%, Range 0–95%

**Small Rock:** Mean 0.1%, Range 0–1%

**Litter Cover:** Mean 61.8%, Range 1–100%

**Soil Texture (field assessed):** Sand, (class unknown) (2), Not recorded (2), Muck (2), Fine silty clay (2), Moderately fine silty clay loam (2), Moderately coarse, sandy loam (1), Medium to very fine, loamy sand (1), Medium silt (1), Fine sandy clay (1), Fine clay (1), Coarse, loamy sand (1), Moderately fine clay loam (1)

**Geology (field or map data):** Sandstone and other sedimentary (44), Alluvium (4), Franciscan melange (4), Marine and nonmarine sand deposits (3), Granitic (3), Granitic (generic) (2), Volcanic and metavolcanic rocks (1)

**Marin County Watersheds:** Point Reyes (33), Bolinas (19), Lagunitas Creek (5), Walker Creek (2), Inverness (1), Novato (1)

**Site Impacts**

This alliance has low non-native plant cover (average 13.3%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Cirsium vulgare* and *Holcus lanatus*.

**Associations in Marin County**

*Argentina egedii* – (*Juncus lescurii*)  
*Carex obnupta*  
*Carex obnupta* – *Argentina egedii*  
*Carex obnupta* – *Juncus patens*  
*Juncus lescurii*  
*Oenanthe sarmentosa*  
*Scirpus microcarpus Pacific Coast*

**Classification Comments**

Herbaceous cover estimates summarized from field data may be higher than what is found on the ground, though cover can be quite high because stands are typically inundated with water available throughout the growing season. A variable array of wetland plants occurs in this alliance, which may fluctuate in abundance and composition from year-to-year depending on amount of inundation and fluvial disturbance. While the NVC currently includes *Juncus effusus* var. *brunneus* (= *Juncus hesperius*) in this alliance, we recommend that taxon and other rushes and sedges for a different wet meadow alliance that has a somewhat shorter hydroperiod, which is being vetted for inclusion in the NVC.

**References:** Buck-Diaz et al. 2019, Keeler-Wolf et al. 2003a, Klein et al. 2015, Newton 1989, Pickart 200606

**Global Rarity Rank:** G4

**State Rarity Rank:** S3

**Surveys Used for Description**

**Total: N=73; Marin County (n=73):** GGNRA268, GGNRA269, GGNRA305, HEAD0313, HEAD0319, HEAD0329, MARIN051, MARIN056, MARIN058, MARIN060, MARIN061, MARIN066, MARIN069, MARIN102, MARIN150, MARIN272, MMWD0058, PGA120, PGA120A, PGA156, PGA164, PGA198-1, PGA2249-1, PGA2264, PGA2643, PGA268, PGA3121, PGA3208, PGA3412, PGA348, PGA3732-2, PGA3755, PGA381, PGA384, PGA398, PGA4007, PGA4185, PGA424, PGA4365, PGA4455, PGA4626, PGA464, PGA4935, PGA55, PGA562, PGA565, PGA5669, PGA5744, PGA584, PGA6570, PGA7599-1, PGA7786, PGA93, PGA99, PORE123, PORE193, SFANF01, SFANF02, SFANF05, SFANF10, SFANF11, SFANF12, TEVA011a, TEVA012a, TEVA014a, TEVA019a, TEVA01a, TEVA02c, TEVA03a, TEVA03b, TEVA06a, TEVA07a, TEVA08a

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Shrub	<i>Rubus ursinus</i>	44	32.7	4.6	0.2	80.0				
	<i>Baccharis pilularis</i>	30	15.0	1.5	0.2	17.2				
Herb	<b><i>Carex obnupta</i></b>	<b>71</b>	<b>29.2</b>	<b>32.9</b>	<b>0.2</b>	<b>100.0</b>				<b>X</b>
	<i>Holcus lanatus</i>	47	7.2	8.8	0.2	87.5				
	<i>Potentilla anserina</i>	46	9.7	10.9	0.2	74.7				
	<i>Juncus effusus</i>	46	4.0	4.5	0.2	41.3				
	<b><i>Oenanthe sarmentosa</i></b>	<b>43</b>	<b>4.8</b>	<b>5.2</b>	<b>0.2</b>	<b>85.0</b>				
	<i>Juncus patens</i>	37	4.3	4.5	0.2	65.0				
	<i>Cirsium vulgare</i>	27	0.2	0.2	0.1	5.0				
	<b><i>Scirpus microcarpus</i></b>	<b>25</b>	<b>8.9</b>	<b>9.1</b>	<b>0.2</b>	<b>95.0</b>				
	<i>Juncus phaeocephalus</i>	20	1.0	1.2	0.1	15.0				

## Argentina egedii – (Juncus lescurii) Association

**Common Name:** Silverweed – (San Francisco Rush) Forbland

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

### Local Vegetation Description

The Silverweed – (San Francisco Rush) Association forms a continuous herbaceous layer. The shrub layer is open and the tree layer is absent. Characteristic herbs include *Potentilla anserina*, a synonym for *Argentina egedii*. Those herbs often present include *Holcus lanatus*, *Juncus lescurii*, *Juncus patens*, *Juncus phaeocephalus*, and *Sisyrinchium bellum*, and herbs that are sometimes present include *Achillea millefolium*, *Briza minor*, *Carex obnupta*, *Cirsium vulgare*, *Eryngium armatum*, *Festuca arundinacea*, *Juncus* spp., *Juncus bufonius*, *Juncus effusus*, *Lotus corniculatus*, *Plantago lanceolata*, *Rumex acetosella*, *Taraxacum officinale*, and *Trifolium wormskoldii*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	2.0	0.0 – 5	1.3	0.5 – 2
Herb	90.7	80 – 100	0.6	0 – 2

### Local Environmental Description

**Elevation:** Mean 21 m, Range 7 – 31 m

**Aspect:** NW (1), NE (1)

**Slope:** 2 degrees (1)

**Macro Topography:** Upper 1/3 of slope (1), Lower 1/3 of slope (1)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** Mean 48.0%, Range 1.0 – 95.0%

**Litter Cover:** Mean 43.5%, Range 3.0 – 84%

**Soil Texture (field assessed):** Coarse, loamy sand (1), Sand, (class unknown) (1)

**Geology (field or map data):** Sandstone and other sedimentary (4)

**Marin County Watersheds:** Point Reyes (4)

### Site Impacts

This association has greater cover of exotics (average 52.4%) than natives. Non-native species that occur with highest frequency and abundance include *Briza minor*, *Cirsium vulgare*, *Festuca arundinacea*, *Holcus lanatus*, *Lotus corniculatus*, *Plantago lanceolata*, *Rumex acetosella*, and *Taraxacum officinale*.

### Classification Comments

The name of the vegetation type has been updated from the *Argentina egedii* Association and has been moved from the *Argentina egedii* Alliance. The scientific name within the association is based on the USDA/NRCS PLANTS database name for the taxon, whereas the California flora accepts the name *Potentilla anserina* for this species.

**References:** Klein et al. 2015, Pickart 2006

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

**Total: N=6; Marin County (n=6):** HEAD0329, MARIN066, PGA384, PGA4455, PGA4626, PGA464

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>	<i>Baccharis pilularis</i>	33	26.7	0.8	2.0	3.0				
<b>Herb</b>	<b><i>Potentilla anserina</i></b>	<b>100</b>	<b>24.2</b>	<b>20.5</b>	<b>10.0</b>	<b>45.0</b>	<b>X</b>			<b>X</b>
	<i>Holcus lanatus</i>	67	10.3	9.9	0.2	40.0				<b>X</b>
	<i>Juncus phaeocephalus</i>	50	3.2	3.2	0.1	15.0				<b>X</b>
	<i>Juncus patens</i>	50	3.0	2.7	0.2	10.0				<b>X</b>
	<i>Sisyrinchium bellum</i>	50	0.4	0.4	0.1	2.0				<b>X</b>
	<i>Festuca arundinacea</i>	33	11.3	10.0	30.0	30.0				
	<b><i>Juncus</i> spp.</b>	<b>33</b>	<b>5.3</b>	<b>5.0</b>	<b>0.1</b>	<b>30.0</b>				
	<i>Plantago lanceolata</i>	33	5.2	5.0	0.1	30.0				
	<i>Juncus effusus</i>	33	3.3	2.8	5.0	12.0				
	<i>Trifolium wormskioldii</i>	33	2.5	2.5	0.1	15.0				
	<i>Carex obnupta</i>	33	2.2	2.2	3.0	10.0				
	<i>Lotus corniculatus</i>	33	4.3	2.0	2.0	10.0				
	<i>Rumex acetosella</i>	33	4.0	1.7	0.2	10.0				
	<i>Juncus bufonius</i>	33	0.4	0.4	0.1	2.0				
	<i>Achillea millefolium</i>	33	0.1	0.1	0.1	0.2				
	<i>Briza minor</i>	33	0.1	0.1	0.1	0.2				
	<i>Cirsium vulgare</i>	33	0.1	0.1	0.1	0.2				
	<i>Eryngium armatum</i>	33	0.1	0.1	0.1	0.2				
	<i>Taraxacum officinale</i>	33	0.1	0.1	0.1	0.2				

## **Carex obnupta Association**

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**Common Name:** Slough sedge Patches

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

### **Local Vegetation Description**

The Slough sedge Association forms a continuous herbaceous layer. The shrub layer is absent to continuous and the tree layer is absent. The dominant herb is *Carex obnupta*. Those herbs often present include *Juncus effusus*, and herbs that are sometimes present include *Athyrium filix-femina*, *Cirsium vulgare*, *Holcus lanatus*, *Oenanthe sarmentosa*, and *Potentilla anserina*. Commonly associated emergent shrubs at variable cover include *Rubus ursinus*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.1	0 – 2	3.5	2 – 5
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	10.7	0.0 – 80	1.7	0 – 5
Herb	94.8	80 – 100	1.1	0.5 – 2

### **Local Environmental Description**

**Elevation:** Mean 27 m, Range 4 – 93 m

**Aspect:** SW (5), NW (3), SE (2)

**Slope:** Mean 2 degrees, Range 0 – 5 degrees

**Macro Topography:** Edge of basin/wetland (3), Lower 1/3 of slope (2), Middle 1/3 of slope (1), Bottom (1)

**Large Rock:** 0.0%

**Small Rock:** Mean 0.1%, Range 0.0 – 1.0%

**Fines Cover:** Mean 35.5%, Range 0.0 – 88.0%

**Litter Cover:** Mean 73.0%, Range 10.0 – 100%

**Soil Texture (field assessed):** Not recorded (2), Fine clay (1), Fine silty clay (1), Moderately coarse, sandy loam (1), Muck (1)

**Geology (field or map data):** Sandstone and other sedimentary (16), Alluvium (3), Franciscan melange (1), Granitic (1), Volcanic and metavolcanic rocks (1)

**Marin County Watersheds:** Point Reyes (10), Bolinas (9), Lagunitas Creek (2), Walker Creek (1)

### **Site Impacts**

This association has low non-native plant cover (average 11.5%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Cirsium vulgare* and *Holcus lanatus*.

### **Classification Comments**

None.

**References:** Buck-Diaz et al. 2019, Klein et al. 2015, Newton 1989, Pickart 2006

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

**Total: N=26; Marin County (n=26):** GGNRA268, GGNRA269, GGNRA305, HEAD0313, MARIN060, MARIN061, MARIN102, PGA268, PGA3121, PGA3208, PGA3412, PGA3732-2, PGA398, PGA4185, PGA4935, PGA565, PGA7599-1, PGA93, PGA99, SFANF02, SFANF11, SFANF12, TEVA011a, TEVA014a, TEVA06a, TEVA08a

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Rubus ursinus</i>	65	47.9	8.9	0.2	80.0				X
	<i>Baccharis pilularis</i>	38	19.6	3.0	0.2	17.2				
<b>Herb</b>										
	<b><i>Carex obnupta</i></b>	<b>100</b>	<b>59.4</b>	<b>64.9</b>	<b>20.0</b>	<b>100.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Juncus effusus</i>	65	5.4	6.3	0.2	40.0				X
	<i>Holcus lanatus</i>	46	6.8	8.8	0.2	87.5				
	<i>Oenanthe sarmentosa</i>	46	2.6	3.1	0.2	25.0				
	<i>Cirsium vulgare</i>	31	0.3	0.3	0.2	5.0				
	<i>Potentilla anserina</i>	27	3.4	4.4	0.2	32.7				
	<i>Athyrium filix-femina</i>	23	1.3	1.6	0.2	20.0				



## ***Carex obnupta* – *Argentina egedii* Provisional Association**

**Common Name:** Slough Sedge – Pacific Silverweed Salt Marsh

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

### **Local Vegetation Description**

The Pacific Reedgrass – Pacific Silverweed – Baltic Rush Salt Marsh Association forms a continuous herbaceous layer. The shrub layer is open and the tree layer is absent. Dominant herbs include *Potentilla anserina* (= *Argentina egedii*), and characteristic herbs include *Calamagrostis nutkaensis*, *Carex obnupta*, *Holcus lanatus*, *Juncus phaeocephalus*, *Lotus corniculatus*, *Luzula comosa*, *Oenanthe sarmentosa*, and *Trifolium wormskioldii*. Those herbs often present include *Achillea millefolium*, *Campanula californica*, *Carex* spp., *Cirsium vulgare*, *Deschampsia cespitosa*, *Equisetum arvense*, *Eryngium armatum*, *Galium triflorum*, *Hypericum anagalloides*, *Hypochaeris radicata*, *Iris douglasiana*, *Juncus effusus*, *Leontodon taraxacoides*, *Maianthemum dilatatum*, *Mimulus guttatus*, *Piperia elegans*, *Plantago lanceolata*, *Plantago subnuda*, *Pteridium aquilinum*, and *Sisyrinchium californicum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	2.7	0 – 8	no data	
Herb	93.3	90 – 98	1.5	1 – 2

### **Local Environmental Description**

**Elevation:** Mean 25 m, Range 23 – 27 m

**Aspect:** NW (2), SW (1)

**Slope:** Mean 2 degrees, Range 1 – 2 degrees

**Macro Topography:** Lower 1/3 of slope (2)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** Mean 9.0%, Range 2.0 – 16.0%

**Litter Cover:** Mean 74.0%, Range 68.0 – 80%

**Soil Texture (field assessed):** Medium to very fine, loamy sand (1)

**Geology (field or map data):** Sandstone and other sedimentary (4)

**Marin County Watersheds:** Point Reyes (4)

### **Site Impacts**

This association has low non-native plant cover (average 18.4%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Agrostis capillaris*, *Briza minor*, *Cirsium vulgare*, *Holcus lanatus*, *Hypochaeris radicata*, *Leontodon taraxacoides*, *Lotus corniculatus*, *Lythrum hyssopifolium*, *Mentha arvensis*, and *Plantago lanceolata*.

### **Classification Comments**

This association is newly described here and considered provisional since it is under-sampled in its expected range. The name of the association is based on the USDA/NRCS PLANTS database name for the taxon, whereas the California flora accepts the name *Potentilla anserina* for this species.

**References:** none

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

**Total: N=4; Marin County (n=4):** HEAD0319, MARIN069, PGA4007, SFANF05

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Shrub	<i>Rubus ursinus</i>	75	69.2	3.5	2.0	10.0	X	X		X
	<i>Baccharis pilularis</i>	25	5.8	0.8	3.0	3.0				
Herb	<b><i>Potentilla anserina</i></b>	<b>100</b>	<b>33.3</b>	<b>56.9</b>	<b>38.0</b>	<b>74.7</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<i>Holcus lanatus</i>	100	18.1	34.2	13.0	50.7	X			X
	<b><i>Carex obnupta</i></b>	<b>100</b>	<b>12.8</b>	<b>27.6</b>	<b>10.0</b>	<b>57.3</b>	<b>X</b>			<b>X</b>
	<i>Calamagrostis nutkaensis</i>	100	11.9	27.2	10.0	66.0	X			X
	<i>Oenanthe sarmentosa</i>	100	2.4	4.1	0.2	15.0	X			X
	<i>Trifolium wormskioldii</i>	75	3.2	8.1	0.2	25.3	X			X
	<i>Juncus phaeocephalus</i>	75	3.6	7.2	8.0	10.7	X			X
	<i>Lotus corniculatus</i>	75	0.1	0.2	0.2	0.2	X			X
	<i>Luzula comosa</i>	75	0.1	0.2	0.2	0.2	X			X
	<i>Maianthemum dilatatum</i>	50	2.6	9.9	0.2	39.3				X
	<i>Iris douglasiana</i>	50	1.7	4.6	7.0	11.3				X
	<i>Plantago subnuda</i>	50	1.9	3.4	5.5	8.0				X
	<i>Campanula californica</i>	50	0.5	1.7	0.2	6.7				X
	<i>Juncus effusus</i>	50	0.4	1.6	0.2	6.2				X
	<i>Deschampsia cespitosa</i>	50	0.7	1.3	0.2	5.0				X
	<i>Carex</i> spp.	50	0.6	1.1	0.2	4.0				X
	<i>Pteridium aquilinum</i>	50	0.5	0.9	0.7	3.0				X
	<i>Galium triflorum</i>	50	0.2	0.7	0.2	2.7				X
	<i>Hypericum anagalloides</i>	50	0.2	0.6	0.2	2.2				X
	<i>Sisyrinchium californicum</i>	50	0.1	0.4	0.2	1.5				X
	<i>Piperia elegans</i>	50	0.1	0.4	0.2	1.3				X
	<i>Achillea millefolium</i>	50	0.1	0.1	0.2	0.2				X
	<i>Cirsium vulgare</i>	50	0.1	0.1	0.2	0.2				X
	<i>Equisetum arvense</i>	50	0.1	0.1	0.2	0.2				X
	<i>Eryngium armatum</i>	50	0.1	0.1	0.2	0.2				X
	<i>Hypochaeris radicata</i>	50	0.1	0.1	0.2	0.2				X
	<i>Leontodon taraxacoides</i>	50	0.1	0.1	0.2	0.2				X
	<i>Mimulus guttatus</i>	50	0.1	0.1	0.2	0.2				X
	<i>Plantago lanceolata</i>	50	0.1	0.1	0.2	0.2				X
	<i>Juncus patens</i>	25	1.7	3.0	12.0	12.0				
<i>Juncus lescurii</i>	25	0.7	2.5	10.0	10.0					
<i>Juncus arcticus</i>	25	0.6	0.8	3.0	3.0					
<i>Agrostis capillaris</i>	25	0.2	0.7	2.7	2.7					
<i>Carex luzulina</i>	25	0.1	0.5	2.0	2.0					

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<i>Festuca rubra</i>	25	0.1	0.5	2.0	2.0				
	<i>Mentha arvensis</i>	25	0.1	0.5	2.0	2.0				
	<i>Maianthemum stellatum</i>	25	0.2	0.3	1.0	1.0				
	<i>Sisyrinchium bellum</i>	25	0.1	0.1	0.4	0.4				
	<i>Agrostis</i> spp.	25	0.0	0.1	0.2	0.2				
	<i>Athyrium filix-femina</i>	25	0.0	0.1	0.2	0.2				
	<i>Briza minor</i>	25	0.0	0.1	0.2	0.2				
	<i>Carex densa</i>	25	0.0	0.1	0.2	0.2				
	<i>Carex echinata</i> ssp. <i>phyllomanica</i>	25	0.0	0.1	0.2	0.2				
	<i>Claytonia sibirica</i>	25	0.0	0.1	0.2	0.2				
	<i>Eleocharis acicularis</i>	25	0.0	0.1	0.2	0.2				
	<i>Elymus glaucus</i>	25	0.0	0.1	0.2	0.2				
	<i>Galium aparine</i>	25	0.0	0.1	0.2	0.2				
	<i>Gamochaeta ustulata</i>	25	0.0	0.1	0.2	0.2				
	<i>Helenium puberulum</i>	25	0.0	0.1	0.2	0.2				
	<i>Hordeum brachyantherum</i>	25	0.0	0.1	0.2	0.2				
	<i>Iris missouriensis</i>	25	0.0	0.1	0.2	0.2				
	<i>Juncus</i> spp.	25	0.0	0.1	0.2	0.2				
	<i>Juncus breweri</i>	25	0.0	0.1	0.2	0.2				
	<i>Juncus bufonius</i>	25	0.0	0.1	0.2	0.2				
	<i>Lythrum hyssopifolium</i>	25	0.0	0.1	0.2	0.2				
	<i>Platanthera dilatata</i> var. <i>leucostachys</i>	25	0.0	0.1	0.2	0.2				
	<i>Ranunculus flammula</i>	25	0.0	0.1	0.2	0.2				
	<i>Scirpus</i> spp.	25	0.0	0.1	0.2	0.2				
	<i>Sidalcea calycosa</i>	25	0.0	0.1	0.2	0.2				
	<i>Veronica scutellata</i>	25	0.0	0.1	0.2	0.2				
	<i>Viola</i> spp.	25	0.0	0.1	0.2	0.2				

## Carex obnupta – Juncus patens Association

**Common Name:** Slough Sedge – Spreading Rush Wet Meadow

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

### Local Vegetation Description

The Slough Sedge – Spreading Rush Wet Meadow Association forms a continuous herbaceous layer. The shrub layer is open and the tree layer is absent. Dominant herbs include *Carex obnupta*, and characteristic herbs include *Juncus patens*. Those herbs often present include *Holcus lanatus* and *Juncus effusus*, and herbs that are sometimes present include *Calamagrostis nutkaensis*, *Cirsium vulgare*, *Oenanthe sarmentosa*, and *Potentilla anserina*. Commonly associated emergent shrubs at sparse cover include *Rubus ursinus*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	6.0	0 – 17	0.9	0 – 2
Herb	95.9	75 – 100	0.8	0 – 2

### Local Environmental Description

**Elevation:** Mean 37 m, Range 9 – 98 m

**Aspect:** SE (2)

**Slope:** Mean 2 degrees, Range 0 – 5 degrees

**Macro Topography:** no data

**Large Rock:** no data

**Small Rock:** no data

**Fines Cover:** no data

**Litter Cover:** no data

**Soil Texture (field assessed):** no data

**Geology (field or map data):** Sandstone and other sedimentary (9), Granitic (2), Marine and nonmarine sand deposits (1)

**Marin County Watersheds:** Point Reyes (8), Bolinas (3), Inverness (1)

### Site Impacts

This association has low non-native plant cover (average 13.1%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Cirsium vulgare* and *Holcus lanatus*.

### Classification Comments

None.

**References:** Keeler-Wolf et al. 2003a

**Global Rarity Rank:** G3

**State Rarity Rank:** S3?

**State Rare:** Y

### Surveys Used for Description

**Total: N=15; Marin County (n=15):** PGA156, PGA164, PGA2249-1, PGA2643, PGA348, PGA381, PGA424, PGA4365, PGA562, PGA5669, PGA5744, PGA6570, SFANF01, SFANF10, TEVA019a

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Rubus ursinus</i>	73	54.3	7.2	0.2	25.0				X
	<i>Baccharis pilularis</i>	40	13.8	1.8	0.2	8.0				
<b>Herb</b>										
	<b><i>Carex obnupta</i></b>	<b>100</b>	<b>35.0</b>	<b>40.7</b>	<b>10.0</b>	<b>88.0</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<b><i>Juncus patens</i></b>	<b>93</b>	<b>16.9</b>	<b>17.9</b>	<b>0.2</b>	<b>65.0</b>	<b>X</b>			<b>X</b>
	<i>Juncus effusus</i>	73	8.6	10.0	0.2	41.3				X
	<i>Holcus lanatus</i>	60	10.6	11.8	0.2	60.0				X
	<i>Potentilla anserina</i>	40	8.5	8.4	3.0	55.0				
	<i>Oenanthe sarmentosa</i>	40	3.1	5.0	1.0	31.3				
	<i>Calamagrostis nutkaensis</i>	27	0.9	0.8	0.2	7.0				
	<i>Cirsium vulgare</i>	27	0.4	0.4	0.2	4.0				

## ***Juncus lescurii* Association**

**Common Name:** Salt Rush Patches

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

### **Local Vegetation Description**

The Salt Rush Association forms a continuous herbaceous layer. The shrub layer is sparse and the tree layer is absent. The dominant or co-dominant herb is *Juncus lescurii*. Those herbs that are sometimes present include *Carex obnupta*, *Distichlis spicata*, and *Potentilla anserina* (=Argentina egedii).

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.6	0 – 2	0.8	0.5 – 1
Herb	93.0	85 – 100	0.8	0.5 – 1

### **Local Environmental Description**

**Elevation:** Mean 10 m, Range 6 – 12 m

**Aspect:** Flat (1)

**Slope:** Mean 0 degrees, Range 0 – 1 degrees

**Macro Topography:** Bottom to Lower 1/3 of slope (1)

### **Site Impacts**

This association has very low non-native plant cover (average 0.9%) relative to native cover.

### **Classification Comments**

None.

**References:** Klein et al. 2015, Pickart 2006

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

### **Surveys Used for Description**

**Total: N=5; Marin County (n=5):** MARIN272, TEVA01a, TEVA02c, TEVA03a, TEVA03b

### **Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Shrub	<i>Baccharis pilularis</i>	40	21.8	0.4	0.2	2.0				
Herb	<i>Juncus lescurii</i>	100	55.3	65.0	40.0	100.0	X	X		X
	<i>Carex obnupta</i>	40	19.5	22.0	40.0	70.0				
	<i>Potentilla anserina</i>	40	14.8	19.0	45.0	50.0				
	<i>Distichlis spicata</i>	40	5.5	6.0	10.0	20.0				

## Oenanthe sarmentosa Association

**Common Name:** Water-parsley Patches

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

### Local Vegetation Description

The Water-parsley Association forms a continuous herbaceous layer. The shrub layer is absent and the tree layer is sparse or absent. The dominant or co-dominant herb is *Oenanthe sarmentosa*. Those herbs that are sometimes present include *Alisma lanceolatum*, *Eleocharis macrostachya*, *Holcus lanatus*, *Polygonum punctatum*, *Rumex conglomeratus*, *Sonchus asper*, and *Typha latifolia*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.1	0 – 0.2	12.5	10 – 15
Regenerating or Shrubby Tree	0.0	0.0 – 0.2	0.3	0 – 0.5
Shrub	0.0	0.0 – 0	no data	
Herb	88.3	83 – 100	0.9	0.5 – 2

### Local Environmental Description

**Elevation:** Mean 17 m, Range 8 – 40 m

**Aspect:** Flat (2), NW (2)

**Slope:** Mean 1 degrees, Range 0 – 2 degrees

**Macro Topography:** Lower 1/3 of slope (2), Bottom (2)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** Mean 10.0%, Range 0.0 – 20.0%

**Litter Cover:** Mean 63.0%, Range 1.0 – 94%

**Soil Texture (field assessed):** Fine silty clay (1), Moderately fine clay loam (1), Muck (1)

**Geology (field or map data):** Sandstone and other sedimentary (3), Alluvium (1), Franciscan melange (1)

**Marin County Watersheds:** Lagunitas Creek (2), Bolinas (1), Point Reyes (1)

**Other Watersheds, Sonoma Co.:** Lower Russian River (1)

### Site Impacts

This association has low non-native plant cover (average 5.2%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Alisma lanceolatum*, *Holcus lanatus*, *Rumex conglomeratus*, and *Sonchus asper*.

### Classification Comments

Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** Buck-Diaz et al. 2019, Klein et al. 2015, Pickart 2006

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

### Surveys Used for Description

**Total: N=5; Marin County (n=4):** MARIN056, MARIN058, MARIN150, TEVA012a

Sonoma County (n=1): SONO0230

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Herb</b>										
	<i>Oenante sarmentosa</i>	100	61.0	57.8	10.0	90.0	X	X		X
	<i>Rumex conglomeratus</i>	40	3.3	2.8	0.2	14.0				
	<i>Eleocharis macrostachya</i>	40	0.9	0.8	1.0	3.0				
	<i>Alisma lanceolatum</i>	40	0.3	0.2	0.2	1.0				
	<i>Holcus lanatus</i>	40	0.2	0.2	0.2	1.0				
	<i>Polygonum punctatum</i>	40	0.3	0.2	0.2	1.0				
	<i>Typha latifolia</i>	40	0.3	0.2	0.2	1.0				
	<i>Sonchus asper</i>	40	0.1	0.1	0.2	0.2				



## ***Scirpus microcarpus* Pacific Coast Association**

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**Common Name:** Small-fruited Bulrush Pacific Coast Marsh

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

### **Local Vegetation Description**

The Small-fruited Bulrush Pacific Coast Marsh Association forms a continuous herbaceous layer. The shrub layer is open and the tree layer is absent. The dominant herb is *Scirpus microcarpus*. Herbs that are sometimes present include *Athyrium filix-femina*, *Calamagrostis nutkaensis*, *Carex obnupta*, *Equisetum arvense*, *Mimulus moschatus*, *Oenanthe sarmentosa*, *Stachys ajugoides*, and *Urtica dioica*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	5.6	0 – 37	1.7	0 – 5
Herb	92.9	75 – 100	1.2	0.5 – 2

### **Local Environmental Description**

**Elevation:** Mean 128 m, Range 12 – 633 m

**Aspect:** SW (3), NW (1)

**Slope:** Mean 3 degrees, Range 0 – 5 degrees

**Macro Topography:** Edge of basin/wetland (2), Lower 1/3 of slope (1), Upper 1/3 of slope (1)

**Large Rock:** 0.0%

**Small Rock:** Mean 0.1%, Range 0.0 – 0.2%

**Fines Cover:** Mean 9.0%, Range 3.0 – 15.0%

**Litter Cover:** Mean 38.8%, Range 5.0 – 95%

**Soil Texture (field assessed):** Moderately fine silty clay loam (2), Fine sandy clay (1), Medium silt (1)

**Geology (field or map data):** Sandstone and other sedimentary (4), Franciscan melange (2), Granitic (generic) (2)

**Marin County Watersheds:** Point Reyes (4), Bolinas (2), Lagunitas Creek (1), Novato (1)

### **Site Impacts**

This association has low non-native plant cover (average 2.3%) relative to native cover.

### **Classification Comments**

This association is newly distinguished from *Scirpus microcarpus* dominated stands in montane settings, which were all formerly included in their own alliance. Now the coastal association is placed here with related associations.

**References:** Keeler-Wolf et al. 2003a, Klein et al. 2015, Pickart 2006

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

### **Surveys Used for Description**

**Total: N=11; Marin County (n=11):** MARIN051, MMWD0058, PGA120, PGA120A, PGA2264, PGA55, PGA584, PGA7786, PORE123, PORE193, TEVA07a

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Rubus spectabilis</i>	27	17.1	0.7	1.2	4.0				
<b>Herb</b>										
	<b><i>Scirpus microcarpus</i></b>	<b>100</b>	<b>58.3</b>	<b>57.3</b>	<b>12.0</b>	<b>95.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Oenanche sarmentosa</i>	45	3.0	3.2	1.2	15.0				
	<i>Urtica dioica</i>	36	3.2	4.2	0.2	40.0				
	<i>Calamagrostis nutkaensis</i>	36	2.7	2.5	0.2	20.0				
	<i>Stachys ajugoides</i>	36	2.1	1.7	2.0	8.0				
	<i>Carex obnupta</i>	27	3.3	3.4	0.2	30.0				
	<i>Athyrium filix-femina</i>	27	2.7	2.6	1.0	25.0				
	<i>Mimulus moschatus</i>	27	2.2	2.5	3.0	14.0				
	<i>Equisetum arvense</i>	27	1.1	1.0	0.2	10.0				

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## ***Ceratophyllum demersum* Aquatic Herbaceous Provisional Alliance**

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**Common Name:** Raccoon's tail mats

**NVC Alliance Code:** A3923. *Ceratophyllum demersum* Aquatic Vegetation Alliance

### **Statewide Description**

*Ceratophyllum demersum* dominates or co-dominates with *Myriophyllum* spp., *Polygonum amphibium*, and algae. *Lemna* spp. and *Azolla filiculoides* may be present.

Plants in this alliance are wholly aquatic and consist of mostly submerged aquatic species. They occupy small lakes and ponds throughout the state from sea level to over 1800 m. The most extensive stands known so far are in the Sacramento–San Joaquin River Delta.

### **Local Vegetation Description**

The Raccoon's tail mats Alliance forms an intermittent to continuous herbaceous layer. The shrub layer is absent and the tree layer is absent. The dominant herb is *Ceratophyllum demersum*. Those herbs often present include *Azolla filiculoides*, *Crypsis schoenoides*, *Euphorbia* spp., *Gnaphalium palustre*, *Myriophyllum aquaticum*, and *Polygonum amphibium*. Commonly associated non-vascular plants include Algae.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.0	0 – 0	no data	
Herb	67.5	55 – 80	0.3	0 – 0.5

### **Local Membership Rule**

*Ceratophyllum demersum* dominates. One stand was surveyed in Marin County along the southern shore of upper Abbott's Lagoon. Other stands are likely to occur in the county.

### **Local Environmental Description**

**Elevation:** Mean 487 m, Range 8 – 966 m

**Aspect:** Flat (1), SE (1)

**Slope:** 0 degrees

**Macro Topography:** Bottom (2)

**Large Rock:** 0.0%

**Small Rock:** Mean 2.5%, Range 0.0 – 5.0%

**Fines Cover:** Mean 2.5%, Range 0.0 – 5.0%

**Litter Cover:** Mean 15.0%, Range 0.0 – 30%

**Soil Texture (field assessed):** Fine sandy clay (1), Muck (1)

**Geology (field or map data):** Franciscan melange (1)

**Marin County Watersheds:** Point Reyes (1)

**Other Watersheds, Sonoma Co.:** Middle Russian River (1)

### **Site Impacts**

This alliance has low non-native plant cover (average 3.9%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Crypsis schoenoides*, and *Myriophyllum aquaticum*.

### **Associations in Marin County**

*Ceratophyllum demersum* Western

### **Classification Comments**

Since Marin County has fewer than five surveys of this alliance, data from nearby counties were included.

**References:** Buck-Diaz et al. 2012, Klein et al. 2015

**Global Rarity Rank:** G5

**State Rarity Rank:** S4

### **Surveys Used for Description**

**Total: N=2; Marin County (n=1):** MARIN134

Sonoma County (n=1): SONO0128

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Herb</b>										
	<i>Ceratophyllum demersum</i>	100	82.5	57.5	35.0	80.0	X	X		X
	<i>Polygonum amphibium</i>	50	13.1	7.0	14.0	14.0				X
	<i>Myriophyllum aquaticum</i>	50	3.7	2.0	4.0	4.0				X
	<i>Gnaphalium palustre</i>	50	0.2	0.1	0.2	0.2				X
	<i>Crypsis schoenoides</i>	50	0.2	0.1	0.2	0.2				X
	<i>Azolla filiculoides</i>	50	0.1	0.1	0.2	0.2				X
	<i>Euphorbia</i> spp.	50	0.2	0.1	0.2	0.2				X
<b>Non-vascular</b>										
	Algae	50	50.0	4.0	8.0	8.0				X

***Ceratophyllum demersum* Western Provisional Association**

**Common Name:** Raccoon's tail Mats

**Alliance:** *Ceratophyllum demersum* Aquatic Herbaceous Provisional Alliance

**Classification Comments**

The association circumscription is the same as that of the alliance. See above for detailed description. This association is considered provisional since it is under-sampled in its expected range. Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**Global Rarity Rank:** G5

**State Rarity Rank:** S4

**State Rare:** N



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## ***Conium maculatum* – *Foeniculum vulgare* Herbaceous Semi-Natural Alliance**

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**Common Name:** Poison hemlock or fennel patches

**NVC Alliance Code:** A3872. *Centaurea virgata* ssp. *squarrosa* - *Conium maculatum* - *Foeniculum vulgare* Ruderal Meadow Alliance

### **Statewide Description**

*Ageratina adenophora*, *Conium maculatum*, *Dipsacus fullonum*, *Dipsacus sativus*, *Foeniculum vulgare* and/or another non-native invasive plant of the *Apiaceae* is dominant or co-dominant with other non-native plants in the herbaceous layer. Emergent trees and shrubs may be present at low cover, including trees *Quercus* spp. and shrubs: *Baccharis pilularis*.

DiTomaso and Healy (2007) considered many members of the *Umbelliferae* in California as weeds, and Cal-IPC lists *Conium maculatum* and *Foeniculum vulgare* as invasive in wildland settings in the state. This forb-dominated ruderal herbaceous alliance has been expanded since the 2009 edition of *The Manual of California Vegetation* to include other non-native perennial forbs that similarly occur in moist roadside verges, ditches, agricultural waysides, and other disturbed moist to wet areas.

### **Local Vegetation Description**

The Poison hemlock or fennel patches Alliance forms a continuous herbaceous layer. The shrub layer is sparse and the tree layer is absent. Dominant or co-dominant non-native herbs include *Dipsacus* spp. and/or *Conium maculatum*. Those herbs often present include *Geranium dissectum* and *Mentha pulegium*, and herbs that are sometimes present include *Anagallis arvensis*, *Avena* spp., *Bromus carinatus*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Carex* spp., *Holcus lanatus*,

*Juncus effusus*, *Juncus patens*, *Lolium perenne*, *Oenanthe sarmentosa*, *Picris echioides*, *Raphanus sativus*, *Rumex acetosella*, *Silybum marianum*, and *Vicia villosa*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.0	0 – 0	no data	
Herb	87.7	80 – 100	0.9	0.5 – 2

### **Local Membership Rule**

*Conium maculatum*, *Ageratina adenophora*, *Dipsacus fullonum*, *D. sativus*, or *Foeniculum vulgare* dominates herbaceous stands, though various other taxa are likely present.

### **Local Environmental Description**

**Elevation:** Mean 58 m, Range 56 – 59 m

**Aspect:** Flat (2)

**Slope:** 0 degrees

**Macro Topography:** Bottom (1), Middle 1/3 of slope (1)

**Large Rock:** 0.0%

**Small Rock:** Mean 0.1%, Range 0.0 – 0.2%

**Fines Cover:** Mean 7.5%, Range 6.0 – 9.0%

**Litter Cover:** Mean 10.5%, Range 10.0 – 11%

**Soil Texture (field assessed):**

**Geology (field or map data):** Franciscan melange (2)

**Marin County Watersheds:** Lagunitas Creek (2)

### **Site Impacts**

This alliance has greater cover of exotics than natives, with very high non-native plant cover (average 92.7%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Anagallis arvensis*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Conium maculatum*, *Geranium dissectum*, *Holcus lanatus*, *Mentha pulegium*, *Picris echioides*, *Raphanus sativus*, *Rumex acetosella*, *Silybum marianum*, and *Vicia villosa*.

### **Associations in Marin County**

*Conium maculatum*

*Dipsacus (fullonum, sativus)*

### **Classification Comments**

None.

**References:** Buck-Diaz et al. 2012, Keeler-Wolf and Vaghti 2000, Sproul et al. 2011

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

### **Surveys Used for Description**

**Total: N=3; Marin County (n=3):** MMWD0091, MMWD0092, PGA3234

### Alliance Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	33	16.7	0.1	0.2	0.2				
	<i>Vaccinium ovatum</i>	33	16.7	0.1	0.2	0.2				
<b>Herb</b>										
	<i>Dipsacus</i> spp.	100	42.5	39.2	30.0	50.0	X		X	X
	<b><i>Conium maculatum</i></b>	<b>100</b>	<b>11.5</b>	<b>13.6</b>	<b>0.2</b>	<b>37.5</b>	<b>X</b>			<b>X</b>
	<i>Geranium dissectum</i>	67	2.0	1.7	2.0	3.0				X
	<i>Mentha pulegium</i>	67	1.2	1.3	1.0	3.0				X
	<i>Picris echioides</i>	33	10.3	12.5	37.5	37.5				
	<i>Holcus lanatus</i>	33	12.8	10.0	30.0	30.0				
	<i>Carex</i> spp.	33	4.3	3.3	10.0	10.0				
	<i>Raphanus sativus</i>	33	3.1	2.7	8.0	8.0				
	<i>Carduus pycnocephalus</i>	33	2.7	2.3	7.0	7.0				
	<i>Rumex acetosella</i>	33	2.1	1.7	5.0	5.0				
	<i>Lolium perenne</i>	33	1.2	1.0	3.0	3.0				
	<i>Vicia villosa</i>	33	1.2	1.0	3.0	3.0				
	<i>Bromus hordeaceus</i>	33	1.2	1.0	3.0	3.0				
	<i>Bromus carinatus</i>	33	1.2	1.0	3.0	3.0				
	<i>Juncus effusus</i>	33	0.8	1.0	3.0	3.0				
	<i>Juncus patens</i>	33	0.8	1.0	3.0	3.0				
	<i>Bromus diandrus</i>	33	0.8	0.7	2.0	2.0				
	<i>Avena</i> spp.	33	0.1	0.1	0.2	0.2				
	<i>Anagallis arvensis</i>	33	0.1	0.1	0.2	0.2				
	<i>Oenanthe sarmentosa</i>	33	0.1	0.1	0.2	0.2				
	<i>Silybum marianum</i>	33	0.1	0.1	0.2	0.2				



## **Conium maculatum Semi-natural Association**

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**Common Name:** Poison Hemlock Forbland

**Alliance:** *Conium maculatum* – *Foeniculum vulgare* Herbaceous Semi-Natural Alliance

### **Local Vegetation Description**

The Poison Hemlock Association forms a continuous herbaceous layer in the single survey available. The shrub layer is absent and the tree layer is absent. *Conium maculatum* is dominant to co-dominant with other characteristic herbs including *Dipsacus* spp. and *Picris echioides* in the one stand sampled, and other herbs present include *Juncus effusus*, *Juncus patens*, *Mentha pulegium*, and *Oenanthe sarmentosa*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	NA	no data	
Hardwood	0.0	NA	no data	
Regenerating or Shrubby Tree	0.0	NA	no data	
Shrub	0.0	NA	no data	
Herb	100.0	NA	1.3	0.5 – 2

### **Local Environmental Description**

**Elevation:** no data

**Aspect:** no data

**Slope:** no data

**Macro Topography:** no data

**Large Rock:** no data

**Small Rock:** no data

**Fines Cover:** no data

**Litter Cover:** no data

**Soil Texture (field assessed):** no data

**Geology (field or map data):** no data

**Marin County Watersheds:** no data

### **Site Impacts**

This association has greater cover of exotics (average 94.9%) than natives. Non-native species that occur with highest frequency and abundance include *Conium maculatum*, *Dipsacus* spp., *Mentha pulegium*, and *Picris echioides*.

### **Classification Comments**

Though the number of surveys of this association in Marin is low, there was no data available from nearby counties. Since the single survey was an Accuracy Assessment without geocoordinates, no environmental data is available.

**References:** Buck-Diaz et al. 2012, Keeler-Wolf and Vaghti 2000, Sproul et al. 2011

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

**State Rare:** N

### **Surveys Used for Description**

**Total: N=1; Marin County (n=1):** PGA3234

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Herb										
	<i>Conium maculatum</i>	100	30.8	37.5	37.5	37.5	X		X	X
	<i>Dipsacus</i> spp.	100	30.8	37.5	37.5	37.5	X		X	X
	<i>Picris echioides</i>	100	30.8	37.5	37.5	37.5	X		X	X
	<i>Juncus effusus</i>	100	2.5	3.0	3.0	3.0	X			X
	<i>Juncus patens</i>	100	2.5	3.0	3.0	3.0	X			X
	<i>Mentha pulegium</i>	100	2.5	3.0	3.0	3.0	X			X
	<i>Oenanthe sarmentosa</i>	100	0.2	0.2	0.2	0.2	X			X

### Statewide

*Corethrogyne filaginifolia*, *Eriogonum elongatum* and/or *Eriogonum nudum* are the dominant and characteristic herbs. Commonly associated herbs include *Bromus diandrus*, *Bromus rubens*, *Cardionema ramosissimum*, *Clarkia* spp., *Erodium* spp., *Eschscholzia californica*, *Lupinus bicolor*, and *Nassella* spp. Shrubs present at low cover may include *Baccharis pilularis* ssp. *consanguinea*, *Eriodictyon* spp., and *Eriogonum fasciculatum*. Stands of the short lived perennial herbaceous buckwheats occupy an ecological niche that is successional between grasslands and shrublands in many parts of cismontane California. They are similar to other alliances such as *Gutierrezia californica* and are thought to be a member of a transitional group mid-way along a seral gradient between grasslands and shrublands.

*Corethrogyne filaginifolia* is found in the Coast Ranges and southern Sierra Foothills, and *E. elongatum* is found in parts of the inner South Coast Ranges and the southern Sierra Foothills. *Eriogonum nudum* is widespread throughout much of the state.

This alliance is represented by only a single sample close to the coast on a steep sedimentary outcrop surrounded by grassland. *Eriogonum nudum* probably occurs elsewhere in the county in small stands on steep slopes or road-cuts.

## *Dipsacus (fullonum, sativus)* Provisional Semi-natural Association

**Common Name:** Teasel Forbland

**Alliance:** *Conium maculatum* – *Foeniculum vulgare* Herbaceous Semi-Natural Alliance

### Local Vegetation Description

The Teasel Association forms a continuous herbaceous layer. The shrub layer is sparse and the tree layer is absent. Dominant herbs include *Dipsacus* spp., and characteristic herbs include *Conium maculatum* and *Geranium dissectum*. Those herbs often present include *Anagallis arvensis*, *Avena* spp., *Bromus carinatus*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Carex* spp., *Holcus lanatus*, *Lolium perenne*, *Mentha pulegium*, *Raphanus sativus*, *Rumex acetosella*, *Silybum marianum*, and *Vicia villosa*. Commonly associated emergent shrubs at sparse cover include *Baccharis pilularis* and *Vaccinium ovatum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.2	0 – 0.4	no data	
Herb	81.5	80 – 83	0.8	0.5 – 1

### Local Environmental Description

**Elevation:** Mean 58 m, Range 56 – 59 m

**Aspect:** Flat (2)

**Slope:** Mean 0 degrees, Range 0 – 0 degrees

**Macro Topography:** Bottom (1), Middle 1/3 of slope (1)

**Large Rock:** 0.0%

**Small Rock:** Mean 0.1%, Range 0.0 – 0.2%

**Fines Cover:** Mean 7.5%, Range 6.0 – 9.0%

**Litter Cover:** Mean 10.5%, Range 10.0 – 11%

**Soil Texture (field assessed):**

**Geology (field or map data):** Franciscan melange (2)

**Marin County Watersheds:** Lagunitas Creek (2)

### Site Impacts

This association has greater cover of exotics (average 91.6%) than natives. Non-native species that occur with highest frequency and abundance include *Anagallis arvensis*, *Avena* spp., *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Conium maculatum*, *Dipsacus* spp., *Geranium dissectum*, *Holcus lanatus*, *Lolium perenne*, *Mentha pulegium*, *Raphanus sativus*, *Rumex acetosella*, *Silybum marianum*, and *Vicia villosa*.

### Classification Comments

This association is newly described here and remains provisional until further sampling is available. While the number of surveys of this association in Marin are low, no other data from nearby counties were available.

**References:** Buck and Evens 2010, Evens and Kentner 2006

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

**State Rare:** N

**Surveys Used for Description**

**Total: N=2; Marin County (n=2):** MMWD0091, MMWD0092

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	50	25.0	0.1	0.2	0.2				X
	<i>Vaccinium ovatum</i>	50	25.0	0.1	0.2	0.2				X
<b>Herb</b>										
	<b><i>Dipsacus spp.</i></b>	<b>100</b>	<b>48.4</b>	<b>40.0</b>	<b>30.0</b>	<b>50.0</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<i>Geranium dissectum</i>	100	3.0	2.5	2.0	3.0	<b>X</b>			<b>X</b>
	<i>Conium maculatum</i>	100	1.9	1.6	0.2	3.0	<b>X</b>			<b>X</b>
	<i>Holcus lanatus</i>	50	19.2	15.0	30.0	30.0				<b>X</b>
	<i>Carex spp.</i>	50	6.4	5.0	10.0	10.0				<b>X</b>
	<i>Raphanus sativus</i>	50	4.7	4.0	8.0	8.0				<b>X</b>
	<i>Carduus pycnocephalus</i>	50	4.1	3.5	7.0	7.0				<b>X</b>
	<i>Rumex acetosella</i>	50	3.2	2.5	5.0	5.0				<b>X</b>
	<i>Bromus carinatus</i>	50	1.8	1.5	3.0	3.0				<b>X</b>
	<i>Bromus hordeaceus</i>	50	1.8	1.5	3.0	3.0				<b>X</b>
	<i>Lolium perenne</i>	50	1.8	1.5	3.0	3.0				<b>X</b>
	<i>Vicia villosa</i>	50	1.8	1.5	3.0	3.0				<b>X</b>
	<i>Bromus diandrus</i>	50	1.2	1.0	2.0	2.0				<b>X</b>
	<i>Mentha pulegium</i>	50	0.6	0.5	1.0	1.0				<b>X</b>
	<i>Anagallis arvensis</i>	50	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Avena spp.</i>	50	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Silybum marianum</i>	50	0.1	0.1	0.2	0.2				<b>X</b>

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## ***Corethrogyne filaginifolia* – *Eriogonum (elongatum, nudum)* Alliance**

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**Common Name:** Sand-aster and perennial buckwheat fields

**NVC Alliance Code:** A4238. *Corethrogyne filaginifolia* - *Eriogonum elongatum* - *Eriogonum nudum* Dry Meadow Alliance Alliance

### **Statewide**

*Corethrogyne filaginifolia*, *Eriogonum elongatum* and/or *Eriogonum nudum* is a co-dominant or characteristic herb. Commonly associated herbs include *Bromus diandrus*, *Bromus rubens*, *Cardionema ramosissimum*, *Clarkia* spp., *Erodium* spp., *Eschscholzia californica*, *Lupinus bicolor*, and *Nassella* spp. Shrubs present at low cover may include *Baccharis pilularis*, *Eriodictyon* spp., and *Eriogonum fasciculatum*. Stands of the short lived perennial buckwheats and sand-aster herbs occupy an ecological niche that is successional between grasslands and shrublands in many parts of cismontane California. They are similar to other alliances such as *Gutierrezia californica* and are thought to be a member of a transitional group mid-way along a seral gradient between grasslands and shrublands.

*Corethrogyne filaginifolia* is found in the Coast Ranges and southern Sierra Foothills, and *E. elongatum* is found in parts of the inner South Coast Ranges and the southern Sierra Foothills. *Eriogonum nudum* is widespread throughout much of the state.

### **Local Vegetation Description**

This alliance was not sampled in Marin County, and sampled once with *Eriogonum nudum* characteristically present as a co-dominant in Sonoma County (see Klein et al. 2015). Stands with *Eriogonum nudum* likely occur in Marin County such as at Lucas Valley Preserve in grassy and open

stands, often with non-native plants such as *Avena*, *Bromus*, *Erodium*, and/or *Vulpia* spp. co-dominant along with other native plants such as *Eschscholzia californica* and *Lupinus* spp. Small stands are likely on steep slopes, road-cuts, and rocky outcrops.

#### **Local Membership Rule**

*Eriogonum nudum* or *Corethrogyne filaginifolia* co-dominates with *Bromus diandrus*, *Erodium botrys*, *Vulpia bromoides*, and others in herbaceous stands often occupying exposed rocky convexities. Stands occur in Sonoma and Contra Costa Co., and may occur as small stands in Marin Co.

#### **Associations in Marin County**

*Eriogonum nudum*\*

#### **Surveys Used for Description**

**Total: N=0; Marin County (n=0)**

**References:** Buck-Diaz and Evens 2011b, Buck-Diaz et al. 2011, Buck-Diaz et al. 2012, Buck-Diaz et al. 2013, CNPS Vegetation Program 2015, Cole 1967, Evens et al. 2006, Garth and Tilden 1986, Hemingway 2012, Kittel et al. 2012, Klein et al. 2015, Markos and Strother. 2016, Menke et al. 2013, Montalvo et al. 2010a, Reyes, et al. 2020a, Reyes et al. 2020b, Rodriguez et al. 2017, Sproul et al. 2011, VegCAMP 2010, VegCAMP and AIS 2013

**Global Rarity Rank:** G4

**State Rarity Rank:** S4

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### ***Eriogonum nudum* Provisional Association**

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**Common Name:** Nude buckwheat fields

**Alliance:** *Corethrogyne filaginifolia* – *Eriogonum (elongatum, nudum)* Herbaceous Alliance

#### **Local Vegetation Description**

The association circumscription is the same as that of the alliance. See above for the description. This association is considered provisional since it does not have adequate sampling in its expected range.

**Global Rarity Rank:** GNR

**State Rarity Rank:** GNR

**State Rare:** N



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## ***Cortaderia (jubata, selloana)* Herbaceous Semi-Natural Alliance**

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**Common Name:** Pampas grass patches

**NVC Alliance Code:** A1203. *Cortaderia jubata* - *Cortaderia selloana* Ruderal Grassland Alliance

### **Statewide Description**

*Cortaderia jubata* or *Cortaderia selloana* is dominant in the herbaceous and shrub canopies. Emergent trees and shrubs may be present at low cover. Stands of *Cortaderia* invade coastal bluff and coastal scrub stands of *Artemisia californica*, *Baccharis pilularis*, and *Eriogonum fasciculatum* alliances and in disturbed openings. They grow in moist, open forest stands and infest inland riparian stands in the Great Valley.

### **Local Vegetation Description**

The Pampas grass patches Alliance forms an open to continuous herbaceous layer. The shrub layer is open and the tree layer is absent. *Cortaderia jubata* or *C. selloana* is typically strongly dominant in the herbaceous layer. Those herbs often present include *Achillea millefolium*, *Anagallis arvensis*, *Avena* spp., *Camissonia ovata*, *Cardamine oligosperma*, *Clinopodium douglasii*, *Daucus carota*, *Dudleya farinosa*, *Eriogonum* spp., *Gamochaeta ustulata*, *Geranium dissectum*, *Hypochaeris radicata*, *Pseudognaphalium ramosissimum*, *Sedum spathulifolium*, *Symphotrichum chilense*. Commonly associated emergent shrubs at sparse to open cover include *Artemisia californica*, *Genista monspessulana*, *Toxicodendron diversilobum*, *Baccharis pilularis*, *Diplacus aurantiacus*, and *Echium candicans*. Commonly associated non-vascular plants include Lichen and Moss.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	5.0	2 – 8	0.5	0 – 1
Herb	50.5	18 – 83	1.1	0.5 – 2

### **Local Membership Rule**

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

### **Local Environmental Description**

**Elevation:** Mean 100 m, Range 96 – 104 m

**Aspect:** SE (1), SW (1)

**Slope:** Mean 30 degrees, Range 21 – 38 degrees

**Macro Topography:** Middle 1/3 of slope (1), Upper 1/3 of slope (1)

**Large Rock:** Mean 46.6%, Range 0 – 93.2%

**Small Rock:** Mean 2.7%, Range 0.4 – 5.0%

**Fines Cover:** Mean 3.5%, Range 2.0 – 5.0%

**Litter Cover:** Mean 37.0%, Range 4.0 – 70% **Soil Texture (field assessed):** Medium to very fine, loamy sand (1), Not recorded (1)

**Geology (field or map data):** Franciscan melange (1), Granitic (generic) (1)

**Marin County Watersheds:** Bolinas (1)

**Other Watersheds, San Mateo Co.:** Pacifica (1)

### **Site Impacts**

This alliance has greater cover of exotics than natives, with high non-native plant cover (average 84.0%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Anagallis arvensis*, *Cortaderia jubata*, *Daucus carota*, *Echium candicans*, *Genista monspessulana*, *Geranium dissectum*, and *Hypochaeris radicata*.

### **Associations in Marin County**

*Cortaderia (jubata, selloana)*

### **Classification Comments**

Since Marin County has fewer than five surveys of this alliance, data from nearby counties were included.

**References:** Buck-Diaz et al. 2012

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

### **Surveys Used for Description**

**Total: N=2; Marin County (n=1):** MARIN318

San Mateo County (n=1): SMAT0012



**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Artemisia californica</i>	100	42.0	3.1	0.2	6.0	X		X	X
	<i>Genista monspessulana</i>	100	12.2	0.6	0.2	1.0	X			X
	<i>Toxicodendron diversilobum</i>	100	7.4	0.2	0.2	0.2	X			X
	<i>Diplacus aurantiacus</i>	50	6.0	0.5	1.0	1.0				X
	<i>Baccharis pilularis</i>	50	31.2	0.5	1.0	1.0				X
	<i>Echium candicans</i>	50	1.2	0.1	0.2	0.2				X
<b>Herb</b>										
	<b><i>Cortaderia jubata</i></b>	<b>100</b>	<b>96.5</b>	<b>51.0</b>	<b>18.0</b>	<b>84.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Anagallis arvensis</i>	50	0.1	0.1	0.2	0.2				X
	<i>Achillea millefolium</i>	50	0.1	0.1	0.2	0.2				X
	<i>Dudleya farinosa</i>	50	0.5	0.1	0.2	0.2				X
	<i>Avena</i> spp.	50	0.5	0.1	0.2	0.2				X
	<i>Sedum spathulifolium</i>	50	0.5	0.1	0.2	0.2				X
	<i>Cardamine oligosperma</i>	50	0.1	0.1	0.2	0.2				X
	<i>Camissonia ovata</i>	50	0.1	0.1	0.2	0.2				X
	<i>Clinopodium douglasii</i>	50	0.1	0.1	0.2	0.2				X
	<i>Gamochaeta ustulata</i>	50	0.1	0.1	0.2	0.2				X
	<i>Geranium dissectum</i>	50	0.1	0.1	0.2	0.2				X
	<i>Hypochaeris radicata</i>	50	0.1	0.1	0.2	0.2				X
	<i>Pseudognaphalium ramosissimum</i>	50	0.1	0.1	0.2	0.2				X
	<i>Symphotrichum chilense</i>	50	0.1	0.1	0.2	0.2				X
	<i>Eriogonum</i> spp.	50	0.5	0.1	0.2	0.2				X
	<i>Daucus carota</i>	50	0.1	0.1	0.2	0.2				X
<b>Non-vascular</b>										
	Lichen	50	25.0	0.1	0.2	0.2				X
	Moss	50	25.0	0.1	0.2	0.2				X

***Cortaderia (jubata, selloana) Provisional Association***

**Common Name:** Pampas grass and Jubata grass Patches

**Alliance:** *Cortaderia (jubata, selloana)* Herbaceous Semi-Natural Alliance

**Classification Comments**

The association circumscription is the same as that of the alliance. See above for detailed description. This association is considered provisional since it is under-sampled in its expected range. Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

**State Rare:** N

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## ***Cynosurus echinatus* – *Arrhenatherum elatius* Herbaceous Semi-Natural Alliance**

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**Common Name:** Annual dogtail – tall oatgrass grasslands

**NVC Alliance Code:** N/A.

### **Statewide Description**

*Arrhenatherum elatius* or *Cynosurus echinatus* is dominant or co-dominant with other non-natives in the herbaceous layer. Emergent trees and shrubs may be present at low cover. Stands occur on warm exposures in areas where annual precipitation tends to be > 8 cm and temperature is relatively low compared to many other annual grass types. *C. echinatus* is also common in the understory in low-elevation hardwood and conifer woodlands in the mountains of northern California (Klein et al. 2007). However, most information about this type comes from the northern Coast Ranges, where these two non-native grasses among others have been increasing and invading many areas formerly dominated by native perennial grasses.

Current vegetation studies assign stands to semi-natural stands categories only if they have high non-native cover, and few natives are present at low cover. Jimerson et al. (2000) defined his series and associations based on overall species composition. Some 27% of the plots lacked native grasses; the remainder had at least one native grass species present. Using the membership rules of recent surveys (e.g., Klein et al. 2007), we would place many of their stands in the *Danthonia californica*, *Elymus glaucus*, and other grassland alliances if we could make standby-stand individual determinations. Further studies where *C. echinatus* is important should emphasize native species composition.

### Local Vegetation Description

The Annual dogtail – tall oatgrass grasslands Alliance forms an intermittent to continuous herbaceous layer. The shrub layer is sparse and the tree layer is absent. Characteristic herbs include *Anagallis arvensis*, *Avena* spp., *Brachypodium distachyon*, *Bromus hordeaceus*, *Cynosurus echinatus*, *Hypochaeris radicata*, *Linum bienne*, *Lolium perenne*, *Plantago lanceolata*, *Romulea rosea*, *Rumex acetosella*, and *Vulpia bromoides*. Those herbs often present include *Aira caryophylla*, *Briza minor*, *Danthonia californica*, *Dichondra donelliana*, *Erodium cicutarium*, *Linum trigynum*, *Nassella manicata*, *Rytidosperma pilosum*, *Sisyrinchium bellum*, *Trifolium dubium*, and *Trifolium subterraneum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.2	0 – 1	0.8	0.5 – 1
Herb	61.2	46 – 90	0.4	0 – 1

### Local Membership Rule

*Cynosurus echinatus*, *Danthonia pilosa* (*Rytidosperma penicillatum*), and/or *Nassella manicata* dominate or co-dominate in the herbaceous layer. *Anagallis*, *Avena*, *Lolium*, *Plantago lanceolata*, *Rumex*, and *Vulpia bromoides* are often present.

### Local Environmental Description

**Elevation:** Mean 216 m, Range 43 – 340 m

**Aspect:** SW (7), SE (3), NE (1), NW (1)

**Slope:** Mean 11 degrees, Range 3 – 20 degrees

**Macro Topography:** Upper 1/3 of slope (7), Lower 1/3 of slope (2), Middle to Upper 1/3 of slope (1), Not recorded (1), Ridge top (1)

**Large Rock:** Mean 0.1%, Range 0.0 – 1.0%

**Small Rock:** Mean 1.0%, Range 0.0 – 2.0%

**Fines Cover:** Mean 15.3%, Range 1.0 – 53.0%

**Litter Cover:** Mean 76.8%, Range 45.0 – 95%

**Soil Texture (field assessed):** Moderately fine sandy clay loam (2), Moderately fine clay loam (2), Medium silt (2), Medium silt loam (1), Medium to very fine, sandy loam (1), Not recorded (1), Coarse, loamy sand (1)

**Geology (field or map data):** Franciscan melange (9), Sandstone, shale, and conglomerate (3)

**Marin County Watersheds:** Lagunitas Creek (1), Walker Creek (1)

**Other Watersheds, Sonoma Co.:** Russian Gulch (6), Lower Russian River (2), Salmon Creek (2)

### Site Impacts

This alliance has greater cover of exotics than natives, with high non-native plant cover (average 94.8%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Aira caryophylla*, *Anagallis arvensis*, *Brachypodium distachyon*, *Briza maxima*, *Briza minor*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Cynosurus echinatus*, *Erodium botrys*, *Erodium cicutarium*, *Gastroidium phleoides*, *Geranium dissectum*, *Holcus lanatus*, *Hypochaeris radicata*, *Leontodon taraxacoides*, *Linum bienne*, *Linum trigynum*, *Logfia gallica*, *Lotus angustissimus*, *Lythrum hyssopifolium*, *Nassella manicata*, *Phalaris aquatica*, *Plantago lanceolata*, *Romulea rosea*, *Rumex acetosella*, *Rytidosperma pilosum*, *Silene gallica*, *Sonchus asper*, *Trifolium dubium*, *Trifolium glomeratum*, *Trifolium subterraneum*, *Vicia sativa*, and *Vulpia bromoides*.

## Associations in Marin County

*Cynosurus echinatus* – (*Danthonia pilosa* – *Nassella manicata*)

### Classification Comments

Since Marin County has fewer than five surveys of this alliance, data from nearby counties are included.

**References:** Klein et al. 2015

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

### Surveys Used for Description

**Total: N=12; Marin County (n=2):** MARIN281, MMWD0385

Sonoma County (n=10): HEAD0087, HEAD0088, HEAD0179, HEAD0186, HEAD0188, HEAD0190, HEAD0273, HEAD0282, SONO0758, SONO0883

### Alliance Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Shrub										
	<i>Baccharis pilularis</i>	25	20.8	0.0	0.1	0.2				
Herb										
	<i>Avena</i> spp.	100	4.8	7.4	0.2	38.0	X			X
	<i>Hypochaeris radicata</i>	92	5.5	8.5	0.2	68.0	X			X
	<i>Lolium perenne</i>	92	4.6	5.9	0.2	38.0	X			X
	<i>Linum bienne</i>	92	2.6	1.5	0.2	10.0	X			X
	<b><i>Cynosurus echinatus</i></b>	<b>83</b>	<b>19.1</b>	<b>22.8</b>	<b>1.0</b>	<b>68.0</b>	<b>X</b>			<b>X</b>
	<i>Plantago lanceolata</i>	83	5.3	6.6	0.2	38.0	X			X
	<i>Vulpia bromoides</i>	83	4.6	5.2	0.2	18.0	X			X
	<i>Brachypodium distachyon</i>	75	8.5	7.5	0.2	38.0	X			X
	<i>Rumex acetosella</i>	75	1.7	3.3	0.2	38.0	X			X
	<i>Bromus hordeaceus</i>	75	2.6	2.4	0.2	8.0	X			X
	<i>Romulea rosea</i>	75	1.1	1.3	0.2	8.0	X			X
	<i>Anagallis arvensis</i>	75	0.8	0.8	0.2	8.0	X			X
	<i>Nassella manicata</i>	67	13.3	12.4	0.2	38.0				X
	<i>Rytidosperma pilosum</i>	67	8.2	10.2	3.0	68.0				X
	<i>Trifolium subterraneum</i>	67	2.4	2.6	0.2	8.0				X
	<i>Trifolium dubium</i>	67	0.6	0.6	0.2	3.0				X
	<i>Aira caryophyllea</i>	67	0.1	0.1	0.2	0.2				X
	<i>Dichondra donelliana</i>	58	0.8	1.1	0.2	8.0				X
	<i>Danthonia californica</i>	58	0.9	0.6	0.2	3.0				X
	<i>Briza minor</i>	58	0.4	0.4	0.2	3.0				X
	<i>Linum trigynum</i>	50	0.6	0.6	0.2	3.0				X
	<i>Erodium cicutarium</i>	50	0.1	0.1	0.2	0.2				X
	<i>Sisyrinchium bellum</i>	50	0.1	0.1	0.2	0.2				X
	<i>Leontodon taraxacoides</i>	42	2.1	2.2	0.2	18.0				
	<i>Holcus lanatus</i>	42	1.7	1.6	0.2	8.0				
	<i>Lotus angustissimus</i>	42	1.2	1.2	0.2	8.0				

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<i>Nassella pulchra</i>	42	0.6	0.8	0.2	3.0				
	<i>Erodium botrys</i>	42	0.1	0.1	0.2	0.2				
	<i>Trifolium macraei</i>	42	0.1	0.1	0.2	0.2				
	<i>Silene gallica</i>	42	0.1	0.1	0.2	0.2				
	<i>Juncus bufonius</i>	42	0.1	0.1	0.2	0.2				
	<i>Juncus occidentalis</i>	42	0.1	0.1	0.2	0.2				
	<i>Sonchus asper</i>	42	0.1	0.1	0.1	0.2				
	<i>Lythrum hyssopifolium</i>	33	0.3	0.3	0.2	3.0				
	<i>Carduus pycnocephalus</i>	33	0.2	0.3	0.2	3.0				
	<i>Briza maxima</i>	33	0.2	0.1	0.2	1.0				
	<i>Geranium dissectum</i>	33	0.1	0.1	0.2	0.2				
	<i>Gastridium phleoides</i>	33	0.1	0.1	0.2	0.2				
	<i>Logfia gallica</i>	33	0.0	0.1	0.1	0.2				
	<i>Phalaris aquatica</i>	25	0.7	0.7	0.1	8.0				
	<i>Trifolium glomeratum</i>	25	0.1	0.3	0.2	3.0				

***Cynosurus echinatus* – (*Danthonia pilosa* – *Nassella manicata*) Provisional Semi-natural Association**

**Common Name:** Dogtail Grass – (Oatgrass – Tropical Needlegrass) Grassland

**Alliance:** *Cynosurus echinatus* – *Arrhenatherum elatius* Herbaceous Semi-Natural Alliance

**Classification Comments**

The association circumscription is the same as that of the alliance. See above for detailed description. This association is considered provisional since it is under-sampled in its expected range. Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

**State Rare:** N



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***Deschampsia cespitosa* – *Festuca rubra* Brackish Salt Marsh Herbaceous Alliance**

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**Common Name:** Tufted Hairgrass - Red Fescue Brackish Salt Marsh Alliance

**NVC Alliance Code:** A3898. *Deschampsia cespitosa* – *Festuca rubra* Salt Marsh Alliance

**Statewide Description**

These dense herbaceous brackish to salt marshes are dominated by *Deschampsia cespitosa* and/or *Festuca rubra*, usually with one or more other more salt-tolerant species such as *Argentina egedii*, *Carex lyngbyei*, *Distichlis spicata*, *Juncus balticus*, and *Sidalcea hendersonii*.

This alliance occurs on high salt marshes with infrequent (less than daily) tidal flooding. These occur along the coast of Oregon, Washington, British Columbia and southeastern Alaska.

**Local Vegetation Description**

The Tufted Hairgrass - Red Fescue Brackish Salt Marsh Alliance forms an intermittent herbaceous layer in the single stand sampled in salt marshes. The shrub layer is absent and the tree layer is absent. The dominant herb is *Festuca rubra*, and characteristic herbs include *Aira caryophyllea*, *Carpobrotus edulis*, *Distichlis spicata*, *Isolepis carinata*, *Oenothera elata*, *Polypogon monspeliensis*, *Pseudognaphalium stramineum*, and *Sonchus oleraceus*. Commonly associated non-vascular plants include Moss.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	NA	no data	
Hardwood	0.0	NA	no data	
Regenerating or Shrubby Tree	0.0	NA	no data	
Shrub	0.0	NA	no data	
Herb	49.0	NA	0.3	0 – 0.5

**Local Membership Rule**

*Festuca rubra* dominates in tidal marsh and dune overwash settings.

**Local Environmental Description**

**Elevation:** 0 m

**Aspect:** Flat (1)

**Slope:** 0 degrees

**Macro Topography:** Bottom to Lower 1/3 of slope (1)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** 4.0%

**Litter Cover:** 95%

**Soil Texture (field assessed):** Fine sand (1)

**Geology (field or map data):** no data

**Marin County Watersheds:** Bolinas (1)

**Site Impacts**

This alliance has low non-native plant cover (average 12.2%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*, *Carpobrotus edulis*, *Polypogon monspeliensis*, and *Sonchus oleraceus*.

**Associations in Marin County**

*Festuca rubra* – (*Argentina egedii*)

**Classification Comments**

This alliance has not previously been documented from California. However, the NVC recognizes this alliance, and additional data from Humboldt Bay National Wildlife Refuge (where *Deschampsia cespitosa* is dominant with *Distichlis spicata*) also represents this alliance (Pickart 2006).

**References:** NatureServe 2021, Pickart 2006

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**Surveys Used for Description**

**Total: N=1; Marin County (n=1):** MARIN248

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Herb</b>										
	<i>Festuca rubra</i>	100	84.9	46.0	46.0	46.0	X	X		X
	<i>Carpobrotus edulis</i>	100	11.1	6.0	6.0	6.0	X			X
	<i>Distichlis spicata</i>	100	1.8	1.0	1.0	1.0	X			X
	<i>Oenothera elata</i>	100	0.4	0.2	0.2	0.2	X			X
	<i>Aira caryophyllea</i>	100	0.4	0.2	0.2	0.2	X			X
	<i>Isolepis carinata</i>	100	0.4	0.2	0.2	0.2	X			X
	<i>Sonchus oleraceus</i>	100	0.4	0.2	0.2	0.2	X			X
	<i>Pseudognaphalium stramineum</i>	100	0.4	0.2	0.2	0.2	X			X
	<i>Polypogon monspeliensis</i>	100	0.4	0.2	0.2	0.2	X			X
<b>Non-vascular</b>										
	Moss	100	100.0	0.2	0.2	0.2	X	X		X

***Festuca rubra* – (*Argentina egedii*) Provisional Association**

**Common Name:** Red Fescue – (Pacific Silverweed) Salt Marsh

**Alliance:** *Deschampsia cespitosa* – *Festuca rubra* Brackish Salt Marsh Herbaceous Provisional Alliance

**Classification Comments**

The association circumscription is the same as that of the alliance. See above for detailed description. This association is considered provisional since it is under-sampled in its expected range. The name of the association is based on the USDA/NRCS PLANTS database name for the taxon, whereas the California flora accepts the name *Potentilla anserina* for this species.

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y



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***Deschampsia cespitosa* – *Hordeum brachyantherum* – *Danthonia californica*  
Herbaceous Alliance**

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**Common Name:** Coastal tufted hair grass – Meadow barley – California oatgrass meadows

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

**Statewide Description**

*Deschampsia cespitosa* or *Hordeum brachyantherum* is dominant or co-dominant in the herbaceous layer with *Achillea millefolium*, *Agrostis stolonifera*, *Aira caryophyllea*, *Anthoxanthum odoratum*, *Argentina egedii*, *Carex* spp., *Cirsium vulgare*, *Danthonia californica*, *Deschampsia danthonioides*, *Distichlis spicata*, *Eleocharis acicularis*, *Eleocharis macrostachya*, *Epilobium ciliatum*, *Eryngium armatum*, *Holcus lanatus*, *Horkelia marinensis*, *Hypochaeris radicata*, *Iris douglasiana*, *Juncus arcticus*, *Juncus phaeocephalus*, *Lilaeopsis masonii*, *Lolium perenne*, *Lotus* spp., *Lupinus versicolor*, *Medicago polymorpha*, *Plantago lanceolata*, *Potentilla gracilis*, *Ranunculus californicus*, *Ranunculus flammula*, *Rumex acetosella*, *Senecio hydrophiloides*, *Sisyrinchium bellum*, *Trifolium* spp. and *Triglochin striata*. Emergent shrubs may be present at low cover, including *Baccharis pilularis*, *Rosa nutkana*, *Rubus* spp. and *Rubus ursinus*.

We now accept the treatment of two alliances for *D. cespitosa*, separating the coastal and lowland stands from those in higher-elevation mountain meadows. Stands along the coast and at lower elevations occur in moist, maritime climates on soils with high moisture-holding capacity or on perched water tables, whereby the associations included in this alliance have a lush growth of *Deschampsia cespitosa*, *Danthonia californica*, *Hordeum brachyantherum*, and other perennial herbs (NatureServe 2020).

Similar to *D. cespitosa*, *H. brachyantherum* has a broad temperature tolerance, enabling stands to exist

adjacent to a divergent array of wetland alliances. Directly along the coast, associations of this alliance interdigitate on a fine scale with herbaceous stands of the *Calamagrostis nutkaensis*, *Festuca idahoensis* - *Danthonia californica*, *Carex obnupta*, and *Juncus* spp. alliances; and woody stands of *Baccharis pilularis*, *Pinus muricata* and *Pseudotsuga menziesii* alliances; and non-native types. Typical associated herbs include *Eleocharis macrostachya*, *Juncus balticus*, and *J. nevadensis*.

Stands of *Deschampsia cespitosa*, *Danthonia californica*, *Hordeum brachyantherum*, in montane meadows fall under the *Danthonia californica* - *Deschampsia cespitosa* - *Camassia quamash* Alliance.

### **Local Vegetation Description**

The Coastal tufted hair grass – Meadow barley – California oatgrass meadows Alliance forms an intermittent to continuous herbaceous layer. The shrub layer is open and the tree layer is absent. Characteristic herbs include *Deschampsia cespitosa*, *Danthonia californica*, *Hordeum brachyantherum*, *Holcus lanatus*, and *Plantago lanceolata*. Those herbs often present include *Achillea millefolium*, *Aira caryophylla*, *Anagallis arvensis*, *Briza minor*, *Gamochoaeta ustulata*, *Hypochaeris radicata*, *Lolium perenne*, *Rumex acetosella*, *Sisyrinchium bellum*, and *Vulpia bromoides*. Commonly associated emergent shrubs at sparse to open cover include *Baccharis pilularis* and *Lupinus versicolor*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	2.6	0.0 – 10.0	0.3	0 – 0.5
Herb	78.9	40 – 100	0.4	0 – 1

### **Local Membership Rule**

*Deschampsia cespitosa*, *Danthonia californica*, *Iris douglasiana*, 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*). Settings range from coastal dunes and bluffs to inland plains (e.g., Santa Rosa Plain) to montane meadows.

### **Local Environmental Description**

**Elevation:** Mean 76 m, Range 8 – 409 m

**Aspect:** SW (15), SE (10), Flat (10), NE (10), NW (6)

**Slope:** Mean 9 degrees, Range 0 – 24 degrees

**Macro Topography:** Upper 1/3 of slope (8), Lower 1/3 of slope (6), Bottom (3), Ridge top (3), Middle 1/3 of slope (2), Other (2), Upper 1/3 of slope to Ridgetop (1), Edge of basin/wetland (1), Middle to Upper 1/3 of slope (1)

**Large Rock:** Mean 0.2%, Range 0.0 – 3.2%

**Small Rock:** Mean 1.3%, Range 0.0 – 30.0%

**Fines Cover:** Mean 17.4%, Range 0.2 – 97.0%

**Litter Cover:** Mean 49.2%, Range 0.2 – 96%

**Soil Texture (field assessed):** Moderately fine clay loam (5), Coarse, loamy sand (4), Moderately fine sandy clay loam (3), Medium silt loam (2), Not recorded (2), Muck (2), Moderately fine silty clay loam (2), Moderately coarse, sandy loam (2), Medium to very fine, sandy loam (2), Medium silt (1), Medium sand (1), Medium to very fine, loamy sand (1)

**Geology (field or map data):** Sandstone and other sedimentary (25), Granitic (15), Franciscan melange (9), Siltstone (4), Ultramafic (type unknown) (3), Sandstone, shale, and conglomerate (1), Sand dunes (1), Granitic (generic) (1), Sandstone (1), Shale (1)

**Marin County Watersheds:** Point Reyes (33), Inverness (16), Walker Creek (5), Estero Americano (3), Lagunitas Creek (3), Bolinas (1), San Rafael (1)

### Site Impacts

This alliance has moderate non-native plant cover (average 48.7%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*, *Aira praecox*, *Anagallis arvensis*, *Briza maxima*, *Briza minor*, *Bromus hordeaceus*, *Cynosurus echinatus*, *Geranium dissectum*, *Holcus lanatus*, *Hypochaeris glabra*, *Hypochaeris radicata*, *Leontodon taraxacoides*, *Linum bienne*, *Logfia gallica*, *Plantago lanceolata*, *Rumex acetosella*, *Silene gallica*, *Vicia sativa*, and *Vulpia bromoides*.

### Associations in Marin County

*Deschampsia (cespitosa, holciformis)*  
*Deschampsia cespitosa* – *Danthonia californica*  
*Deschampsia cespitosa* – *Eryngium armatum*  
*Deschampsia cespitosa* – *Horkelia marinensis*  
*Deschampsia cespitosa* – *Iris douglasiana*  
*Hordeum brachyantherum* Lowland

### Classification Comments

None.

**References:** Buck-Diaz et al. 2019, Keeler-Wolf et al. 2003a, Klein et al. 2015, Pickart 2006

**Global Rarity Rank:** GNR

**State Rarity Rank:** S3

### Surveys Used for Description

**Total: N=62; Marin County (n=62):** HEAD0075, HEAD0183, HEAD0222, HEAD0266, HEAD0271, HEAD0272, HEAD0278, HEAD0279, HEAD0316, HEAD0323, HEAD0398, HEAD0400, HEAD0402, MARIN216, MARIN217, MARIN263, MARIN283, MMWD0038, MMWD0089, PGA1112, PGA220, PGA222, PGA2249, PGA228, PGA325, PGA440, PGA506, PGA5284, PGA5346-1, PGA62, PORE016, PORE028, PORE029, PORE031, PORE032, PORE044, PORE052, PORE077, SFANT01, SFANT01A, SFANT01B, SFANT02, SFANT02A, SFANT02B, SFANT03, SFANT03A, SFANT03B, SFANT04, SFANT04A, SFANT05, SFANT05A, SFANT05B, SFANT06, SFANT06A, SFANT06B, SFANT07B, SFANT08B, SFANT09B, SFANT10, SFANT11A, SFANT13B, SFANT14B

### Alliance Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Shrub	<i>Baccharis pilularis</i>	73	41.0	3.6	0.1	19.4				X
	<i>Lupinus versicolor</i>	37	19.4	1.4	0.2	11.8				
	<i>Rubus ursinus</i>	35	16.7	0.7	0.2	6.3				
Herb	<b><i>Deschampsia cespitosa</i></b>	<b>85</b>	<b>13.7</b>	<b>19.5</b>	<b>0.2</b>	<b>56.0</b>	<b>X</b>			<b>X</b>
	<i>Plantago lanceolata</i>	84	9.6	16.1	0.2	64.0	X			X
	<i>Holcus lanatus</i>	76	8.5	10.9	0.2	80.0	X			X
	<i>Aira caryophyllea</i>	74	3.4	6.9	0.2	65.3				X
	<i>Sisyrinchium bellum</i>	73	0.6	1.1	0.1	18.0				X
	<i>Hypochaeris radicata</i>	71	3.5	6.3	0.2	27.3				X
	<i>Lolium perenne</i>	68	5.8	7.1	0.2	68.0				X
	<i>Rumex acetosella</i>	68	0.9	1.6	0.2	17.3				X
	<i>Vulpia bromoides</i>	63	5.7	10.5	0.2	62.0				X

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<b><i>Danthonia californica</i></b>	<b>61</b>	<b>3.5</b>	<b>7.0</b>	<b>0.2</b>	<b>52.0</b>				<b>X</b>
	<i>Briza minor</i>	60	1.0	2.1	0.2	18.0				<b>X</b>
	<i>Achillea millefolium</i>	60	1.0	1.2	0.2	18.0				<b>X</b>
	<i>Anagallis arvensis</i>	58	0.4	0.7	0.2	9.3				<b>X</b>
	<i>Gamochaeta ustulata</i>	56	0.3	0.4	0.1	3.0				<b>X</b>
	<i>Cirsium quercetorum</i>	48	0.1	0.2	0.2	3.0				
	<i>Iris douglasiana</i>	47	3.5	4.4	0.2	45.3				
	<i>Elymus glaucus</i>	44	0.6	1.1	0.2	15.0				
	<i>Luzula comosa</i>	42	0.2	0.4	0.2	4.7				
	<i>Bromus hordeaceus</i>	37	0.5	0.8	0.2	20.0				
	<i>Plantago erecta</i>	35	0.3	0.4	0.2	5.5				
	<i>Silene gallica</i>	35	0.1	0.3	0.1	2.7				
	<i>Eryngium armatum</i>	34	2.4	3.3	0.2	30.0				
	<i>Carex brevicaulis</i>	34	1.3	2.9	0.2	17.3				
	<i>Juncus bufonius</i>	32	0.5	1.2	0.2	38.7				
	<i>Logfia gallica</i>	31	0.2	0.4	0.2	6.0				
	<i>Geranium dissectum</i>	31	0.2	0.3	0.2	7.0				
	<i>Prunella vulgaris</i>	31	0.2	0.2	0.2	4.0				
	<i>Nassella pulchra</i>	29	1.0	1.3	0.7	14.0				
	<i>Cynosurus echinatus</i>	27	1.8	2.0	0.2	68.0				
	<i>Hypochaeris glabra</i>	27	0.2	0.4	0.2	13.3				
	<i>Chlorogalum pomeridianum</i>	27	0.2	0.3	0.2	6.0				
	<i>Vicia sativa</i>	27	0.1	0.2	0.2	2.7				
	<i>Briza maxima</i>	24	2.5	5.8	0.2	72.0				
	<i>Leontodon taraxacoides</i>	24	2.0	3.0	0.2	48.0				
	<i>Bromus maritimus</i>	24	0.3	0.8	0.2	26.0				
	<i>Stachys ajugoides</i>	24	0.2	0.3	0.2	8.7				
	<i>Linum bienne</i>	24	0.1	0.2	0.2	6.2				
	<i>Juncus phaeocephalus</i>	23	0.6	1.1	0.2	16.7				
	<i>Ranunculus californicus</i>	23	0.2	0.2	0.1	5.0				
	<i>Bromus carinatus</i>	23	0.1	0.1	0.2	3.0				
	<i>Sidalcea malviflora</i>	23	0.0	0.1	0.2	1.3				
	<b><i>Hordeum brachyantherum</i></b>	<b>21</b>	<b>3.1</b>	<b>2.5</b>	<b>0.2</b>	<b>50.0</b>				
	<i>Aira praecox</i>	21	0.8	1.2	0.2	18.0				
	<i>Pteridium aquilinum</i>	21	0.9	1.0	0.2	18.0				
	<i>Wyethia angustifolia</i>	21	0.8	0.9	0.1	18.0				
	<i>Triteleia laxa</i>	21	0.1	0.2	0.1	3.0				
	<i>Symphyotrichum chilense</i>	21	0.1	0.1	0.1	3.0				

## ***Deschampsia (cespitosa, holciformis) Association***

**Common Name:** Coast hairgrass Grassland

**Alliance:** *Deschampsia cespitosa* – *Hordeum brachyantherum* – *Danthonia californica* Herbaceous Alliance

### **Local Vegetation Description**

The Coast hairgrass Association forms an intermittent to continuous herbaceous layer. The shrub layer is sparse and the tree layer is absent. *Deschampsia cespitosa* is dominant or co-dominant, and other characteristic herbs include *Achillea millefolium*, *Hypochaeris radicata*, and *Plantago lanceolata*. Those herbs often present include *Aira caryophyllea*, *Anagallis arvensis*, *Rumex acetosella*, *Sisyrinchium bellum*, and *Vulpia bromoides*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	3.0	0.2 – 8.2	0.3	0– 0.5
Herb	72.7	50 – 89	0.3	0 –0.5

### **Local Environmental Description**

**Elevation:** Mean 129 m, Range 9 – 282 m

**Aspect:** NE (2), SE (2), NW (2)

**Slope:** Mean 7 degrees, Range 2 – 15 degrees

**Macro Topography:** Lower 1/3 of slope (2), Upper 1/3 of slope (1), Middle 1/3 of slope (1), Middle to Upper 1/3 of slope (1), Ridge top (1)

**Large Rock:** Mean 0.9%, Range 0.0 – 3.2%

**Small Rock:** Mean 5.6%, Range 0.2 – 30.0%

**Fines Cover:** Mean 22.5%, Range 1.0 – 85.0%

**Litter Cover:** Mean 60.5%, Range 11.0 – 92%

**Soil Texture (field assessed):** Moderately fine clay loam (2), Not recorded (1), Moderately fine silty clay loam (1), Coarse, loamy sand (1), Medium silt loam (1)

**Geology (field or map data):** Franciscan melange (2), Sandstone, shale, and conglomerate (2), Alluvium (1), Sandstone (1), Ultramafic (type unknown) (1)

**Marin County Watersheds:** Walker Creek (2), Bolinas (1), Point Reyes (1)

**Other Watersheds, San Mateo Co.:** San Mateo Coastal (1); **Sonoma Co.:** Gualala River (1), Salmon Creek (1)

### **Site Impacts**

This association has moderate non-native plant cover (average 36.8%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*, *Anagallis arvensis*, *Avena* spp., *Brachypodium distachyon*, *Briza minor*, *Bromus hordeaceus*, *Cirsium vulgare*, *Cynosurus echinatus*, *Holcus lanatus*, *Hypochaeris radicata*, *Leontodon taraxacoides*, *Linum bienne*, *Lolium perenne*, *Lotus corniculatus*, *Plantago lanceolata*, *Rumex acetosella*, *Sonchus asper*, *Trifolium dubium*, and *Vulpia bromoides*.

**Classification Comments**

The name of this association has been updated from *Deschampsia cespitosa* ssp. *holciformis* Association to conform to the names used in Oregon and Washington. Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** Buck-Diaz et al. 2019, Pickart 2006

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

**Total: N=7; Marin County (n=4):** HEAD0183, HEAD0222, MARIN263, PGA506

San Mateo County (n=1): SMAT0122

Sonoma County (n=2): HEAD0103, HEAD0210

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	43	21.8	0.5	0.2	3.0				
	<i>Lupinus arboreus</i>	29	28.2	1.2	0.2	8.0				
	<i>Rubus ursinus</i>	29	28.1	0.9	3.0	3.0				
	<i>Lupinus versicolor</i>	29	21.4	0.5	0.2	3.0				
<b>Herb</b>										
	<b><i>Deschampsia cespitosa</i></b>	<b>100</b>	<b>34.2</b>	<b>37.3</b>	<b>8.0</b>	<b>68.0</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<i>Plantago lanceolata</i>	100	6.8	6.9	0.2	18.0	<b>X</b>			<b>X</b>
	<i>Hypochaeris radicata</i>	86	2.2	2.0	0.2	8.0	<b>X</b>			<b>X</b>
	<i>Achillea millefolium</i>	86	1.0	1.3	0.2	8.0	<b>X</b>			<b>X</b>
	<i>Vulpia bromoides</i>	71	5.7	5.6	0.2	18.0				<b>X</b>
	<i>Aira caryophylla</i>	71	0.6	0.5	0.2	3.0				<b>X</b>
	<i>Anagallis arvensis</i>	71	0.2	0.1	0.2	0.2				<b>X</b>
	<i>Sisyrinchium bellum</i>	71	0.2	0.1	0.2	0.2				<b>X</b>
	<i>Rumex acetosella</i>	57	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Holcus lanatus</i>	43	5.6	8.0	3.0	35.0				
	<i>Nassella pulchra</i>	43	1.3	1.0	1.0	3.0				
	<i>Bromus carinatus</i>	43	0.5	0.5	0.2	3.0				
	<i>Cirsium quercetorum</i>	43	0.5	0.5	0.2	3.0				
	<i>Cynosurus echinatus</i>	43	0.5	0.5	0.2	3.0				
	<i>Juncus bufonius</i>	43	0.5	0.5	0.2	3.0				
	<i>Sidalcea malviflora</i>	43	0.4	0.3	0.2	2.0				
	<i>Danthonia californica</i>	43	0.2	0.1	0.2	0.4				
	<i>Bromus hordeaceus</i>	43	0.1	0.1	0.2	0.2				
	<i>Cirsium vulgare</i>	43	0.1	0.1	0.2	0.2				
	<i>Elymus glaucus</i>	43	0.1	0.1	0.2	0.2				
	<i>Eschscholzia californica</i>	43	0.1	0.1	0.2	0.2				
	<i>Fragaria chiloensis</i>	43	0.1	0.1	0.2	0.2				
	<i>Koeleria macrantha</i>	43	0.1	0.1	0.2	0.2				

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<i>Linum bienne</i>	43	0.1	0.1	0.2	0.2				
	<i>Vicia</i> spp.	43	0.1	0.1	0.2	0.2				
	<i>Agrostis</i> spp.	29	3.5	5.5	0.2	38.0				
	<i>Lolium perenne</i>	29	2.0	2.9	0.2	20.0				
	<i>Brachypodium distachyon</i>	29	4.1	2.6	0.2	18.0				
	<i>Erigeron glaucus</i>	29	1.3	1.2	0.2	8.0				
	<i>Armeria maritima</i>	29	1.2	1.1	3.0	5.0				
	<i>Leontodon taraxacoides</i>	29	1.5	1.0	0.2	7.0				
	<i>Eriogonum latifolium</i>	29	0.4	0.5	0.2	3.0				
	<i>Triteleia laxa</i>	29	0.4	0.5	0.2	3.0				
	<i>Festuca idahoensis</i>	29	0.5	0.3	0.2	2.0				
	<i>Juncus patens</i>	29	0.2	0.3	0.2	2.0				
	<i>Lotus corniculatus</i>	29	0.3	0.3	0.2	2.0				
	<i>Daucus pusillus</i>	29	0.2	0.2	0.2	1.0				
	<i>Gamochaeta ustulata</i>	29	0.2	0.2	0.2	1.0				
	<i>Lasthenia californica</i>	29	0.2	0.2	0.2	1.0				
	<i>Avena</i> spp.	29	0.1	0.1	0.2	0.2				
	<i>Briza minor</i>	29	0.1	0.1	0.2	0.2				
	<i>Juncus occidentalis</i>	29	0.1	0.1	0.2	0.2				
	<i>Luzula comosa</i>	29	0.1	0.1	0.2	0.2				
	<i>Microseris bigelovii</i>	29	0.1	0.1	0.2	0.2				
	<i>Plantago erecta</i>	29	0.1	0.1	0.2	0.2				
	<i>Sonchus asper</i>	29	0.1	0.1	0.2	0.2				
	<i>Trifolium dubium</i>	29	0.1	0.1	0.2	0.2				
	<i>Triphysaria pusilla</i>	29	0.1	0.1	0.2	0.2				
	<i>Ranunculus californicus</i>	29	0.1	0.0	0.1	0.2				

## ***Deschampsia cespitosa* – *Danthonia californica* Association**

**Common Name:** Tufted Hairgrass – California Oatgrass Grassland

**Alliance:** *Deschampsia cespitosa* – *Hordeum brachyantherum* – *Danthonia californica* Herbaceous Alliance

### **Local Vegetation Description**

The Tufted Hairgrass – California Oatgrass Association forms a continuous herbaceous layer. The shrub layer is sparse to open and the tree layer is absent. *Deschampsia cespitosa* and *Danthonia californica* are co-dominant and/or diagnostic herbs along with other characteristic herbs including *Aira caryophyllea*, *Anagallis arvensis*, *Briza minor*, *Carex brevicaulis*, *Gamochaeta ustulata*, *Holcus lanatus*, *Hypochaeris radicata*, *Lolium perenne*, *Plantago lanceolata*, *Rumex acetosella*, *Sisyrinchium bellum*, and *Vulpia bromoides*. Those herbs often present include *Achillea millefolium*, *Briza maxima*, *Bromus hordeaceus*, *Elymus glaucus*, *Logfia gallica*, *Luzula comosa*, *Nassella pulchra*, *Plantago erecta*, *Silene gallica*, and *Vicia sativa*. Commonly associated emergent shrubs at sparse cover include *Baccharis pilularis*, and *Lupinus versicolor*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	8.1	0.2 – 19.4	no data	
Herb	87.5	85 – 90	no data	

### **Local Environmental Description**

**Elevation:** Mean 70 m, Range 12 – 226 m

**Aspect:** SW (9), SE (8), NE (2), Flat (1), NW (1)

**Slope:** Mean 13 degrees, Range 0 – 24 degrees

**Macro Topography:** Upper 1/3 of slope (3), Middle 1/3 of slope (1), Other (1)

**Large Rock:** 0.0%

**Small Rock:** Mean 0.4%, Range 0.0 – 1.0%

**Fines Cover:** Mean 5.2%, Range 0.2 – 20.0%

**Litter Cover:** Mean 47.8%, Range 7.0 – 76%

**Soil Texture (field assessed):** Moderately fine clay loam (2), Coarse, loamy sand (1), Medium to very fine, sandy loam (1), Moderately fine sandy clay loam (1)

**Geology (field or map data):** Granitic (13), Sandstone and other sedimentary (3), Siltstone (2), Franciscan melange (2), Granitic (generic) (1)

**Marin County Watersheds:** Inverness (14), Point Reyes (5), Walker Creek (2)

### **Site Impacts**

This association has greater cover of exotics (average 55.3%) than natives. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*, *Anagallis arvensis*, *Avena* spp., *Briza maxima*, *Briza minor*, *Bromus hordeaceus*, *Cynosurus echinatus*, *Geranium dissectum*, *Holcus lanatus*, *Hypochaeris glabra*, *Hypochaeris radicata*, *Leontodon taraxacoides*, *Linum bienne*, *Logfia gallica*, *Lolium perenne*, *Plantago lanceolata*, *Rumex acetosella*, *Silene gallica*, *Trifolium dubium*, *Vicia sativa*, and *Vulpia bromoides*.

### **Classification Comments**

*Cynosurus echinatus* – (*Danthonia pilosa* – *Nassella manicata*) Provisional Semi-natural Association  
*Deschampsia cespitosa* – *Hordeum brachyantherum* – *Danthonia californica* Herbaceous Alliance



None.

**References:** Keeler-Wolf et al. 2003a, Klein et al. 2015

**Global Rarity Rank:** G2

**State Rarity Rank:** S2

**State Rare:** Y

**Surveys Used for Description**

**Total: N=21; Marin County (n=21):** HEAD0278, HEAD0279, PORE028, PORE052, PORE077, SFANT01, SFANT01A, SFANT01B, SFANT02, SFANT02A, SFANT02B, SFANT03, SFANT03A, SFANT03B, SFANT04, SFANT04A, SFANT07B, SFANT08B, SFANT09B, SFANT10, SFANT13B

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	95	41.3	4.7	0.2	19.4	X		X	X
	<i>Lupinus versicolor</i>	67	35.4	2.8	0.2	9.7				X
	<i>Toxicodendron diversilobum</i>	33	12.4	0.4	0.2	3.0				
	<i>Rubus ursinus</i>	24	10.2	0.8	0.2	6.3				
<b>Herb</b>										
	<i>Plantago lanceolata</i>	100	15.6	32.6	0.2	64.0	X			X
	<b><i>Deschampsia cespitosa</i></b>	<b>100</b>	<b>16.0</b>	<b>29.5</b>	<b>8.0</b>	<b>56.0</b>	<b>X</b>			<b>X</b>
	<b><i>Danthonia californica</i></b>	<b>100</b>	<b>8.2</b>	<b>17.7</b>	<b>3.0</b>	<b>52.0</b>	<b>X</b>			<b>X</b>
	<i>Aira caryophylla</i>	100	6.2	15.2	0.2	65.3	X			X
	<i>Hypochaeris radicata</i>	100	5.6	12.3	0.2	26.0	X			X
	<i>Vulpia bromoides</i>	90	9.4	22.4	3.0	62.0	X			X
	<i>Briza minor</i>	86	1.9	4.4	0.2	18.0	X			X
	<i>Rumex acetosella</i>	86	1.1	2.0	0.2	14.0	X			X
	<i>Sisyrinchium bellum</i>	86	0.5	1.0	0.2	4.0	X			X
	<i>Anagallis arvensis</i>	81	0.8	1.6	0.2	9.3	X			X
	<i>Gamochaeta ustulata</i>	81	0.3	0.6	0.2	3.0	X			X
	<i>Carex brevicaulis</i>	76	3.5	7.6	0.2	17.3	X			X
	<i>Lolium perenne</i>	76	1.6	3.5	0.2	38.7	X			X
	<i>Holcus lanatus</i>	76	0.7	1.4	0.2	8.0	X			X
	<i>Elymus glaucus</i>	71	0.7	1.2	0.2	6.7				X
	<i>Logfia gallica</i>	71	0.5	0.9	0.2	6.0				X
	<i>Luzula comosa</i>	71	0.4	0.9	0.2	4.7				X
	<i>Briza maxima</i>	67	6.0	16.3	0.2	72.0				X
	<i>Silene gallica</i>	67	0.3	0.6	0.2	2.7				X
	<i>Vicia sativa</i>	57	0.2	0.4	0.2	2.7				X
	<i>Achillea millefolium</i>	57	0.2	0.2	0.2	3.0				X
	<i>Nassella pulchra</i>	52	1.0	2.2	0.7	14.0				X
	<i>Plantago erecta</i>	52	0.4	0.8	0.2	5.5				X
	<i>Bromus hordeaceus</i>	52	0.3	0.5	0.2	3.0				X
	<i>Iris douglasiana</i>	48	1.8	2.9	0.2	30.0				
	<i>Bromus maritimus</i>	48	0.4	0.8	0.2	6.0				
	<i>Cirsium quercetorum</i>	48	0.1	0.1	0.2	0.7				

*Cynosurus echinatus* – (*Danthonia pilosa* – *Nassella manicata*) Provisional Semi-natural Association  
*Deschampsia cespitosa* – *Hordeum brachyantherum* – *Danthonia californica* Herbaceous Alliance

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<i>Acaena pinnatifida</i>	48	0.1	0.1	0.2	0.4				
	<i>Cynosurus echinatus</i>	43	3.3	3.7	0.2	68.0				
	<i>Hypochaeris glabra</i>	43	0.3	0.9	0.2	13.3				
	<i>Linum bienne</i>	43	0.2	0.6	0.2	6.2				
	<i>Geranium dissectum</i>	43	0.1	0.3	0.2	2.0				
	<i>Juncus bufonius</i>	38	0.7	2.1	0.2	38.7				
	<i>Iris macrosiphon</i>	38	0.7	1.6	0.2	9.5				
	<i>Wyethia angustifolia</i>	33	0.2	0.6	0.2	6.7				
	<i>Koeleria macrantha</i>	33	0.2	0.4	0.2	4.0				
	<i>Trifolium dubium</i>	33	0.3	0.4	0.2	3.0				
	<i>Avena</i> spp.	33	0.1	0.3	0.2	2.9				
	<i>Chlorogalum pomeridianum</i>	33	0.1	0.2	0.2	3.5				
	<i>Symphotrichum chilense</i>	33	0.1	0.2	0.2	2.0				
	<i>Agrostis pallens</i>	29	0.2	0.5	0.2	8.0				
	<i>Perideridia kelloggii</i>	29	0.1	0.3	0.2	1.5				
	<i>Triteleia laxa</i>	29	0.1	0.1	0.2	0.7				
	<i>Sidalcea malviflora</i>	29	0.1	0.1	0.2	1.0				
	<i>Leontodon taraxacoides</i>	24	1.4	2.4	1.3	22.0				
	<i>Stachys ajugoides</i>	24	0.3	0.5	0.2	8.7				
	<i>Brodiaea elegans</i>	24	0.1	0.3	0.2	5.0				
	<i>Grindelia stricta</i>	24	0.2	0.2	0.2	3.0				
	<i>Prunella vulgaris</i>	24	0.0	0.1	0.2	0.9				
	<i>Bromus carinatus</i>	24	0.0	0.0	0.2	0.2				
	<i>Grindelia hirsutula</i>	24	0.0	0.0	0.2	0.2				

## ***Deschampsia cespitosa* – *Eryngium armatum* Association**

**Common Name:** Tufted hairgrass – coastal button-celery Grassland

**Alliance:** *Deschampsia cespitosa* – *Hordeum brachyantherum* – *Danthonia californica* Herbaceous Alliance

### **Local Vegetation Description**

The Tufted hairgrass – coastal button-celery Association forms an intermittent to continuous herbaceous layer. The shrub layer is open and the tree layer is absent. *Deschampsia cespitosa* and/or *Eryngium armatum* are co-dominant and/or diagnostic herbs along with other characteristic herbs including *Achillea millefolium*, *Aira caryophyllea*, *Holcus lanatus*, and *Plantago lanceolata*. Those herbs often present include *Briza minor*, *Cirsium quercetorum*, *Gamochaeta ustulata*, *Hypochaeris radicata*, *Iris douglasiana*, *Juncus phaeocephalus*, *Lolium perenne*, *Prunella vulgaris*, *Rumex acetosella*, and *Sisyrinchium bellum*. Commonly associated emergent shrubs at sparse cover include *Baccharis pilularis*, *Rubus ursinus*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	5.6	0.2 – 19	0.3	0 – 0.5
Herb	83.3	40 – 99	0.3	0 – 0.5

### **Local Environmental Description**

**Elevation:** Mean 34 m, Range 8 – 75 m

**Aspect:** Flat (4), NE (2), NW (2), SW (1)

**Slope:** Mean 5 degrees, Range 0 – 15 degrees

**Macro Topography:** Lower 1/3 of slope (3), Other (1), Edge of basin/wetland (1), Bottom (1)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** Mean 21.4%, Range 2.0 – 60.0%

**Litter Cover:** Mean 51.5%, Range 18.0 – 75%

**Soil Texture (field assessed):** Coarse, loamy sand (2), Medium sand (1), Moderately coarse, sandy loam (1), Moderately fine clay loam (1), Moderately fine sandy clay loam (1)

**Geology (field or map data):** Sandstone and other sedimentary (8), Franciscan melange (1), Sand dunes (1), Sandstone (1), Siltstone (1)

**Marin County Watersheds:** Point Reyes (11), Estero Americano (2)

### **Site Impacts**

This association has moderate non-native plant cover (average 41.3%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*, *Aira praecox*, *Anagallis arvensis*, *Briza minor*, *Bromus hordeaceus*, *Cynosurus echinatus*, *Geranium dissectum*, *Holcus lanatus*, *Hypochaeris radicata*, *Leontodon taraxacoides*, *Lolium perenne*, *Lotus corniculatus*, *Lythrum hyssopifolium*, *Medicago* spp., *Plantago lanceolata*, *Rumex acetosella*, and *Vulpia bromoides*.

### **Classification Comments**

None.

**References:** Buck-Diaz et al. 2019, Klein et al. 2015

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

**Total: N=13; Marin County (n=13):** HEAD0316, HEAD0398, HEAD0400, PGA220, PGA222, PGA325, PGA5284, PORE016, PORE029, PORE031, SFANT06, SFANT06A, SFANT06B

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	54	32.0	3.1	0.2	19.0				X
	<i>Rubus ursinus</i>	54	30.3	0.8	0.2	4.0				X
	<i>Lupinus versicolor</i>	38	29.9	1.6	0.2	11.8				
<b>Herb</b>										
	<b><i>Eryngium armatum</i></b>	<b>100</b>	<b>10.3</b>	<b>13.6</b>	<b>0.2</b>	<b>30.0</b>	<b>X</b>			<b>X</b>
	<i>Holcus lanatus</i>	92	15.5	23.8	0.2	80.0	X			X
	<b><i>Deschampsia cespitosa</i></b>	<b>92</b>	<b>15.1</b>	<b>17.7</b>	<b>0.2</b>	<b>40.0</b>	<b>X</b>			<b>X</b>
	<i>Plantago lanceolata</i>	77	7.3	9.0	0.9	37.5	X			X
	<i>Aira caryophylla</i>	77	1.8	2.7	0.2	13.3	X			X
	<i>Achillea millefolium</i>	77	1.9	2.3	0.2	18.0	X			X
	<i>Hypochaeris radicata</i>	69	3.0	4.4	1.1	27.3				X
	<i>Lolium perenne</i>	69	2.8	2.9	0.2	20.0				X
	<i>Sisyrinchium bellum</i>	69	1.6	2.7	0.2	18.0				X
	<i>Rumex acetosella</i>	69	1.2	2.1	0.2	6.7				X
	<i>Briza minor</i>	69	0.8	1.3	0.2	6.9				X
	<i>Gamochaeta ustulata</i>	62	0.4	0.5	0.2	3.0				X
	<i>Prunella vulgaris</i>	62	0.2	0.3	0.2	2.0				X
	<i>Iris douglasiana</i>	54	2.1	2.5	0.2	20.0				X
	<i>Juncus phaeocephalus</i>	54	1.0	1.9	0.2	16.7				X
	<i>Cirsium quercetorum</i>	54	0.1	0.1	0.2	0.2				X
	<i>Danthonia californica</i>	46	1.4	2.2	0.2	10.0				
	<i>Vulpia bromoides</i>	46	1.0	1.6	0.2	12.0				
	<i>Juncus bufonius</i>	46	0.8	1.2	0.2	6.7				
	<i>Trifolium wormskioldii</i>	46	0.5	0.8	0.2	3.3				
	<i>Leontodon taraxacoides</i>	38	5.9	9.0	8.0	48.0				
	<i>Potentilla anserina</i>	38	1.1	2.4	0.2	27.0				
	<i>Carex obnupta</i>	38	1.6	2.2	2.7	9.3				
	<i>Panicum acuminatum</i>	38	0.9	1.9	0.2	12.7				
	<i>Juncus</i> spp.	38	1.0	0.9	0.2	8.0				
	<i>Lythrum hyssopifolium</i>	38	0.1	0.2	0.2	0.9				
	<i>Horkelia marinensis</i>	38	0.1	0.1	0.2	0.2				
	<i>Juncus patens</i>	31	1.5	2.2	0.2	20.0				
	<i>Lotus formosissimus</i>	31	1.0	2.0	0.2	16.7				
	<i>Pteridium aquilinum</i>	31	0.9	1.3	0.2	10.0				
	<i>Castilleja ambigua</i>	31	0.8	0.7	0.9	3.0				
	<i>Hypericum anagalloides</i>	31	0.3	0.6	0.2	6.0				

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<i>Bromus hordeaceus</i>	31	0.5	0.5	0.2	3.0				
	<i>Stachys ajugoides</i>	31	0.3	0.5	0.2	3.0				
	<i>Aira praecox</i>	31	0.3	0.5	0.2	4.7				
	<i>Anagallis arvensis</i>	31	0.2	0.3	0.2	2.9				
	<i>Luzula comosa</i>	31	0.2	0.2	0.2	1.1				
	<i>Fragaria chiloensis</i>	31	0.1	0.1	0.2	0.2				
	<i>Medicago</i> spp.	31	0.0	0.1	0.2	0.2				
	<i>Carex hassei</i>	23	1.2	2.6	4.7	18.7				
	<i>Cynosurus echinatus</i>	23	1.6	2.0	8.0	10.0				
	<i>Calamagrostis nutkaensis</i>	23	1.1	1.9	3.0	15.0				
	<i>Hordeum brachyantherum</i>	23	0.9	0.9	2.0	8.0				
	<i>Bromus carinatus</i>	23	0.4	0.5	0.2	3.0				
	<i>Sisyrinchium californicum</i>	23	0.2	0.4	0.2	4.2				
	<i>Lotus corniculatus</i>	23	0.2	0.3	0.2	2.7				
	<i>Armeria maritima</i>	23	0.3	0.3	0.2	3.0				
	<i>Juncus kelloggii</i>	23	0.1	0.2	0.4	1.1				
	<i>Cicendia quadrangularis</i>	23	0.1	0.1	0.4	0.9				
	<i>Lotus unifoliolatus</i> var. <i>unifoliolatus</i>	23	0.1	0.1	0.2	0.7				
	unknown Poaceae	23	0.0	0.1	0.2	0.7				
	<i>Geranium dissectum</i>	23	0.0	0.0	0.2	0.2				
<b>Non-vascular</b>										
	Moss	23	23.1	0.7	2.0	4.0				

## ***Deschampsia cespitosa* – *Horkelia marinensis* Association**

**Common Name:** Tufted Hairgrass – Point Reyes Honeydew Marsh

**Alliance:** *Deschampsia cespitosa* – *Hordeum brachyantherum* – *Danthonia californica* Herbaceous Alliance

### **Local Vegetation Description**

The Tufted Hairgrass – Point Reyes Honeydew Marsh Association forms a continuous herbaceous layer. The shrub layer is open and the tree layer is absent. *Deschampsia cespitosa* and *Horkelia marinensis* are co-dominant and/or diagnostic herbs along with other characteristic herbs including *Aira caryophyllea*, *Aira praecox*, *Anagallis arvensis*, *Briza minor*, *Cardionema ramosissimum*, *Carex brevicaulis*, *Castilleja ambigua*, *Clarkia davyi*, *Danthonia californica*, *Eryngium armatum*, *Gamochaeta ustulata*, *Holcus lanatus*, *Hypochaeris glabra*, *Hypochaeris radicata*, *Juncus bufonius*, *Juncus phaeocephalus*, *Leontodon taraxacoides*, *Luzula comosa*, *Panicum acuminatum*, *Plantago erecta*, *Plantago lanceolata*, *Rumex acetosella*, *Silene gallica*, *Sisyrinchium bellum*, *Spergula arvensis*, *Triphysaria floribunda*, and *Vulpia bromoides*. Those herbs often present include *Agrostis densiflora*, *Crassula connata*, *Daucus pusillus*, *Hypericum anagalloides*, *Juncus capitatus*, *Lasthenia californica*, and *Logfia gallica*. Commonly associated emergent shrubs at sparse cover include *Baccharis pilularis* and *Lupinus arboreus*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	7.7	0.4 – 18.1	no data	
Herb	94.5	76 – 99	no data	

### **Local Environmental Description**

**Elevation:** Mean 24 m, Range 20 – 25 m

**Aspect:** Flat (4), NE (1)

**Slope:** Mean 1 degrees, Range 0 – 3 degrees

**Macro Topography:** Bottom (1)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** Mean 9.0%, Range 1.3 – 19.3%

**Litter Cover:** 10%

**Soil Texture (field assessed):** Moderately coarse, sandy loam (1)

**Geology (field or map data):** Sandstone and other sedimentary (4), Siltstone (1)

**Marin County Watersheds:** Point Reyes (5)

### **Site Impacts**

This association has moderate non-native plant cover (average 34.3%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*, *Aira praecox*, *Anagallis arvensis*, *Briza minor*, *Carpobrotus edulis*, *Holcus lanatus*, *Hypochaeris glabra*, *Hypochaeris radicata*, *Juncus capitatus*, *Leontodon taraxacoides*, *Logfia gallica*, *Lythrum hyssopifolium*, *Plantago lanceolata*, *Rumex acetosella*, *Silene gallica*, *Spergula arvensis*, and *Vulpia bromoides*.

### **Classification Comments**

None.

References: Keeler-Wolf et al. 2003a

Global Rarity Rank: G3

State Rarity Rank: S1?

State Rare: Y

**Surveys Used for Description**

Total: N=5; Marin County (n=5): PORE032, SFANT05, SFANT05A, SFANT05B, SFANT11A

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	100	75.4	6.8	0.2	18.1	X	X		X
	<i>Lupinus arboreus</i>	80	19.9	0.8	0.2	2.1	X			X
	<i>Lupinus versicolor</i>	40	4.7	1.0	0.2	4.9				
<b>Herb</b>										
	<b><i>Horkelia marinensis</i></b>	<b>100</b>	<b>17.8</b>	<b>21.2</b>	<b>18.0</b>	<b>23.3</b>	<b>X</b>			<b>X</b>
	<b><i>Deschampsia cespitosa</i></b>	<b>100</b>	<b>10.6</b>	<b>12.8</b>	<b>4.7</b>	<b>25.3</b>	<b>X</b>			<b>X</b>
	<i>Aira caryophyllea</i>	100	8.2	11.5	3.0	20.0	X			X
	<i>Danthonia californica</i>	100	4.5	5.9	3.0	9.3	X			X
	<i>Rumex acetosella</i>	100	3.1	5.1	0.6	17.3	X			X
	<i>Hypochaeris radicata</i>	100	2.4	3.9	0.2	10.7	X			X
	<i>Plantago lanceolata</i>	100	0.7	1.4	0.2	5.3	X			X
	<i>Holcus lanatus</i>	100	0.7	1.4	0.2	6.0	X			X
	<i>Gamochaeta ustulata</i>	100	1.2	1.2	0.6	3.0	X			X
	<i>Plantago erecta</i>	100	1.1	1.0	0.2	3.0	X			X
	<i>Cardionema ramosissimum</i>	100	0.6	0.9	0.2	1.5	X			X
	<i>Eryngium armatum</i>	100	0.4	0.5	0.2	1.1	X			X
	<i>Aira praecox</i>	80	6.7	9.9	8.0	18.0	X			X
	<i>Vulpia bromoides</i>	80	4.6	8.4	3.3	29.3	X			X
	<i>Panicum acuminatum</i>	80	4.5	5.1	3.0	12.7	X			X
	<i>Carex brevicaulis</i>	80	1.9	3.1	0.9	8.0	X			X
	<i>Briza minor</i>	80	2.2	3.1	1.1	6.7	X			X
	<i>Juncus bufonius</i>	80	1.9	2.6	2.7	4.0	X			X
	<i>Juncus phaeocephalus</i>	80	1.9	2.5	0.9	5.3	X			X
	<i>Leontodon taraxacoides</i>	80	1.8	2.3	0.2	8.0	X			X
	<i>Triphysaria floribunda</i>	80	0.9	1.5	0.7	3.7	X			X
	<i>Clarkia davyi</i>	80	0.6	0.9	0.6	1.7	X			X
	<i>Sisyrinchium bellum</i>	80	0.7	0.9	0.9	1.3	X			X
	<i>Spergula arvensis</i>	80	0.7	0.8	0.2	2.0	X			X
	<i>Hypochaeris glabra</i>	80	0.5	0.7	0.2	2.0	X			X
	<i>Silene gallica</i>	80	0.6	0.7	0.4	2.2	X			X
	<i>Anagallis arvensis</i>	80	0.4	0.5	0.2	1.1	X			X
	<i>Castilleja ambigua</i>	80	0.4	0.5	0.2	1.1	X			X
	<i>Luzula comosa</i>	80	0.3	0.5	0.2	0.9	X			X
	<i>Juncus capitatus</i>	60	1.9	2.3	2.9	5.3				X
	<i>Logfia gallica</i>	60	0.9	1.1	1.1	2.2				X

*Deschampsia cespitosa* – *Horkelia marinensis* Association

*Deschampsia cespitosa* – *Hordeum brachyantherum* – *Danthonia californica* Herbaceous Alliance

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<i>Agrostis densiflora</i>	60	0.8	1.1	0.7	3.5				X
	<i>Crassula connata</i>	60	0.5	0.6	0.6	1.5				X
	<i>Daucus pusillus</i>	60	0.2	0.3	0.2	0.7				X
	<i>Lasthenia californica</i>	60	0.2	0.3	0.2	0.7				X
	<i>Hypericum anagalloides</i>	60	0.2	0.2	0.2	0.7				X
	<i>Lotus formosissimus</i>	40	1.2	1.6	1.3	6.9				
	<i>Juncus kelloggii</i>	40	1.1	1.5	3.5	4.0				
	<i>Eschscholzia californica</i>	40	0.5	1.0	0.2	4.7				
	<i>Cicendia quadrangularis</i>	40	0.4	0.5	0.7	2.0				
	<i>Ranunculus californicus</i>	40	0.2	0.3	0.7	1.1				
	<i>Isolepis carinata</i>	40	0.2	0.3	0.2	1.3				
	<i>Sagina decumbens</i>	40	0.2	0.3	0.7	0.7				
	<i>Psilocarphus tenellus</i>	40	0.2	0.2	0.6	0.6				
	<i>Anagallis minima</i>	40	0.2	0.2	0.2	0.9				
	<i>Centaureum muehlenbergii</i>	40	0.1	0.2	0.2	0.6				
	<i>Lythrum hyssopifolium</i>	40	0.1	0.1	0.2	0.4				
	<i>Agrostis blasdalei</i>	40	0.1	0.1	0.2	0.2				
	<i>Calandrinia ciliata</i>	40	0.0	0.1	0.2	0.2				
	<i>Carpobrotus edulis</i>	40	0.1	0.1	0.2	0.2				
	<i>Cirsium quercetorum</i>	40	0.1	0.1	0.2	0.2				
	<i>Lotus heermannii</i>	40	0.1	0.1	0.2	0.2				
	<i>Navarretia squarrosa</i>	40	0.1	0.1	0.2	0.2				



## Deschampsia cespitosa – Iris douglasiana Association

**Common Name:** Tufted Hairgrass – Douglas Iris Patches

**Alliance:** *Deschampsia cespitosa* – *Hordeum brachyantherum* – *Danthonia californica* Herbaceous Alliance

### Local Vegetation Description

The Tufted Hairgrass – Douglas Iris Association forms an intermittent to continuous herbaceous layer. The shrub layer is open and the tree layer is absent. *Deschampsia cespitosa* and/or *Iris douglasiana* are co-dominant and/or diagnostic herbs along with other characteristic herbs including *Achillea millefolium*, *Holcus lanatus*, and *Plantago lanceolata*. Those herbs often present include *Aira caryophyllea*, *Anagallis arvensis*, *Chlorogalum pomeridianum*, *Cirsium quercetorum*, *Elymus glaucus*, *Geranium dissectum*, *Hypochaeris radicata*, *Lolium perenne*, *Pteridium aquilinum*, *Rumex acetosella*, *Sisyrinchium bellum*, *Stachys ajugoides*, and *Vulpia bromoides*. Commonly associated emergent shrubs at sparse cover include *Baccharis pilularis* and *Rubus ursinus*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	4.3	0 – 10	0.3	0 – 0.5
Herb	76.8	50 – 96	0.3	0 – 0.5

### Local Environmental Description

**Elevation:** Mean 71 m, Range 23 – 127 m

**Aspect:** NE (4), SW (3), NW (1), SE (1)

**Slope:** Mean 11 degrees, Range 3 – 20 degrees

**Macro Topography:** Upper 1/3 of slope (4), Lower 1/3 of slope (2), Bottom (1), Ridge top (1)

**Large Rock:** Mean 0.2%, Range 0.0 – 1.0%

**Small Rock:** Mean 0.2%, Range 0.0 – 1.0%

**Fines Cover:** Mean 9.0%, Range 1.0 – 30.0%

**Litter Cover:** Mean 64.0%, Range 15.0 – 92%

**Soil Texture (field assessed):** Moderately fine silty clay loam (2), Moderately fine clay loam (2), Medium silt loam (1), Medium to very fine, loamy sand (1), Medium to very fine, sandy loam (1), Moderately fine sandy clay loam (1)

**Geology (field or map data):** Sandstone and other sedimentary (8), Franciscan melange (2), Shale (1), Granitic (1)

**Marin County Watersheds:** Point Reyes (9), Estero Americano (1), Inverness (1), Lagunitas Creek (1)

### Site Impacts

This association has greater cover of exotics (average 51.8%) than natives. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*, *Anagallis arvensis*, *Briza minor*, *Bromus hordeaceus*, *Cerastium glomeratum*, *Cirsium vulgare*, *Geranium dissectum*, *Holcus lanatus*, *Hypochaeris radicata*, *Linum bienne*, *Lolium perenne*, *Plantago lanceolata*, *Rumex acetosella*, *Sonchus asper*, *Vicia sativa*, and *Vulpia bromoides*.

### Classification Comments

None.

References: Evens and Kentner 2006

Global Rarity Rank: GNR

State Rarity Rank: SNR

State Rare: Y

**Surveys Used for Description**

**Total: N=12; Marin County (n=12):** HEAD0075, HEAD0266, HEAD0271, HEAD0272, HEAD0323, HEAD0402, MMWD0089, PGA1112, PGA440, PGA62, PORE044, SFANT14B

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	83	62.2	3.6	0.1	9.0	X	X		X
	<i>Rubus ursinus</i>	67	22.0	0.8	0.2	5.0				X
<b>Herb</b>										
	<b><i>Iris douglasiana</i></b>	<b>100</b>	<b>12.6</b>	<b>15.0</b>	<b>3.0</b>	<b>45.3</b>	<b>X</b>			<b>X</b>
	<b><i>Deschampsia cespitosa</i></b>	<b>83</b>	<b>10.5</b>	<b>13.5</b>	<b>3.0</b>	<b>40.0</b>	<b>X</b>			<b>X</b>
	<i>Plantago lanceolata</i>	83	10.3	12.2	3.0	31.3	X			X
	<i>Holcus lanatus</i>	75	13.2	14.0	0.2	68.0	X			X
	<i>Achillea millefolium</i>	75	2.0	2.6	0.2	8.0	X			X
	<i>Lolium perenne</i>	67	11.0	14.7	0.2	68.0				X
	<i>Vulpia bromoides</i>	67	8.2	8.2	0.2	38.0				X
	<i>Cirsium quercetorum</i>	67	0.5	0.7	0.2	3.0				X
	<i>Rumex acetosella</i>	67	0.3	0.4	0.2	3.0				X
	<i>Sisyrinchium bellum</i>	67	0.2	0.3	0.1	2.9				X
	<i>Pteridium aquilinum</i>	58	3.6	3.7	0.2	18.0				X
	<i>Aira caryophylla</i>	58	1.0	1.3	0.2	6.0				X
	<i>Chlorogalum pomeridianum</i>	58	0.9	1.0	0.2	6.0				X
	<i>Anagallis arvensis</i>	58	0.3	0.4	0.2	3.0				X
	<i>Hypochaeris radicata</i>	50	2.9	3.5	0.2	18.0				X
	<i>Elymus glaucus</i>	50	1.5	2.5	0.2	15.0				X
	<i>Geranium dissectum</i>	50	0.9	0.9	0.2	7.0				X
	<i>Stachys ajugoides</i>	50	0.2	0.4	0.2	4.0				X
	<i>Fragaria chiloensis</i>	42	5.0	6.9	3.0	38.0				
	<i>Bromus hordeaceus</i>	42	1.3	2.0	0.2	20.0				
	<i>Wyethia angustifolia</i>	42	1.3	1.9	0.1	11.3				
	<i>Prunella vulgaris</i>	42	0.3	0.4	0.2	4.0				
	<i>Triteleia laxa</i>	42	0.3	0.3	0.1	3.0				
	<i>Briza minor</i>	42	0.3	0.3	0.2	3.0				
	<i>Symphotrichum chilense</i>	42	0.2	0.3	0.1	3.0				
	<i>Vicia sativa</i>	42	0.1	0.2	0.2	1.3				
	<i>Sidalcea malviflora</i>	42	0.1	0.2	0.2	1.3				
	<i>Grindelia hirsutula</i>	42	0.1	0.1	0.1	0.2				
	<i>Daucus pusillus</i>	33	0.1	0.3	0.2	3.1				
	<i>Bromus carinatus</i>	33	0.1	0.1	0.2	0.2				
	<i>Calystegia purpurata</i>	33	0.1	0.1	0.2	0.2				

*Deschampsia cespitosa* – *Iris douglasiana* Association  
*Deschampsia cespitosa* – *Hordeum brachyantherum* – *Danthonia californica* Herbaceous Alliance

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<i>Sonchus asper</i>	33	0.1	0.1	0.2	0.2				
	<i>Gamochaeta ustulata</i>	33	0.0	0.1	0.1	0.2				
	<i>Grindelia stricta</i>	25	1.0	1.2	0.2	14.0				
	<i>Calamagrostis nutkaensis</i>	25	1.0	1.0	0.2	7.0				
	<i>Angelica hendersonii</i>	25	0.3	0.3	0.2	3.0				
	<i>Hordeum brachyantherum</i>	25	0.2	0.3	0.2	3.0				
	<i>Danthonia californica</i>	25	0.1	0.1	0.2	1.3				
	<i>Cerastium glomeratum</i>	25	0.0	0.1	0.2	0.2				
	<i>Juncus patens</i>	25	0.0	0.1	0.2	0.2				
	<i>Linum bienne</i>	25	0.1	0.1	0.2	0.2				
	<i>Plantago erecta</i>	25	0.0	0.1	0.2	0.2				
	<i>Cirsium vulgare</i>	25	0.0	0.0	0.1	0.2				

## ***Hordeum brachyantherum* Lowland Association**

**Common Name:** Meadow Barley Lowland Wet Meadow

**Alliance:** *Deschampsia cespitosa* – *Hordeum brachyantherum* – *Danthonia californica* Herbaceous Alliance

### **Local Vegetation Description**

The Meadow Barley Lowland Wet Meadow Association forms an intermittent to continuous herbaceous layer. The shrub layer is sparse and the tree layer is absent. Characteristic herbs include *Hordeum brachyantherum* and *Lolium perenne*. Those herbs often present include *Holcus lanatus*, and herbs that are sometimes present include *Festuca arundinacea*, *Festuca rubra*, *Hemizonia congesta*, *Lotus wrangelianus*, *Nassella pulchra*, *Phalaris aquatica*, *Ranunculus californicus*, and *Sisyrinchium bellum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.5	0.0 – 3	no data	
Herb	84.3	62 – 100	0.6	0 – 1

### **Local Environmental Description**

**Elevation:** Mean 139 m, Range 21 – 409 m

**Aspect:** SW (1), Flat (1), NW (1)

**Slope:** Mean 3 degrees, Range 1 – 5 degrees

**Macro Topography:** Upper 1/3 of slope (1), Ridge top (1), Lower 1/3 of slope (1)

**Large Rock:** 0.0%

**Small Rock:** Mean 0.1%, Range 0.0 – 0.2%

**Fines Cover:** Mean 37.7%, Range 2.0 – 96.0%

**Litter Cover:** Mean 35.4%, Range 0.2 – 96%

**Soil Texture (field assessed):** Medium silt (1), Muck (1)

**Geology (field or map data):** Franciscan melange (2), Sandstone and other sedimentary (2), Granitic (1), Ultramafic (type unknown) (1)

**Marin County Watersheds:** Point Reyes (2), Inverness (1), Lagunitas Creek (1), San Rafael (1), Walker Creek (1)

### **Site Impacts**

This association has greater cover of exotics (average 52.1%) than natives. Non-native species that occur with highest frequency and abundance include *Festuca arundinacea*, *Holcus lanatus*, *Lolium perenne*, and *Phalaris aquatica*.

### **Classification Comments**

This association was formerly included in its own alliance, but is now placed in this coastal grassland alliance.

**References:** Buck-Diaz et al. 2011, Buck-Diaz et al. 2012, Buck-Diaz et al. 2013, Kittel et al. 2012, Klein et al. 2015, Rodriguez et al. 2017

**Global Rarity Rank:** G2

**State Rarity Rank:** SNR

**State Rare:** Y

### Surveys Used for Description

Total: N=6; Marin County (n=6): MARIN217, MARIN283, MMWD0038, PGA2249, PGA228, PGA5346-1

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Herb	<i>Hordeum brachyantherum</i>	100	29.0	23.2	5.0	50.0	X			X
	<i>Lolium perenne</i>	83	23.0	20.2	2.0	60.0	X			X
	<i>Holcus lanatus</i>	67	20.6	21.2	2.0	60.0				X
	<i>Festuca arundinacea</i>	33	3.4	3.5	1.0	20.0				
	<i>Nassella pulchra</i>	33	2.6	1.8	5.0	6.0				
	<i>Festuca rubra</i>	33	0.6	0.4	0.2	2.0				
	<i>Ranunculus californicus</i>	33	0.3	0.4	0.2	2.0				
	<i>Hemizonia congesta</i>	33	0.3	0.2	0.2	1.0				
	<i>Lotus wrangelianus</i>	33	0.3	0.2	0.2	1.0				
	<i>Phalaris aquatica</i>	33	0.2	0.2	0.2	1.0				
	<i>Sisyrinchium bellum</i>	33	0.1	0.1	0.2	0.2				

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## *Distichlis spicata* Herbaceous Alliance

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**Common Name:** Salt grass flats

**NVC Alliance Code:** A1332. *Distichlis spicata* Alkaline Wet Meadow Alliance

### **Statewide Description**

*Distichlis spicata* 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 arcticus*, *Juncus cooperi*, *Lepidium latifolium*, *Leymus triticoides*, *Limonium californicum*, *Muhlenbergia asperifolia*, *Parapholis strigosa*, *Pascopyrum smithii*, *Poa secunda*, *Puccinellia nuttalliana*, *Sarcocornia pacifica*, *Sporobolus airoides*, and *Triglochin maritima*. Emergent shrubs may be present at low cover, including *Allenrolfea occidentalis*, *Atriplex* spp., *Ericameria albida*, *Ericameria nauseosa*, *Sarcobatus vermiculatus*, or *Suaeda moquinii*.

The alliance is commonly found in alkaline or saline environments from the coast to the mountains and deserts of California. Zedler et al. (1999) stated that elevation profiles and vegetation patterns do not always correlate with discrete zonation in coastal marshes, but they recognize three habitats: high marsh, marsh plain, cord grass. *Distichlis spicata* vegetation types are part of the marsh plain habitat.

The National Vegetation Classification (NVC) has two distinct alliances dominated by *Distichlis spicata* for California (NatureServe 2021), which are placed in different groups according to their ecological setting, associated plants, and ecoregional distribution in coastal salt marshes versus inland alkaline marshes. It is undecided at this time whether we will split this into distinct alliances. More data analysis across the state is needed before additional changes are made.

### Local Vegetation Description

The Salt grass flats Alliance forms an intermittent to continuous herbaceous layer. The shrub layer is sparse and the tree layer is sparse. Dominant herbs include *Distichlis spicata*, and characteristic herbs include *Sarcocornia pacifica*. Those herbs often present include *Jaumea carnosa*, and herbs that are sometimes present include *Cordylanthus maritimus*, *Cotula coronopifolia*, *Frankenia salina*, *Limonium californicum*, *Plantago maritima*, *Triglochin concinna*, and *Triglochin maritima*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.2	0 – 4	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	1.0	0 – 15	2.1	0.5 – 5
Herb	83.0	45 – 100	0.3	0 – 1

### Local Membership Rule

*Distichlis spicata* dominates or co-dominates with *Frankenia salina* and/or *Jaumea carnosa*. Non-native grasses including *Avena* spp. and *Bromus hordeaceus* may have high cover and *Sarcocornia pacifica* may be present as a sub-dominant.

### Local Environmental Description

**Elevation:** Mean 7 m, Range 0 – 13 m

**Aspect:** Flat (6), SW (4), SE (3), NE (2), NW (2)

**Slope:** Mean 1 degrees, Range 0 – 4 degrees

**Macro Topography:** Bottom (5), Edge of basin/wetland (5), Lower 1/3 of slope (4), Other (2)

**Large Rock:** Mean 0.0%, Range 0.0 – 0.2%

**Small Rock:** Mean 0.1%, Range 0.0 – 1.0%

**Fines Cover:** Mean 52.4%, Range 0.2 – 97.0%

**Litter Cover:** Mean 19.6%, Range 0.2 – 96%

**Soil Texture (field assessed):** Muck (4), Fine silty clay (2), Medium silt (2), Coarse sand (1), Unknown (1), Moderately fine sandy clay loam (1), Medium to very fine, loamy sand (1), Medium sand (1), Fine sand (1)

**Geology (field or map data):** Alluvium (7), Granitic (4), Mixed alluvium (4), Franciscan melange (2), Sandstone (1)

**Marin County Watersheds:** Walker Creek (8), Point Reyes (7), Bolinas (5), Inverness (4), Lagunitas Creek (4), Novato (2), Drakes Estero (1), Tomales Bay (1)

### Site Impacts

This alliance has low non-native plant cover (average 5.4%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Cotula coronopifolia*.

### Associations in Marin County

*Distichlis spicata* – (*Sarcocornia pacifica*)

*Distichlis spicata* – annual grasses

*Distichlis spicata* – *Frankenia salina* – *Jaumea carnosa*

### Classification Comments

None.

**References:** Atwater et al. 1979, Buck-Diaz and Evens 2011b, Buck-Diaz et al. 2011, Buck-Diaz et al. 2012, Buck-Diaz et al. 2013, Hickson and Keeler-Wolf 2007, Junak et al. 2007, Keeler-Wolf and

Vaghti 2000, Keeler-Wolf et al. 2003a, Klein et al. 2015, Newton 1989, Rodriguez et al. 2017, Sproul et al. 2011

**Global Rarity Rank:** GNR

**State Rarity Rank:** S4

**Surveys Used for Description**

**Total: N=35; Marin County (n=35):** MARIN006, MARIN045, MARIN053, MARIN063, MARIN070, MARIN071, MARIN077, MARIN406, MARIN411, NCSALT03, NCSALT05, PGA1329, PGA186, PGA2081, PGA2200, PGA2256, PGA264, PGA283, PGA294, PGA3419, PGA3551, PGA388, PGA395, PGA3971, PGA4111, PGA56, PGA8555, PORE007, PORE014, PORE020, PORE079, PORE202, SFANM01, SFANM05, SFANM08

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Herb	<i>Distichlis spicata</i>	100	45.7	48.0	2.0	100.0	X		X	X
	<i>Sarcocornia pacifica</i>	80	9.3	10.9	0.2	68.8	X			X
	<i>Jaumea carnosa</i>	71	11.6	14.5	0.2	75.0				X
	<i>Frankenia salina</i>	40	6.3	6.8	1.0	54.0				
	<i>Limonium californicum</i>	37	1.0	1.5	0.2	24.7				
	<i>Triglochin maritima</i>	34	3.1	3.3	1.0	26.0				
	<i>Triglochin concinna</i>	29	2.3	3.2	1.0	63.3				
	<i>Plantago maritima</i>	26	1.8	1.7	0.2	25.0				
	<i>Cotula coronopifolia</i>	23	0.8	0.9	0.2	17.0				
	<i>Cordylanthus maritimus</i>	23	0.2	0.2	0.2	3.0				



## *Distichlis spicata* – (*Sarcocornia pacifica*) Association

**Common Name:** Saltgrass – (Pacific Glasswort) Patches

**Alliance:** *Distichlis spicata* Herbaceous Alliance

### Local Vegetation Description

The Saltgrass – (Pacific Glasswort) Association forms an intermittent to continuous herbaceous layer. The shrub layer is sparse and the tree layer is sparse. The dominant herb is *Distichlis spicata*, and characteristic herbs include *Sarcocornia pacifica*. Often present is *Jaumea carnosa*, and herbs that are sometimes present include *Cotula coronopifolia*, *Frankenia salina*, *Lolium perenne*, *Polypogon monspeliensis*, *Schoenoplectus acutus*, *Spartina foliosa*, *Triglochin concinna*, and *Triglochin maritima*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.7	0 – 4	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.7	0.0 – 5	3.5	2 – 5
Herb	85.1	60 – 100	0.3	0 – 0.5

### Local Environmental Description

**Elevation:** Mean 9 m, Range 4 – 13 m

**Aspect:** SW (2), Flat (1)

**Slope:** Mean 0 degrees, Range 0 – 0 degrees

**Macro Topography:** Edge of basin/wetland (2), Bottom (1)

**Large Rock:** Mean 0.0%, Range 0.0 – 0.0%

**Small Rock:** Mean 0.0%, Range 0.0 – 0.0%

**Fines Cover:** Mean 0.1%, Range 0.0 – 1.0%

**Litter Cover:** Mean 35.3%, Range 5.0 – 96%

**Soil Texture (field assessed):** Fine silty clay (2), Medium silt (1)

**Geology (field or map data):** Alluvium (2), Mixed alluvium (2), Sandstone and other sedimentary (2), Franciscan melange (1), Granitic (1)

**Marin County Watersheds:** Walker Creek (3), Bolinas (1), Inverness (1), Lagunitas Creek (1), Novato (1)

### Site Impacts

This association has low non-native plant cover (average 5.5%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Cotula coronopifolia*, *Lolium perenne*, and *Polypogon monspeliensis*.

### Classification Comments

The name of this vegetation type has been updated from *Distichlis spicata* – *Sarcocornia pacifica* Association to better match the NVC.

**References:** Atwater et al. 1979, Hickson and Keeler-Wolf 2007, Newton 1989

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

### Surveys Used for Description

**Total: N=9; Marin County (n=9):** MARIN406, PGA1329, PGA2081, PGA2256, PGA264, PGA283, PGA3419, PORE079, PORE202

*Distichlis spicata* – (*Sarcocornia pacifica*) Association  
*Distichlis spicata* Herbaceous Alliance

### **Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

<b>Layer</b>	<b>Taxon</b>	<b>Con</b>	<b>Rel</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>	<b>Ch</b>	<b>D</b>	<b>cD</b>	<b>Oft</b>
<b>Herb</b>										
	<i>Distichlis spicata</i>	100	61.3	60.9	18.0	100	X	X		X
	<i>Sarcocornia pacifica</i>	100	14.2	14.2	0.2	30.0	X			X
	<i>Jaumea carnosa</i>	56	2.2	2.0	3.0	5.0				X
	<i>Cotula coronopifolia</i>	44	1.2	1.3	0.2	8.0				
	<i>Triglochin maritima</i>	33	1.6	1.8	4.0	8.0				
	<i>Lolium perenne</i>	22	2.5	2.7	12.0	12.0				
	<i>Schoenoplectus acutus</i>	22	2.9	2.2	5.0	15.0				
	<i>Polypogon monspeliensis</i>	22	1.1	1.1	2.0	8.0				
	<i>Spartina foliosa</i>	22	1.1	1.0	4.0	5.0				
	<i>Frankenia salina</i>	22	0.7	0.7	1.0	5.0				
	<i>Triglochin concinna</i>	22	0.2	0.2	1.0	1.0				

## ***Distichlis spicata* – annual grasses Association**

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**Common Name:** Saltgrass – Ripgut Brome Ruderal Saline/Alkaline Grassland

**Alliance:** *Distichlis spicata* Herbaceous Alliance

### **Local Vegetation Description**

The Saltgrass – Ripgut Brome Ruderal Saline/Alkaline Grassland Association forms a continuous herbaceous layer in the single survey available. The shrub layer is sparse and the tree layer is absent. *Distichlis spicata* is sub-dominant to co-dominant with annual grasses such as *Avena* spp. and *Bromus hordeaceus* in the stand sampled.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	NA	no data	
Hardwood	0.0	NA	no data	
Regenerating or Shrubby Tree	0.0	NA	no data	
Shrub	5.0	NA	no data	
Herb	85.0	NA	0.3	0 – 0.5

### **Local Environmental Description**

**Elevation:** 10 m

**Aspect:** no data

**Slope:** no data

**Macro Topography:** no data

**Large Rock:** no data

**Small Rock:** no data

**Fines Cover:** no data

**Litter Cover:** no data

**Soil Texture (field assessed):** no data

**Geology (field or map data):** Granitic (1)

**Marin County Watersheds:** Inverness (1)

### **Site Impacts**

This association has greater cover of exotics (average 66.7%) than natives. Non-native species that occur with highest frequency and abundance include *Avena* spp. and *Bromus hordeaceus*.

### **Classification Comments**

Though the number of surveys of this association in Marin is low, there was no data available from nearby counties. Since the single survey was an Accuracy Assessment, environmental data is scant.

**References:** Buck-Diaz and Evens 2011b, Buck-Diaz et al. 2011, Buck-Diaz et al. 2012, Buck-Diaz et al. 2013, Hickson and Keeler-Wolf 2007, Junak et al. 2007, Keeler-Wolf and Vaghti 2000, Rodriguez et al. 2017, Sproul et al. 2011

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** N

### **Surveys Used for Description**

**Total: N=1; Marin County (n=1):** PGA56

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	100	100.0	5.0	5.0	5.0	X	X		X
<b>Herb</b>										
	<i>Avena</i> spp.	100	57.1	40.0	40.0	40.0	X	X		X
	<b><i>Distichlis spicata</i></b>	<b>100</b>	<b>28.6</b>	<b>20.0</b>	<b>20.0</b>	<b>20.0</b>	X			X
	<i>Bromus hordeaceus</i>	100	14.3	10.0	10.0	10.0	X			X

***Distichlis spicata* – *Frankenia salina* – *Jaumea carnosa* Association**

**Common Name:** Salt Grass – Alkali Heath – Jaumea Patches

**Alliance:** *Distichlis spicata* Herbaceous Alliance

**Local Vegetation Description**

The Salt Grass – Alkali Heath – Jaumea Association forms an intermittent to continuous herbaceous layer. The shrub layer is absent and the tree layer is absent. Dominant to co-dominant herbs include *Distichlis spicata* with *Jaumea carnosa* and/or *Frankenia salina*, and characteristic herbs include *Sarcocornia pacifica*. However, other forbs can occur and may be co-dominant including those often or sometimes present such as *Limonium californicum*, *Cordylanthus maritimus*, *Plantago maritima*, *Triglochin concinna*, and *Triglochin maritima*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.0	0 – 0	0.8	0.5 – 1
Herb	80.3	45 – 100	0.3	0 – 1

**Local Environmental Description**

**Elevation:** Mean 6 m, Range 0 – 12 m

**Aspect:** Flat (4), SE (3), SW (2), NE (2), NW (2)

**Slope:** Mean 1 degrees, Range 0 – 4 degrees

**Macro Topography:** Lower 1/3 of slope (4), Edge of basin/wetland (3), Bottom (3), Other (2)

**Large Rock:** Mean 0.0%, Range 0.0 – 0.2%

**Small Rock:** Mean 0.1%, Range 0.0 – 1.0%

**Fines Cover:** Mean 62.6%, Range 0.2 – 97.0%

**Litter Cover:** Mean 9.4%, Range 0.2 – 40%

**Soil Texture (field assessed):** Muck (4), Unknown (1), Moderately fine sandy clay loam (1), Medium silt (1), Medium sand (1), Fine sand (1), Coarse sand (1)

**Geology (field or map data):** Sandstone and other sedimentary (7), Alluvium (2), Mixed alluvium (2), Granitic (2), Sandstone (1), Franciscan melange (1)

**Marin County Watersheds:** Point Reyes (6), Walker Creek (5), Bolinas (3), Lagunitas Creek (2), Drakes Estero (1), Inverness (1), Tomales Bay (1)

**Site Impacts**

This association has very low non-native plant cover (average 0.5%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Lolium perenne* and *Cotula coronopifolia*.

**Classification Comments**

None.

**References:** Keeler-Wolf et al. 2003a, Klein et al. 2015, Rodriguez et al. 2017

**Global Rarity Rank:** G3

**State Rarity Rank:** S2.2

**State Rare:** Y

**Surveys Used for Description**

**Total: N=20; Marin County (n=20):** MARIN006, MARIN045, MARIN053, MARIN063, MARIN070, MARIN071, MARIN077, NCSALT03, NCSALT05, PGA186, PGA2200, PGA3551, PGA395, PGA4111, PORE007, PORE014, PORE020, SFANM01, SFANM05, SFANM08

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Herb	<i>Distichlis spicata</i>	100	41.1	46.8	2.0	80.7	X		X	X
	<i>Jaumea carnosa</i>	95	18.9	24.0	0.2	75.0	X			X
	<i>Sarcocornia pacifica</i>	85	9.4	12.3	0.2	68.8	X			X
	<i>Limonium californicum</i>	60	1.8	2.6	0.2	24.7				X
	<i>Frankenia salina</i>	55	10.4	11.2	1.0	54.0				X
	<i>Triglochin concinna</i>	40	3.9	5.5	1.0	63.3				
	<i>Triglochin maritima</i>	40	4.0	4.0	1.0	26.0				
	<i>Plantago maritima</i>	40	3.2	3.0	0.2	25.0				
	<i>Cordylanthus maritimus</i>	35	0.3	0.4	0.2	3.0				

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***Eichhornia crassipes* – *Ludwigia* (*hexapetala*, *peploides*) Herbaceous Provisional Semi-Natural Alliance**

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**Common Name:** Water primrose – water hyacinth wetlands

**NVC Alliance Code:** N/A.

**Statewide Description**

*Eichhornia crassipes*, *Ludwigia hexapetala*, *Ludwigia peploides* ssp. *montevidensis* or other non-native hybrid *Ludwigia* species are dominant as emergent or floating plants on the water surface. *Azolla* spp., algae, *Sparganium*, *Polygonum* spp. and other hydrophytic plants are often present.

Plants create dense mats in shallow water and over wet soil, occurring alone or with natives such as *Azolla filiculoides*, *Hydrocotyle ranunculoides*, and *Schoenoplectus acutus*. The diagnostic non-native plants clog river waterways, lakes, irrigation canals, and agricultural wetland areas, and the mats threaten agriculture and federal water delivery projects. *Ludwigia* species compete with native plants, eliminate open water habitat, and reduce oxygen levels critical for fish survival. The mats also pose a public health threat as a habitat for mosquitoes that carry West Nile virus (Sears et al. 2005). Efforts to remove dense, spreading stands of *Ludwigia hexapetala* are underway, especially in the Russian River watershed, through a *Ludwigia* Task Force (Sears et al. 2005, 2006).

**Local Vegetation Description**

The Water primrose – water hyacinth wetlands Alliance forms an intermittent to continuous herbaceous layer. The shrub layer is absent and the tree layer is absent. Dominant herbs include *Ludwigia* spp. Herbs that are sometimes present include *Azolla filiculoides* and *Myriophyllum aquaticum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.0	0 – 0	no data	
Herb	75.8	50 – 95	0.6	0 – 2

### **Local Membership Rule**

*Ludwigia hexapetala* or *L. peploides* dominates, creating mats in shallow water or over wet soil. Other aquatic plants such as *Azolla*, *Lemna*, *Myriophyllum aquaticum*, *Polygonum*, and *Sparganium* may be present.

### **Local Environmental Description**

**Elevation:** Mean 124 m, Range 19 – 384 m

**Aspect:** Flat (6)

**Slope:** Mean 0 degrees, Range 0 – 2 degrees

**Macro Topography:** Bottom (5), Bottom to Lower 1/3 of slope (1)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** Mean 11.2%, Range 0.0 – 55.0%

**Litter Cover:** Mean 16.7%, Range 0.0 – 97%

**Soil Texture (field assessed):** Muck (5), Not recorded (1)

**Geology (field or map data):** Sandstone and other sedimentary (2), Franciscan melange (1), Silty alluvium (1)

**Marin County Watersheds:** Lagunitas Creek (1), Novato (1)

**Other Watersheds, San Mateo Co.:** Palo Alto (1); **Sonoma Co.:** Lower Russian River (2), Middle Russian River (1)

### **Site Impacts**

This alliance has greater cover of exotics than natives, with high non-native plant cover (average 73.1%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Myriophyllum aquaticum*.

### **Associations in Marin County**

*Ludwigia (hexapetala, peploides)*

### **Classification Comments**

The name of this alliance has been updated from *Ludwigia (hexapetala, peploides)* Alliance to include water hyacinth. Since Marin County has fewer than five surveys of this alliance, data from nearby counties were included.

**References:** Buck-Diaz et al. 2012, Hickson and Keeler-Wolf 2007, Klein et al. 2015

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

### **Surveys Used for Description**

**Total: N=6; Marin County (n=2):** MARIN052, MARIN124

San Mateo County (n=1): SMAT0240

Sonoma County (n=3): SONO0276, SONO0325, SONO0501



### **Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

<b>Layer</b>	<b>Taxon</b>	<b>Con</b>	<b>Rel</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>	<b>Ch</b>	<b>D</b>	<b>cD</b>	<b>Oft</b>
<b>Herb</b>										
	<i>Ludwigia</i> spp.	100	86.5	68.5	46.0	95.0	X	X		X
	<i>Myriophyllum aquaticum</i>	33	5.7	4.5	12.0	15.0				
	<i>Azolla filiculoides</i>	33	1.6	1.3	3.0	5.0				

### ***Ludwigia (hexapetala, peploides)* Provisional Semi-natural Association**

**Common Name:** Water primrose wetlands

**Alliance:** *Eichhornia crassipes* – *Ludwigia (hexapetala, peploides)* Herbaceous Provisional Semi-Natural Alliance

#### **Classification Comments**

The association circumscription is the same as that of the alliance. See above for detailed description. This association is considered provisional since it is under-sampled in its expected range. Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

**State Rare:** N

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## ***Eleocharis (acicularis, macrostachya)* Herbaceous Alliance**

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**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, vernal 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 brackish marshes, ponds, shallow lakes, stream sides, vernal pools, 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).

### Local Vegetation Description

The Needle spike rush and pale spike rush marshes Alliance forms an open to continuous herbaceous layer. The shrub layer is absent and the tree layer is absent. Dominant herbs include *Eleocharis macrostachya*. Those herbs often present include *Rumex crispus*, and herbs that are sometimes present include *Atriplex prostrata*, *Bidens frondosa*, *Bolboschoenus maritimus*, *Cyperus eragrostis*, *Deschampsia danthonioides*, *Distichlis spicata*, *Juncus bufonius*, *Juncus patens*, *Juncus phaeocephalus*, *Leontodon taraxacoides*, *Lolium perenne*, *Lythrum hyssopifolium*, *Mentha pulegium*, *Paspalum distichum*, *Polypogon monspeliensis*, *Raphanus sativus*, and *Xanthium strumarium*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.0	0 – 0	no data	
Herb	79.3	26 – 100	0.3	0 – 1

### Local Membership Rule

*Eleocharis macrostachya* dominates in the herbaceous layer along lakeshores, streambeds, swales, vernal pools, pastures, ditches, and ponds. *Juncus phaeocephalus* and *J. patens* may also be present. If *Lasthenia glaberrima* or *Pleuropogon californicus* have high cover, key to the *L. glaberrima* Alliance.

### Local Environmental Description

**Elevation:** Mean 43 m, Range 2 – 186 m

**Aspect:** Flat (5), SE (2)

**Slope:** Mean 2 degrees, Range 0 – 8 degrees

**Macro Topography:** Lower 1/3 of slope (2), Bottom (2), Edge of basin/wetland (1), Bottom to Lower 1/3 of slope (1), Upper 1/3 of slope (1)

**Large Rock:** Mean 0.2%, Range 0.0 – 1.0%

**Small Rock:** Mean 3.6%, Range 0.0 – 24.0%

**Fines Cover:** Mean 29.2%, Range 0.0 – 72.0%

**Litter Cover:** Mean 47.6%, Range 0.2 – 97%

**Soil Texture (field assessed):** Medium to very fine, loamy sand (3), Fine silty clay (1), Muck (1), Not recorded (1)

**Geology (field or map data):** Alluvium (3), Franciscan melange (2), Sandstone and other sedimentary (2), Large landslides (1), Clayey alluvium (1)

**Marin County Watersheds:** Novato (5), Lagunitas Creek (1), Petaluma River (1), Point Reyes (1), Walker Creek (1)

### Site Impacts

This alliance has moderate non-native plant cover (average 27.0%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Atriplex prostrata*, *Leontodon taraxacoides*, *Lythrum hyssopifolium*, *Mentha pulegium*, *Polypogon monspeliensis*, *Raphanus sativus*, and *Rumex crispus*.

### Associations in Marin County

*Eleocharis macrostachya*

### Classification Comments

None.

**References:** Boul et al. 2021, Buck-Diaz and Evens 2011b, Buck-Diaz et al. 2011, Buck-Diaz et al. 2012, Buck-Diaz et al. 2013, Buck-Diaz et al. 2019, CNPS Vegetation Program 2015, Kittel et al. 2012, Klein et al. 2007, Klein et al. 2015, Pickart 2006, Potter 2005, Smith 1998b

**Global Rarity Rank:** GNR

**State Rarity Rank:** S3S4

### Surveys Used for Description

**Total: N=9; Marin County (n=9):** MARIN109, MARIN233, MARIN412, MARIN414, MARIN416, MTBP009, PGA3775, PGA6646, PORE178

### Alliance Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Herb										
	<i>Eleocharis macrostachya</i>	89	41.9	38.1	6.0	95.0	X		X	X
	<i>Rumex crispus</i>	56	2.0	2.2	0.2	10.0				X
	<i>Polypogon monspeliensis</i>	44	6.9	7.9	0.2	48.0				
	<i>Mentha pulegium</i>	33	8.8	9.7	5.0	42.0				
	<i>Lolium perenne</i>	33	6.5	4.5	0.2	25.0				
	<i>Atriplex prostrata</i>	33	1.5	2.0	0.2	18.0				
	<i>Juncus phaeocephalus</i>	33	1.2	1.7	0.2	10.0				
	<i>Xanthium strumarium</i>	33	0.3	0.3	0.2	2.0				
	<i>Bidens frondosa</i>	33	0.1	0.1	0.2	0.2				
	<i>Bolboschoenus maritimus</i>	22	2.5	2.4	2.0	20.0				
	<i>Raphanus sativus</i>	22	1.7	2.2	0.2	20.0				
	<i>Paspalum distichum</i>	22	2.3	2.2	0.2	20.0				
	<i>Juncus patens</i>	22	0.4	0.5	0.2	4.0				
	<i>Cyperus eragrostis</i>	22	0.4	0.3	1.0	2.0				
	<i>Leontodon taraxacoides</i>	22	0.3	0.1	0.2	1.0				
	<i>Distichlis spicata</i>	22	0.1	0.1	0.2	1.0				
	<i>Lythrum hyssopifolium</i>	22	0.1	0.0	0.2	0.2				
	<i>Juncus bufonius</i>	22	0.1	0.0	0.2	0.2				
	<i>Deschampsia danthonioides</i>	22	0.0	0.0	0.2	0.2				

### ***Eleocharis macrostachya* Association**

**Common Name:** Common spikerush Patches

**Alliance:** *Eleocharis (acicularis, macrostachya)* Herbaceous Alliance

### Classification Comments

The association circumscription is the same as that of the alliance. See above for detailed description.

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** N



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

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

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

**Statewide Description**

*Artemisia pycnocephala*, *Erigeron glaucus*, *Eriogonum latifolium*, *Eriogonum parvifolium*, *Eriophyllum staechadifolium* and/or *Fragaria chiloensis* mix with herbaceous species such as *Achillea millefolium*, *Angelica hendersonii*, *Armeria maritima*, *Bromus carinatus*, *Bromus maritimus*, *Camissonia cheiranthifolia*, *Cardionema ramosissimum*, *Carpobrotus edulis*, *Daucus pusillus*, *Dudleya farinosa*, *Dudleya* spp., *Grindelia stricta*, or *Poa douglasii*. Emergent shrubs may be present including *Baccharis pilularis*, *Lupinus arboreus*, *Lupinus versicolor*, or *Rubus ursinus*.

This alliance occupies a narrow band along the immediate coast of California. It typically occurs on rocky or sandy soils of coastal strand along the North Coast and Central Coast, although occurrences of the diagnostic taxa are known along the Pacific Coast from San Diego County to central Oregon. Stands occur on inner dunes to steep slopes above dunes inland from the leading edge of the beach; they are distinct from those of the *Abronia latifolia* - *Ambrosia chamissonis* Alliance, which is found on more active dune surfaces. Stands of this alliance are rarely impacted by saltwater overwash from storm events. However, reflective dune sand and steep coastal bluffs can have high temperatures in full sunlight. Dry sand is mobile so plants can be damaged by sand blast, root exposure, and foliage burial under the shifting sands. Additionally, beach sand has low water storage capacity and is nutrient poor and lacking in organic matter. Summer fog ameliorates surface conditions to some degree (Pickart and Barbour 2007).

Species composition of this alliance is richer on the inner dunes and coastal bluffs than the

related *Abronia latifolia* - *Ambrosia chamissonis* Alliance because of somewhat decreased salt spray yet wind intensity may vary depending on setting. Vegetation is generally short or mounded in stature due to environmental factors such as intense winds, fluctuation in and/or high temperatures, salt spray, and sand/sandstone movement. Stands are primarily composed of perennial herbs and subshrubs.

Species dominance shifts spatially and temporally in coastal environments and dune ecosystems because environmental conditions create fine-scale vegetation patterning, in which stands of this alliance are often adjacent to stands of the *Abronia latifolia* - *Ambrosia chamissonis*, *Lupinus arboreus*, or *Lupinus chamissonis* - *Ericameria ericoides* alliances. The *Eriophyllum staechadifolium* - *Erigeron glaucus* - *Eriogonum latifolium* alliance is defined following surveys of coastal stands from Mendocino to Santa Barbara County. Stands dominated by *Artemisia pycnocephala* were previously considered as various associations of the *Abronia latifolia* - *Ambrosia chamissonis* dune mat alliance, depending on the codominant species, but have now been included in this more recently defined dune mat alliance.

### **Local Vegetation Description**

The Seaside woolly-sunflower - seaside daisy - buckwheat patches Alliance forms an open to continuous herbaceous layer. The shrub layer is open and the tree layer is absent. Characteristic herbs include *Carpobrotus edulis*. Those herbs often present include *Achillea millefolium*, *Artemisia pycnocephala*, and *Eriogonum latifolium*, and herbs that are sometimes present include *Armeria maritima*, *Camissonia cheiranthifolia*, *Cardionema ramosissimum*, *Daucus pusillus*, *Dudleya farinosa*, *Erigeron glaucus*, *Eriophyllum staechadifolium*, *Grindelia hirsutula*, *Grindelia stricta*, *Hypochaeris radicata*, *Poa douglasii*, *Pteridium aquilinum*, *Rumex acetosella*, and *Vulpia bromoides*. Commonly associated emergent shrubs at sparse cover include *Baccharis pilularis* and *Lupinus arboreus*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	5.6	0 – 17	0.3	0 – 1
Herb	53.7	11 – 90	0.3	0 – 0.5

### **Local Membership Rule**

*Artemisia pycnocephala*, *Erigeron glaucus*, *Eriophyllum staechadifolium*, *Eriogonum latifolium*, and/or *Fragaria chiloensis* dominate or characterize stabilized dunes, sea bluffs and exposed coastal terraces. Shrubs such as *Baccharis pilularis*, *Lupinus arboreus*, *L. versicolor*, and *Rubus ursinus* may be present at low cover. Other native forbs and grasses may be present including *Achillea millefolium*, *Angelica hendersonii*, *Bromus carinatus*, *Daucus pusillus* and/or *Dudleya* spp.

### **Local Environmental Description**

**Elevation:** Mean 39 m, Range 2 – 175 m

**Aspect:** SW (4), NE (2), NW (2), Flat (1), SE (1)

**Slope:** Mean 17 degrees, Range 1 – 46 degrees

**Macro Topography:** Upper 1/3 of slope (3), Dune/sandfield (2), Lower 1/3 of slope (2), Backslope (cliff) (1), Middle to Upper 1/3 of slope (1), Upper 1/3 of slope to Ridgetop (1)

**Large Rock:** Mean 2.1%, Range 0 – 20%

**Fines Cover:** Mean 78.5%, Range 30 – 92%

**Small Rock:** Mean 5.7%, Range 0 – 48%

**Litter Cover:** Mean 14.8%, Range 1 – 55%

**Soil Texture (field assessed):** Medium sand (4), Not recorded (2), Fine sand (2), Moderately coarse, sandy loam (1), Sand, (class unknown) (1)

**Geology (field or map data):** Sandstone and other sedimentary (7), Sand dunes (4), Marine and nonmarine sand deposits (3), Sandstone (1), Granitic (1), Sandstone, shale, and conglomerate (1), Conglomerate (1), Granitic (generic) (1)

**Marin County Watersheds:** Point Reyes (18), Walker Creek (1)

## Site Impacts

This alliance has moderate non-native plant cover (average 23.7%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Carpobrotus edulis*, *Hypochaeris radicata*, *Rumex acetosella*, and *Vulpia bromoides*.

## Associations in Marin County

*Artemisia pycnocephala*  
*Erigeron glaucus* – *Fragaria chiloensis*  
*Eriophyllum staechadifolium* – *Eriogonum latifolium*

## Classification Comments

The NVC will be inducting this as a new alliance, being split from the *Abronia latifolia* - *Ambrosia chamissonis* Dune Grassland and *Ericameria ericoides* – *Lupinus chamissonis* Alliances.

**References:** AIS 2013, AIS 2019, Buck-Diaz et al. 2019, Holton and Johnson 1979, WRA 2017b

**Global Rarity Rank:** G3

**State Rarity Rank:** S3

## Surveys Used for Description

**Total: N=22; Marin County (n=22):** MARIN274, MARIN311, MARIN313, MARIN315, MARIN319, MARIN321, PGA1118, PGA1480, PGA279, PGA3031, PGA418, PGA431, PGA442, PGA475, PGA478, PGA483, PGA484, PGA493A, PORE024, PORE135, PORE177, PORE198

## Alliance Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Shrub	<i>Lupinus arboreus</i>	64	35.6	2.1	0.2	7.0				X
	<i>Baccharis pilularis</i>	55	20.8	2.1	0.2	10.0				X
	<i>Ericameria ericoides</i>	32	13.6	0.8	1.0	7.0				
Herb	<i>Carpobrotus edulis</i>	82	16.7	10.3	0.2	62.5	X			X
	<i>Artemisia pycnocephala</i>	73	21.8	13.2	0.2	42.0				X
	<b><i>Eriogonum latifolium</i></b>	<b>68</b>	<b>9.4</b>	<b>4.5</b>	<b>0.2</b>	<b>25.0</b>				<b>X</b>
	<i>Achillea millefolium</i>	50	1.3	0.7	0.2	5.0				X
	<i>Cardionema ramosissimum</i>	36	4.8	2.6	0.2	18.0				
	<i>Dudleya farinosa</i>	36	1.1	0.7	0.2	10.0				
	<b><i>Eriophyllum staechadifolium</i></b>	<b>32</b>	<b>10.2</b>	<b>6.1</b>	<b>0.2</b>	<b>76.0</b>				
	<i>Grindelia stricta</i>	32	3.4	1.6	3.0	8.0				
	<i>Armeria maritima</i>	32	1.6	1.1	0.2	20.0				
	<b><i>Erigeron glaucus</i></b>	<b>32</b>	<b>0.7</b>	<b>0.4</b>	<b>0.2</b>	<b>6.0</b>				
	<i>Pteridium aquilinum</i>	27	1.1	0.8	0.2	7.0				
	<i>Vulpia bromoides</i>	27	1.5	0.7	0.2	11.0				
	<i>Camissonia cheiranthifolia</i>	27	0.2	0.1	0.2	0.2				
	<i>Poa douglasii</i>	23	2.3	1.0	0.2	10.0				
	<i>Grindelia hirsutula</i>	23	1.7	0.9	0.2	8.0				
	<i>Rumex acetosella</i>	23	1.5	0.9	0.2	12.0				
<i>Hypochaeris radicata</i>	23	0.8	0.3	0.2	3.0					
<i>Daucus pusillus</i>	23	0.2	0.1	0.2	1.0					

## Artemisia pycnocephala Association

**Common Name:** Beach Wormwood Patches

**Alliance:** *Artemisia pycnocephala* Herbaceous Alliance

### Local Vegetation Description

The Beach Wormwood Association forms an open to continuous herbaceous layer. The shrub layer is open and the tree layer is absent. Dominant herbs include *Artemisia pycnocephala*, and characteristic herbs include *Carpobrotus edulis*. Those herbs often present include *Eriogonum latifolium*, and herbs that are sometimes present include *Abronia latifolia*, *Achillea millefolium*, *Armeria maritima*, *Camissonia cheiranthifolia*, *Cardionema ramosissimum*, *Chorizanthe cuspidata*, *Dudleya farinosa*, *Grindelia hirsutula*, *Grindelia stricta*, *Poa douglasii*, and *Pteridium aquilinum*. Commonly associated emergent shrubs at sparse to open cover include *Baccharis pilularis* and *Lupinus arboreus*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	6.0	0.0 – 15	0.3	0 – 1
Herb	60.5	11 – 85	0.3	0 – 0.5

### Local Environmental Description

**Elevation:** Mean 21 m, Range 2 – 37 m

**Aspect:** NW (2), Flat (1), SE (1), SW (1)

**Slope:** Mean 5 degrees, Range 1 – 8 degrees

**Macro Topography:** Dune/sandfield (2), Lower 1/3 of slope (2), Upper 1/3 of slope to Ridgetop (1)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** Mean 87.7%, Range 80.0 – 92.0%

**Litter Cover:** Mean 14.0%, Range 7.0 – 19%

**Soil Texture (field assessed):** Medium sand (3), Sand, (class unknown) (1), Fine sand (1)

**Geology (field or map data):** Sandstone and other sedimentary (5), Marine and nonmarine sand deposits (3), Sand dunes (3)

**Marin County Watersheds:** Point Reyes (10), Walker Creek (1)

### Site Impacts

This association has moderate non-native plant cover (average 28.9%) relative to native cover. The non-native species that occurs with highest frequency and abundance is *Carpobrotus edulis*.

### Classification Comments

Previously five separate associations had been described for stands dominated or co-dominated by *Artemisia pycnocephala*, which were placed in the *Abronia latifolia* – *Ambrosia chamissonis* Herbaceous Alliance. Here these stands are treated as a single association and placed in a new alliance.

**References:** Casavecchia and Biondi 2001, Klein et al. 2015, McBride and Stone 1976

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y



**Surveys Used for Description**

**Total: N=13; Marin County (n=13):** MARIN274, MARIN315, MARIN321, PGA1480, PGA279, PGA418, PGA431, PGA442, PGA475, PGA478, PGA483, PORE135, PORE198

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Lupinus arboreus</i>	62	30.3	2.2	0.2	7.0				X
	<i>Baccharis pilularis</i>	54	16.9	1.9	0.2	10.0				X
	<i>Ericameria ericoides</i>	46	21.7	1.2	1.0	7.0				
<b>Herb</b>										
	<b><i>Artemisia pycnocephala</i></b>	<b>92</b>	<b>34.7</b>	<b>21.4</b>	<b>5.0</b>	<b>42.0</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<i>Carpobrotus edulis</i>	92	27.3	17.0	0.2	62.5	<b>X</b>			<b>X</b>
	<i>Eriogonum latifolium</i>	69	4.8	3.2	0.2	10.0				<b>X</b>
	<i>Cardionema ramosissimum</i>	46	8.0	4.3	3.0	18.0				
	<i>Camissonia cheiranthifolia</i>	46	0.3	0.1	0.2	0.2				
	<i>Grindelia hirsutula</i>	38	2.9	1.6	0.2	8.0				
	<i>Chorizanthe cuspidata</i>	31	3.6	1.8	0.2	12.0				
	<i>Armeria maritima</i>	31	2.3	1.6	0.2	20.0				
	<i>Grindelia stricta</i>	31	1.4	0.9	3.0	3.0				
	<i>Achillea millefolium</i>	31	0.1	0.1	0.2	0.2				
	<i>Poa douglasii</i>	23	2.0	1.4	3.0	10.0				
	<i>Dudleya farinosa</i>	23	1.0	0.8	0.2	10.0				
	<i>Pteridium aquilinum</i>	23	0.7	0.5	0.2	6.0				
	<i>Abronia latifolia</i>	23	0.3	0.1	0.2	1.0				

## ***Erigeron glaucus* – *Fragaria chiloensis* Association**

**Common Name:** Seaside Daisy – Beach strawberry Forbland

**Alliance:** *Eriophyllum staechadifolium* – *Erigeron glaucus* – *Eriogonum latifolium* Herbaceous Alliance

### **Local Vegetation Description**

The Seaside Daisy – Beach strawberry Association forms an open to continuous herbaceous layer. The shrub layer is open and the tree layer is absent. Characteristic herbs include *Erigeron glaucus* and *Fragaria chiloensis*. Those herbs often present include *Achillea millefolium*, *Bromus maritimus*, *Daucus pusillus*, *Dudleya farinosa*, *Eriogonum latifolium*, *Eriophyllum staechadifolium*, *Gamochaeta ustulata*, *Grindelia stricta*, *Hypochaeris radicata*, and *Vulpia bromoides*. Commonly associated emergent shrubs at sparse cover include *Baccharis pilularis*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0.4	0.3	0 – 0.5
Shrub	5.9	0.2 – 13.2	0.3	0 – 1
Herb	58.6	18 – 95	0.3	0 – 0.5

### **Local Environmental Description**

**Elevation:** Mean 31 m, Range 4 – 175 m

**Aspect:** SW (9), NW (6), NE (4), Flat (2), Variable (1), W (1)

**Slope:** Mean 15 degrees, Range 0 – 40 degrees

**Macro Topography:** Lower 1/3 of slope (7), Upper 1/3 of slope (6), Ridge top (3), Lower to Middle 1/3 of slope (2), Middle 1/3 of slope (2), Middle to Upper 1/3 of slope (2), Upper 1/3 of slope to Ridgetop (1)

**Large Rock:** Mean 1.5%, Range 0.0 – 20.0%

**Small Rock:** Mean 5.0%, Range 0.0 – 48.0%

**Fines Cover:** Mean 32.4%, Range 2.0 – 90.0%

**Litter Cover:** Mean 47.5%, Range 0.0 – 95%

**Soil Texture (field assessed):** Medium to very fine, sandy loam (4), Clay, (class unknown) (3), Coarse, loamy sand (3), Sand, (class unknown) (2), Not recorded (2), Moderately fine clay loam (2), Medium sand (2), (1), Loam, (class unknown) (1), Fine sandy clay (1), Medium to very fine, loamy sand (1), Moderately fine sandy clay loam (1)

**Geology (field or map data):** Sandstone (6), Alluvium (3), Sandstone and other sedimentary (3), Sedimentary (type unknown) (2), Granitic (generic) (2), Granitic (2), Sand dunes (2), Conglomerate (1), Clayey alluvium (1), Volcanic and metavolcanic rocks (1)

**Marin County Watersheds:** Point Reyes (3)

**Other Watersheds, San Francisco Co.:** San Francisco Coastal (1); **San Mateo Co.:** San Mateo Coastal (5), Ano Nuevo (3), Pescadero Creek (3), San Francisco Coastal (2); **Sonoma Co.:** Salmon Creek (4), Gualala River (1)

### **Site Impacts**

This association has low non-native plant cover (average 16.7%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Anagallis arvensis*, *Bromus hordeaceus*, *Carpobrotus edulis*, *Geranium dissectum*, *Hypochaeris radicata*, *Lolium perenne*, *Plantago coronopus*, *Plantago lanceolata*, *Sonchus asper*, *Sonchus oleraceus*, and *Vulpia bromoides*.

**Classification Comments**

This association is newly described here. Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** none

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

**Total: N=24; Marin County (n=3):** MARIN311, MARIN313, PGA3031

San Francisco County (n=1): SMAT0226

San Mateo County (n=14): SMAT0113, SMAT0199, SMAT0268, SMAT0270, SMAT0273, SMAT0312, SMAT0321, SMAT0334, SMAT0643, SMAT0645, SMATREL0197, WRBL035, WRBL045, WRBL075

Sonoma County (n=6): HEAD0057, HEAD0362, SONO0457, WRBL053, WRBL054, WRBL056

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	54	40.3	2.9	0.2	10.0				X
	<i>Lupinus versicolor</i>	42	24.0	0.6	0.2	4.0				
	<i>Rubus ursinus</i>	25	1.8	0.1	0.2	1.0				
<b>Herb</b>										
	<b><i>Erigeron glaucus</i></b>	<b>88</b>	<b>17.9</b>	<b>11.1</b>	<b>0.2</b>	<b>37.0</b>	<b>X</b>			<b>X</b>
	<b><i>Fragaria chiloensis</i></b>	<b>79</b>	<b>20.9</b>	<b>17.1</b>	<b>0.2</b>	<b>85.0</b>	<b>X</b>			<b>X</b>
	<i>Achillea millefolium</i>	71	1.2	0.8	0.2	3.0				X
	<i>Daucus pusillus</i>	71	1.2	0.7	0.2	4.0				X
	<i>Eriogonum latifolium</i>	67	3.4	2.6	0.2	20.0				X
	<i>Vulpia bromoides</i>	63	3.6	2.7	0.2	25.0				X
	<i>Eriophyllum stoechadifolium</i>	63	2.7	2.1	0.2	17.5				X
	<i>Bromus maritimus</i>	63	2.6	1.9	0.2	20.0				X
	<i>Dudleya farinosa</i>	63	2.1	1.2	0.2	10.0				X
	<i>Grindelia stricta</i>	50	4.4	2.8	0.2	20.0				X
	<i>Hypochaeris radicata</i>	50	1.8	1.0	0.2	8.0				X
	<i>Gamochaeta ustulata</i>	50	0.9	0.7	0.2	10.0				X
	<i>Carpobrotus edulis</i>	46	3.3	1.8	0.2	20.0				
	<i>Plantago lanceolata</i>	46	0.6	0.3	0.2	2.0				
	<i>Anagallis arvensis</i>	46	0.3	0.3	0.2	3.0				
	<i>Armeria maritima</i>	42	0.8	0.7	0.2	10.0				
	<i>Angelica hendersonii</i>	42	0.7	0.5	0.2	3.0				
	<i>Hordeum brachyantherum</i>	38	0.8	0.7	0.2	8.0				
	<i>Cirsium quercetorum</i>	38	0.4	0.3	0.2	3.0				
	<i>Iris douglasiana</i>	29	1.6	0.7	0.2	10.0				
	<i>Eschscholzia californica</i>	29	0.2	0.2	0.2	3.0				
	<i>Luzula comosa</i>	29	0.4	0.2	0.2	3.0				
	<i>Madia sativa</i>	29	0.2	0.1	0.2	1.0				

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<i>Chlorogalum pomeridianum</i>	25	1.0	0.6	0.2	8.0				
	<i>Danthonia californica</i>	25	0.7	0.3	0.2	5.0				
	<i>Plantago coronopus</i>	25	0.6	0.3	0.2	6.0				
	<i>Ranunculus californicus</i>	25	0.2	0.1	0.2	1.0				
	<i>Plantago maritima</i>	25	0.2	0.1	0.2	1.0				
	<i>Poa unilateralis</i>	25	0.1	0.1	0.2	1.0				
	<i>Pseudognaphalium stramineum</i>	25	0.2	0.1	0.2	1.0				
	<i>Dudleya caespitosa</i>	21	1.0	0.7	1.0	10.0				
	<i>Stachys ajugoides</i>	21	0.6	0.2	0.2	4.0				
	<i>Sidalcea malviflora</i>	21	0.3	0.2	0.2	2.0				
	<i>Geranium dissectum</i>	21	0.2	0.1	0.2	1.6				
	<i>Bromus hordeaceus</i>	21	0.1	0.1	0.2	1.0				
	<i>Galium aparine</i>	21	0.1	0.1	0.2	0.5				
	<i>Lolium perenne</i>	21	0.1	0.1	0.2	0.5				
	<i>Sonchus asper</i>	21	0.1	0.1	0.2	0.5				
	<i>Sonchus oleraceus</i>	21	0.1	0.1	0.2	0.5				

## *Eriophyllum staechadifolium* – *Eriogonum latifolium* Association

**Common Name:** Seaside Woolly Sunflower – Coast Buckwheat Forbland

**Alliance:** *Eriophyllum staechadifolium* – *Erigeron glaucus* – *Eriogonum latifolium* Herbaceous Alliance

### Local Vegetation Description

The Seaside Woolly Sunflower – Coast Buckwheat Association forms an open to continuous herbaceous layer. The shrub layer is open and the tree layer is absent. Dominant herbs include *Eriophyllum staechadifolium*. Those herbs often present include *Eriogonum latifolium* along with *Achillea millefolium*, *Carpobrotus edulis*, *Lolium perenne*, and *Pteridium aquilinum*, and herbs that are sometimes present include *Aira caryophylla*, *Amsinckia*, *Anagallis arvensis*, *Angelica hendersonii*, *Artemisia pycnocephala*, *Bromus carinatus*, *Bromus diandrus*, *Calamagrostis nutkaensis*, *Claytonia perfoliata*, *Dudleya farinosa*, *Erigeron glaucus*, *Marah fabaceus*, *Rumex acetosella*, *Silene gallica*, *Stachys ajugoides*, and *Vulpia bromoides*. Commonly associated emergent shrubs at sparse cover include *Lupinus arboreus*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	5.9	2 – 12	0.3	0 – 0.5
Herb	41.8	17 – 90	0.3	0 – 0.5

### Local Environmental Description

**Elevation:** Mean 37 m, Range 5 – 77 m

**Aspect:** SW (2), NE (1)

**Slope:** Mean 36 degrees, Range 22 – 46 degrees

**Macro Topography:** Backslope (cliff) (1), Middle to Upper 1/3 of slope (1), Upper 1/3 of slope (1)

**Large Rock:** Mean 0.4%, Range 0.0 – 1.2%

**Small Rock:** Mean 1.1%, Range 0.0 – 3.0%

**Fines Cover:** Mean 90.0%, Range 90.0 – 90.0%

**Litter Cover:** Mean 24.0%, Range 7.0 – 55%

**Soil Texture (field assessed):** Fine sand (1), Medium sand (1), Moderately coarse, sandy loam (1)

**Geology (field or map data):** Sandstone (1), Sandstone and other sedimentary (1), Sand dunes (1), Granitic (generic) (1), Sandstone, shale, and conglomerate (1)

**Marin County Watersheds:** Point Reyes (5)

### Site Impacts

This association has low non-native plant cover (average 12.1%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Aira caryophylla*, *Anagallis arvensis*, *Bromus diandrus*, *Carpobrotus edulis*, *Lolium perenne*, *Rumex acetosella*, *Silene gallica*, and *Vulpia bromoides*.

### Classification Comments

None.

**References:** Buck-Diaz et al. 2019, Holton and Johnson 1979

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

**Total: N=6; Marin County (n=6):** MARIN319, PGA1118, PGA484, PGA493A, PORE024, PORE177

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Lupinus arboreus</i>	83	64.7	3.0	2.0	6.0	X	X		X
	<i>Baccharis pilularis</i>	33	12.1	1.4	0.2	8.0				
	<i>Rubus ursinus</i>	33	3.3	0.2	0.2	1.0				
<b>Herb</b>										
	<b><i>Eriophyllum stoechadifolium</i></b>	<b>83</b>	<b>34.8</b>	<b>21.3</b>	<b>0.2</b>	<b>76.0</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<b><i>Eriogonum latifolium</i></b>	<b>67</b>	<b>22.3</b>	<b>8.4</b>	<b>0.2</b>	<b>25.0</b>				<b>X</b>
	<i>Achillea millefolium</i>	67	3.7	1.9	0.2	5.0				X
	<i>Carpobrotus edulis</i>	67	1.7	0.7	0.2	2.0				X
	<i>Pteridium aquilinum</i>	50	2.7	1.7	0.2	7.0				X
	<i>Lolium perenne</i>	50	1.5	0.9	0.2	4.0				X
	<i>Bromus carinatus</i>	33	2.2	1.5	2.0	7.0				
	<i>Rumex acetosella</i>	33	2.0	1.2	1.0	6.0				
	<i>Bromus diandrus</i>	33	1.9	1.0	0.2	6.0				
	<i>Aira caryophyllea</i>	33	1.3	0.8	2.0	3.0				
	<i>Vulpia bromoides</i>	33	1.3	0.7	0.2	4.0				
	<i>Angelica hendersonii</i>	33	1.0	0.7	1.0	3.0				
	<i>Stachys ajugoides</i>	33	0.6	0.5	0.2	3.0				
	<i>Anagallis arvensis</i>	33	0.8	0.5	1.0	2.0				
	<i>Erigeron glaucus</i>	33	0.7	0.5	1.0	2.0				
	<i>Artemisia pycnocephala</i>	33	0.8	0.4	0.2	2.0				
	<i>Calamagrostis nutkaensis</i>	33	0.9	0.4	0.2	2.0				
	<i>Silene gallica</i>	33	0.7	0.4	0.2	2.0				
	<i>Amsinckia</i> spp.	33	0.1	0.1	0.2	0.2				
	<i>Claytonia perfoliata</i>	33	0.1	0.1	0.2	0.2				
	<i>Dudleya farinosa</i>	33	0.1	0.1	0.2	0.2				
	<i>Marah fabaceus</i>	33	0.1	0.1	0.2	0.2				

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## ***Eryngium aristulatum* Herbaceous Alliance**

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**Common Name:** California button-celery patches

**NVC Alliance Code:** A4169. *Eryngium aristulatum* Vernal Pool Alliance

### **Statewide Description**

*Eryngium aristulatum* is co-dominant or characteristically present in the herbaceous layer with *Blennosperma nanum*, *Centromadia fitchii*, *Cicendia quadrangularis*, *Downingia cuspidata*, *Erodium* spp., *Hemizonia congesta* ssp. *luzulifolia*, *Lasthenia glabrata* ssp. *glabrata*, *Lepidium latipes* var. *latipes*, *Lepidium nitidum*, *Limnanthes douglasii* ssp. *rosea*, *Lolium perenne*, *Lupinus bicolor*, *Medicago polymorpha*, *Plagiobothrys greenei*, *Psilocarphus oregonus*, *Trifolium depauperatum* and *Trifolium willdenovii*.

Barbour et al. (2003, 2007b) recognized the *Downingia-Lasthenia* class that includes California pool vegetation on all geomorphic surfaces, landscapes, and soil types in the Central Valley and adjacent foothills. Within that class, they recognized this alliance for the vegetation of shallow vernal pools and pool edges on vertisols. Rare taxa (CNPS 1B.2 plants) include *Astragalus tener* var. *tener* and *Lepidium latipes* var. *heckardii*.

We denote the alliance using only *E. aristulatum* in this treatment; Barbour et al. (2007b) originally named the alliance *Eryngium aristulatum-Lupinus bicolor*. They restricted their alliance definition to vertisols of the Central Valley; however, we are reinterpreting the alliance more broadly to allow for other stands with *E. aristulatum* as the primary diagnostic species without *L. bicolor*.

Klein and Evens (2005) identified similar stands with *E. aristulatum* ssp. *parishii* as a characteristic species within the *Eleocharis macrostachya* alliance in vernal pools on the Santa Rosa Plateau in southern California. Furthermore, some associations classified by Barbour et al. (2007b) in the *Cressa truxillensis-Distichlis spicata* alliance appear similar to this alliance. We need further sampling and data

analysis to understand relationships of these and other types.

**Local Vegetation Description**

The California button-celery patches Alliance forms an open herbaceous layer in the single sample available. The shrub layer is absent and the tree layer is absent. The dominant herb is *Eryngium aristulatum*, and characteristic herbs include *Eleocharis macrostachya*, *Isoetes howellii*, *Lasthenia glaberrima*, *Navarretia leucocephala*, and *Plagiobothrys chorisianus*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.0	0 – 0	no data	
Herb	23.0	23 – 23	0.3	0 – 0.5

**Local Membership Rule**

*Eryngium aristulatum* or *Hemizonia congesta* is co-dominant in the herbaceous layer with other swale and vernal pool species.

**Local Environmental Description**

**Elevation:** 263 m

**Aspect:** Flat (1)

**Slope:** 0 degrees

**Macro Topography:** Bottom (1)

**Large Rock:** 0.2%

**Small Rock:** 0.0%

**Fines Cover:** 56.0%

**Litter Cover:** 1.0%

**Soil Texture (field assessed):** Muck (1)

**Geology (field or map data):** Large landslides (1)

**Marin County Watersheds:** Novato (1)

**Site Impacts**

This alliance has very low non-native plant cover (average 0.0%) relative to native cover. No non-native species were recorded in the single survey.

**Associations in Marin County**

None.

**Classification Comments**

The survey was classified to the alliance level only because we only have one occurrence of this in Marin County, and we need more information to differentiate an Association.

**References:** Barbour et al. 2007b, Buck-Diaz et al. 2012

**Global Rarity Rank:** G2

**State Rarity Rank:** S2

**Surveys Used for Description**

**Total: N=1; Marin County (n=1):** MARIN305



### Alliance Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Herb	<i>Eryngium aristulatum</i>	100	59.8	14.0	14.0	14.0	X	X		X
	<i>Navarretia leucocephala</i>	100	25.6	6.0	6.0	6.0	X			X
	<i>Isoetes howellii</i>	100	8.5	2.0	2.0	2.0	X			X
	<i>Eleocharis macrostachya</i>	100	4.3	1.0	1.0	1.0	X			X
	<i>Plagiobothrys chorisianus</i>	100	0.9	0.2	0.2	0.2	X			X
	<i>Lasthenia glaberrima</i>	100	0.9	0.2	0.2	0.2	X			X

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

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**Common Name:** California poppy – lupine fields

**NVC Alliance Code:** A4240. *Eschscholzia californica* - *Lupinus nanus* Dry Meadow Alliance

### **Statewide Description**

*Eschscholzia californica*, other *Eschscholzia* species, *Lupinus nanus* and/or *Lupinus bicolor* are characteristically present and/or abundant in the herbaceous layer with *Amsinckia* spp., *Avena barbata*, *Bromus* spp., *Chaenactis glabriuscula*, *Clarkia* spp., *Eriogonum* spp., *Erodium cicutarium*, *Hirschfeldia incana*, *Hypochaeris radicata*, *Lotus purshianus*, *Lupinus bicolor*, *Rumex salicifolius*, and *Vulpia myuros*. Emergent trees and shrubs may be present at low cover, including *Pinus sabiniana* or *Eriogonum fasciculatum*.

This alliance represents one of several annual herbaceous types that are widespread in the southern and central portion of cismontane California, where disturbances such as grazing, fire, occasional flooding, and slope movement are moderately frequent. The species composition of these stands appears to shift radically from year to year, depending primarily on the amount and timing of precipitation.

Stands of this alliance may include *Eschscholzia californica*, *E. lemmonii*, and *E. caespitosa*, and commonly include *Lupinus nanus*, *L. bicolor* and related taxa. Other species, especially the non-natives, may mask *Eschscholzia* and *Lupinus* abundance in some years, and competition with non-native plants is common. Robinson et al. (1995) showed that *Eschscholzia californica* competes closely with non-native *Bromus diandrus* for resources. A study by Cook (1965) suggested *E. californica* grows principally where *Avena fatua* cannot exist, as on rocky, steep sites with porous, sterile, or serpentine soils. *E. californica* is adapted to these conditions through its deep taproot and physiological tolerance to different soil conditions.

### Local Vegetation Description

The California poppy – lupine fields Alliance forms an open to intermittent herbaceous layer. The shrub layer is sparse and the tree layer is absent. Characteristic herbs include *Bromus diandrus*, *Bromus hordeaceus*, *Eschscholzia californica*, and *Hypochaeris glabra*. Those herbs often present include *Aira caryophyllea*, *Anagallis arvensis*, *Avena* spp., *Carduus pycnocephalus*, *Chlorogalum pomeridianum*, *Erodium botrys*, *Erodium cicutarium*, *Logfia gallica*, *Lolium perenne*, *Lotus wrangelianus*, *Lupinus bicolor*, *Nassella pulchra*, *Rumex acetosella*, *Silene gallica*, *Trifolium willdenovii*, and *Vulpia bromoides*. Commonly associated emergent shrubs at sparse cover include *Lupinus arboreus*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.9	0.0 – 5.0	0.3	0 – 0.5
Herb	48.5	21 – 60	0.3	0 – 0.5

### Local Membership Rule

*Eschscholzia californica*, *Lupinus bicolor*, and/or *L. nanus* dominate or co-dominate with a variety of native and non-native forbs and grasses.

### Local Environmental Description

**Elevation:** Mean 244 m, Range 72 – 576 m

**Aspect:** SE (3), NW (3), SW (1), NE (1), E (1), Flat (1)

**Slope:** Mean 13 degrees, Range 0 – 24 degrees

**Macro Topography:** Upper 1/3 of slope (3), Middle 1/3 of slope (3), Ridge top (1), Draw (1), Upper 1/3 of slope to Ridgetop (1), Lower 1/3 of slope (1)

**Large Rock:** Mean 1.7%, Range 0.0 – 11.0%

**Small Rock:** Mean 6.4%, Range 0.0 – 29.0%

**Fines Cover:** Mean 38.3%, Range 2.0 – 81.0%

**Litter Cover:** Mean 27.8%, Range 0.2 – 91%

**Soil Texture (field assessed):** Medium to very fine, sandy loam (2), Moderately fine sandy clay loam (2), Not recorded (2), Coarse, loamy sand (1), Fine sandy clay (1), Moderately coarse, sandy loam (1), Moderately fine clay loam (1)

**Geology (field or map data):** Franciscan melange (3), Ultramafic (type unknown) (2), Granitic (generic) (2), Greenstone (1), Volcanic flow rocks (1), Granitic (1)

**Marin County Watersheds:** Lagunitas Creek (3), Point Reyes (2), Bolinas (1), Inverness (1), Petaluma River (1), San Rafael (1), Walker Creek (1)

### Site Impacts

This alliance has greater cover of exotics than natives, non-native plant cover (average 83.5%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*, *Anagallis arvensis*, *Brachypodium distachyon*, *Briza maxima*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Cirsium vulgare*, *Cynosurus echinatus*, *Erodium botrys*, *Erodium cicutarium*, *Galium murale*, *Geranium dissectum*, *Hordeum murinum*, *Hypochaeris glabra*, *Hypochaeris radicata*, *Logfia gallica*, *Plantago lanceolata*, *Rumex acetosella*, *Sherardia arvensis*, *Silene gallica*, *Soliva sessilis*, *Trifolium dubium*, *Trifolium glomeratum*, *Trifolium hirtum*, *Trifolium subterraneum*, *Vicia sativa*, *Vulpia bromoides*, and *Vulpia myuros*.

### Associations in Marin County

*Bromus hordeaceus* – *Lupinus nanus* – *Trifolium* spp.  
*Eschscholzia californica*  
*Lupinus bicolor*

### Classification Comments

None.

**References:** Boul et al. 2011, Buck-Diaz and Evens 2011b, Buck-Diaz et al. 2011, Buck-Diaz et al. 2012, Buck-Diaz et al. 2013, Evens et al. 2004, Kittel et al. 2012, Klein et al. 2007, Klein et al. 2015, Rodriguez et al. 2017

**Global Rarity Rank:** G4

**State Rarity Rank:** S4

### Surveys Used for Description

**Total: N=10; Marin County (n=10):** HEAD0072, HEAD0233, MARIN215, MARIN255, MMWD0004, MMWD0006, MMWD0020, PORE089, PORE152, TAMG010C

### Alliance Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Lupinus arboreus</i>	30	29.4	0.4	0.2	3.0				
	<i>Baccharis pilularis</i>	20	10.6	0.1	0.2	1.0				
<b>Herb</b>										
	<i>Bromus hordeaceus</i>	90	17.6	11.6	1.0	27.0	X			X
	<i>Bromus diandrus</i>	90	10.1	9.2	0.2	30.0	X			X
	<i>Hypochaeris glabra</i>	80	11.2	9.1	0.2	38.0	X			X
	<b><i>Eschscholzia californica</i></b>	<b>80</b>	<b>1.6</b>	<b>0.7</b>	<b>0.1</b>	<b>3.0</b>	<b>X</b>			<b>X</b>
	<i>Lolium perenne</i>	70	4.3	5.3	0.2	30.0				X
	<i>Aira caryophyllea</i>	70	3.2	2.3	0.2	11.0				X
	<i>Silene gallica</i>	70	0.4	0.3	0.2	1.0				X
	<i>Rumex acetosella</i>	60	3.7	4.1	0.2	18.0				X
	<i>Erodium botrys</i>	60	4.3	2.0	0.2	7.0				X
	<i>Erodium cicutarium</i>	60	1.6	1.4	0.2	8.0				X
	<i>Avena</i> spp.	60	1.5	0.9	0.2	3.0				X
	<i>Carduus pycnocephalus</i>	60	0.6	0.6	0.2	3.0				X
	<i>Anagallis arvensis</i>	60	0.4	0.3	0.2	1.0				X
	<i>Chlorogalum pomeridianum</i>	60	0.4	0.2	0.1	1.0				X
	<i>Vulpia bromoides</i>	50	6.5	6.4	3.0	20.0				X
	<b><i>Lupinus bicolor</i></b>	<b>50</b>	<b>1.6</b>	<b>1.6</b>	<b>0.2</b>	<b>10.0</b>				<b>X</b>
	<i>Nassella pulchra</i>	50	1.2	0.6	0.2	3.0				X
	<i>Trifolium willdenovii</i>	50	0.6	0.5	0.2	3.0				X
	<i>Lotus wrangelianus</i>	50	0.3	0.2	0.2	1.0				X
	<i>Logfia gallica</i>	50	0.4	0.2	0.2	1.0				X
	<i>Hordeum murinum</i>	40	2.8	3.2	0.2	30.0				
	<i>Vulpia myuros</i>	40	1.7	0.8	0.2	3.0				
	<b><i>Lupinus nanus</i></b>	<b>40</b>	<b>0.8</b>	<b>0.5</b>	<b>0.2</b>	<b>3.0</b>				

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<i>Achillea millefolium</i>	40	0.4	0.5	0.2	4.0				
	<i>Cynosurus echinatus</i>	40	0.4	0.4	0.2	3.0				
	<i>Trifolium bifidum</i>	40	1.1	0.3	0.2	2.0				
	<i>Plantago lanceolata</i>	40	0.4	0.2	0.2	1.0				
	<i>Trifolium depauperatum</i>	40	0.2	0.1	0.2	0.5				
	<i>Briza maxima</i>	30	2.9	1.9	3.0	10.0				
	<i>Geranium dissectum</i>	30	0.9	1.2	0.2	10.0				
	<i>Hordeum brachyantherum</i>	30	0.9	1.1	0.2	10.0				
	<i>Melica californica</i>	30	0.7	0.6	0.2	6.0				
	<i>Vicia sativa</i>	30	0.6	0.6	0.2	5.0				
	<i>Sidalcea malviflora</i>	30	0.1	0.1	0.2	0.3				
	<i>Sisyrinchium bellum</i>	30	0.1	0.1	0.1	0.2				
	<i>Trifolium hirtum</i>	20	4.2	4.2	0.2	42.0				
	<i>Pteridium aquilinum</i>	20	0.6	0.6	3.0	3.0				
	<i>Stachys ajugoides</i>	20	0.4	0.5	0.2	5.0				
	<i>Lotus micranthus</i>	20	0.4	0.2	0.2	2.0				
	<i>Medicago</i> spp.	20	0.3	0.2	1.0	1.2				
	<i>Brachypodium distachyon</i>	20	0.6	0.2	1.0	1.0				
	<i>Calystegia purpurata</i>	20	0.1	0.1	0.3	1.0				
	<i>Amsinckia</i> spp.	20	0.1	0.1	0.2	1.0				
	<i>Sherardia arvensis</i>	20	0.1	0.1	0.2	0.5				
	<i>Lotus humistratus</i>	20	0.1	0.1	0.2	0.5				
	<i>Galium aparine</i>	20	0.1	0.1	0.2	0.3				
<b>Non-vascular</b>										
	Moss	20	13.5	0.2	0.2	2.2				
	Lichen	20	5.8	0.0	0.2	0.2				

## ***Bromus hordeaceus* – *Lupinus nanus* – *Trifolium* spp. Association**

**Common Name:** Soft Brome – Sky Lupine – Clover Grassland

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

### **Local Vegetation Description**

The Soft Brome – Sky Lupine – Clover Association forms an intermittent herbaceous layer. The shrub layer is sparse and the tree layer is absent. Characteristic herbs include *Aira caryophyllea*, *Bromus diandrus*, *Bromus hordeaceus*, *Hypochaeris glabra* and *Trifolium* spp. Those herbs often present include *Achillea millefolium*, *Anagallis arvensis*, *Avena* spp., *Erodium botrys*, *Erodium cicutarium*, *Eschscholzia californica*, *Logfia gallica*, *Lolium perenne*, *Lotus wrangelianus*, *Lupinus nanus*, *Nassella pulchra*, *Rumex acetosella*, *Silene gallica*, *Trifolium depauperatum*, and *Trifolium willdenovii*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	1.4	0.0 – 5	0.3	0 – 0.5
Herb	52.5	40 – 60	0.3	0 – 0.5

### **Local Environmental Description**

**Elevation:** Mean 204 m, Range 82 – 349 m

**Aspect:** SE (3), NW (2), NE (1)

**Slope:** Mean 13 degrees, Range 7 – 17 degrees

**Macro Topography:** Middle 1/3 of slope (3), Upper 1/3 of slope (1), Draw (1), Upper 1/3 of slope to Ridgetop (1)

**Large Rock:** Mean 0.3%, Range 0.0 – 1.0%

**Small Rock:** Mean 2.6%, Range 0.0 – 7.0%

**Fines Cover:** Mean 34.0%, Range 2.0 – 76.0%

**Litter Cover:** Mean 22.9%, Range 0.2 – 91%

**Soil Texture (field assessed):** Moderately fine sandy clay loam (2), Moderately fine clay loam (1), Medium to very fine, sandy loam (1), Coarse, loamy sand (1), Moderately coarse, sandy loam (1)

**Geology (field or map data):** Franciscan melange (3), Granitic (generic) (1), Ultramafic (type unknown) (1), Granitic (1)

**Marin County Watersheds:** Lagunitas Creek (3), Inverness (1), Point Reyes (1), San Rafael (1)

### **Site Impacts**

This association has greater cover of exotics (average 85.5%) than natives. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*, *Anagallis arvensis*, *Avena* spp., *Briza maxima*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Cynosurus echinatus*, *Erodium botrys*, *Erodium cicutarium*, *Hordeum murinum*, *Hypochaeris glabra*, *Logfia gallica*, *Lolium perenne*, *Medicago* spp., *Plantago lanceolata*, *Rumex acetosella*, *Sherardia arvensis*, *Silene gallica*, *Trifolium dubium*, *Vicia sativa*, *Vulpia bromoides*, and *Vulpia myuros*.

### **Classification Comments**

None.

**References:** Buck-Diaz et al. 2012, Evens et al. 2004, Klein et al. 2007, Klein et al. 2015

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** N

*Bromus hordeaceus* – *Lupinus nanus* – *Trifolium* spp. Association  
*Eschscholzia (californica)* – *Lupinus (nanus)* Herbaceous Alliance

**Surveys Used for Description**

**Total: N=6; Marin County (n=6):** HEAD0072, MARIN215, MMWD0004, MMWD0006, MMWD0020, PORE089

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Lupinus arboreus</i>	33	32.3	0.7	1.0	3.0				
	<i>Baccharis pilularis</i>	33	17.7	0.2	0.2	1.0				
<b>Herb</b>										
	<b><i>Bromus hordeaceus</i></b>	<b>100</b>	<b>23.9</b>	<b>14.3</b>	<b>1.0</b>	<b>27.0</b>	<b>X</b>			<b>X</b>
	<i>Hypochaeris glabra</i>	83	12.7	8.7	1.0	20.0	<b>X</b>			<b>X</b>
	<i>Bromus diandrus</i>	83	9.2	6.2	4.0	10.0	<b>X</b>			<b>X</b>
	<i>Aira caryophylla</i>	83	4.1	2.5	0.2	11.0	<b>X</b>			<b>X</b>
	<i>Nassella pulchra</i>	67	1.9	1.0	0.2	3.0				<b>X</b>
	<b><i>Lupinus nanus</i></b>	<b>67</b>	<b>1.3</b>	<b>0.9</b>	<b>0.2</b>	<b>3.0</b>				<b>X</b>
	<i>Anagallis arvensis</i>	67	0.6	0.4	0.2	1.0				<b>X</b>
	<b><i>Trifolium willdenovii</i></b>	<b>67</b>	<b>0.6</b>	<b>0.3</b>	<b>0.2</b>	<b>1.0</b>				<b>X</b>
	<i>Eschscholzia californica</i>	67	0.5	0.3	0.2	1.0				<b>X</b>
	<i>Logfia gallica</i>	67	0.5	0.3	0.2	1.0				<b>X</b>
	<i>Lotus wrangelianus</i>	67	0.5	0.3	0.2	1.0				<b>X</b>
	<i>Rumex acetosella</i>	50	3.5	3.5	0.2	18.0				<b>X</b>
	<i>Lolium perenne</i>	50	2.8	3.0	0.2	10.0				<b>X</b>
	<i>Erodium botrys</i>	50	3.5	2.0	0.2	7.0				<b>X</b>
	<i>Erodium cicutarium</i>	50	1.3	0.9	0.2	5.0				<b>X</b>
	<i>Avena</i> spp.	50	1.6	0.7	0.2	3.0				<b>X</b>
	<i>Silene gallica</i>	50	0.3	0.2	0.2	1.0				<b>X</b>
	<i>Trifolium depauperatum</i>	50	0.3	0.2	0.2	0.5				<b>X</b>
	<i>Achillea millefolium</i>	50	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Vulpia bromoides</i>	33	5.8	6.3	18.0	20.0				
	<i>Hordeum murinum</i>	33	4.2	5.0	0.2	30.0				
	<i>Briza maxima</i>	33	4.4	2.7	6.0	10.0				
	<i>Hordeum brachyantherum</i>	33	1.4	1.7	0.2	10.0				
	<i>Vicia sativa</i>	33	1.0	1.0	1.0	5.0				
	<i>Carduus pycnocephalus</i>	33	0.7	0.7	1.2	3.0				
	<i>Vulpia myuros</i>	33	0.9	0.5	0.2	3.0				
	<i>Lotus micranthus</i>	33	0.6	0.4	0.2	2.0				
	<i>Medicago</i> spp.	33	0.5	0.4	1.0	1.2				
	<i>Chlorogalum pomeridianum</i>	33	0.5	0.2	0.2	1.0				
	<i>Plantago lanceolata</i>	33	0.5	0.2	0.2	1.0				
	<i>Lotus humistratus</i>	33	0.2	0.1	0.2	0.5				
	<i>Sherardia arvensis</i>	33	0.2	0.1	0.2	0.5				
	<i>Cynosurus echinatus</i>	33	0.1	0.1	0.2	0.2				
	<i>Daucus pusillus</i>	33	0.1	0.1	0.2	0.2				

*Bromus hordeaceus* – *Lupinus nanus* – *Trifolium* spp. Association  
*Eschscholzia (californica)* – *Lupinus (nanus)* Herbaceous Alliance

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<i>Heracleum maximum</i>	33	0.1	0.1	0.2	0.2				
	<i>Plantago erecta</i>	33	0.2	0.1	0.2	0.2				
	<i>Sidalcea malviflora</i>	33	0.2	0.1	0.2	0.2				
	<i>Sisyrinchium bellum</i>	33	0.2	0.1	0.2	0.2				
	<b><i>Trifolium bifidum</i></b>	<b>33</b>	<b>0.2</b>	<b>0.1</b>	<b>0.2</b>	<b>0.2</b>				
	<b><i>Trifolium dubium</i></b>	<b>33</b>	<b>0.2</b>	<b>0.1</b>	<b>0.2</b>	<b>0.2</b>				
	<b><i>Trifolium macraei</i></b>	<b>33</b>	<b>0.2</b>	<b>0.1</b>	<b>0.2</b>	<b>0.2</b>				
	<i>Triphysaria pusilla</i>	33	0.1	0.1	0.2	0.2				
	<i>Vulpia microstachys</i>	33	0.2	0.1	0.2	0.2				



## ***Eschscholzia californica* Association**

**Common Name:** California poppy fields Patches

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

### **Local Vegetation Description**

The California poppy fields Association forms an open to continuous herbaceous layer. The shrub layer is sparse and the tree layer is absent. Characteristic herbs include *Avena* spp., *Eschscholzia californica*, *Rumex acetosella*, and *Silene gallica*. Those herbs often present include *Anagallis arvensis*, *Brachypodium distachyon*, *Bromus diandrus*, *Bromus hordeaceus*, *Chlorogalum pomeridianum*, *Erodium botrys*, *Hypochaeris glabra*, *Logfia gallica*, *Lolium perenne*, and *Vulpia bromoides*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.8	0.0 – 6	no data	
Herb	54.6	21 – 90	0.3	0 – 0.5

### **Local Environmental Description**

**Elevation:** Mean 212 m, Range 15 – 425 m

**Aspect:** SW (4), SE (2), NE (1)

**Slope:** Mean 17 degrees, Range 2 – 36 degrees

**Macro Topography:** Upper 1/3 of slope (4), Middle 1/3 of slope (2), Lower 1/3 of slope (1)

**Large Rock:** Mean 3.1%, Range 0.0 – 15.0%

**Small Rock:** Mean 9.5%, Range 2.0 – 20.0%

**Fines Cover:** Mean 29.1%, Range 2.0 – 81.0%

**Litter Cover:** Mean 38.0%, Range 3.0 – 75%

**Soil Texture (field assessed):** Moderately fine sandy clay loam (2), Not recorded (1), Coarse, loamy sand (1), Fine sandy clay (1), Medium to very fine, sandy loam (1), Moderately fine clay loam (1)

**Geology (field or map data):** Franciscan melange (5), Ultramafic (type unknown) (1), Granitic (1)

**Marin County Watersheds:** Walker Creek (1)

**Other Watersheds, Sonoma Co.:** Lower Russian River (2), Salmon Creek (2), Bodega Harbor (1), Estero San Antonio (1)

### **Site Impacts**

This association has greater cover of exotics (average 72.3%) than natives. Non-native species that occur with highest frequency and abundance include *Anagallis arvensis*, *Avena* spp., *Brachypodium distachyon*, *Briza maxima*, *Briza minor*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Erodium botrys*, *Erodium cicutarium*, *Geranium dissectum*, *Hordeum murinum*, *Hypochaeris glabra*, *Hypochaeris radicata*, *Linum bienne*, *Logfia gallica*, *Lolium perenne*, *Plantago lanceolata*, *Rumex acetosella*, *Sherardia arvensis*, *Silene gallica*, *Sonchus asper*, *Trifolium subterraneum*, *Vulpia bromoides*, and *Vulpia myuros*.

### **Classification Comments**

Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** Buck-Diaz and Evens 2011b, Buck-Diaz et al. 2011, Buck-Diaz et al. 2012, Buck-Diaz et al. 2013, Kittel et al. 2012, Klein et al. 2015, Rodriguez et al. 2017

Global Rarity Rank: GNR

State Rarity Rank: SNR

State Rare: N

**Surveys Used for Description**

Total: N=7; Marin County (n=1): MARIN255

Sonoma County (n=6): HEAD0105, HEAD0256, HEAD0332, HEAD0363, SONO0407, SONO0475

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Herb	<i>Eschscholzia californica</i>	100	10.8	6.0	2.0	8.0	X			X
	<i>Rumex acetosella</i>	86	3.2	2.2	0.2	8.0	X			X
	<i>Avena</i> spp.	86	4.4	2.1	0.2	8.0	X			X
	<i>Silene gallica</i>	86	0.4	0.2	0.2	0.2	X			X
	<i>Vulpia bromoides</i>	71	11.1	7.1	0.2	38.0				X
	<i>Bromus diandrus</i>	71	6.4	4.9	0.2	18.0				X
	<i>Bromus hordeaceus</i>	71	5.3	2.6	0.2	10.0				X
	<i>Anagallis arvensis</i>	71	0.4	0.1	0.2	0.2				X
	<i>Lolium perenne</i>	57	9.2	5.9	0.2	38.0				X
	<i>Hypochaeris glabra</i>	57	4.0	5.5	0.2	38.0				X
	<i>Erodium botrys</i>	57	5.1	2.6	0.2	8.0				X
	<i>Brachypodium distachyon</i>	57	7.1	2.3	0.2	12.0				X
	<i>Chlorogalum pomeridianum</i>	57	0.9	0.5	0.2	3.0				X
	<i>Logfia gallica</i>	57	0.3	0.1	0.2	0.2				X
	<i>Hypochaeris radicata</i>	43	1.2	0.5	0.2	3.0				
	<i>Sonchus asper</i>	43	0.7	0.5	0.2	3.0				
	<i>Sherardia arvensis</i>	43	0.6	0.3	0.1	2.0				
	<i>Geranium dissectum</i>	43	0.3	0.2	0.2	1.0				
	<i>Erodium cicutarium</i>	43	0.3	0.1	0.2	0.2				
	<i>Linum bienne</i>	43	0.2	0.1	0.2	0.2				
	<i>Plantago lanceolata</i>	43	0.3	0.1	0.2	0.2				
	<i>Briza maxima</i>	29	3.3	3.4	6.0	18.0				
	<i>Vulpia myuros</i>	29	3.2	2.9	2.0	18.0				
	<i>Lotus micranthus</i>	29	0.8	1.2	0.2	8.0				
	<i>Brodiaea elegans</i>	29	1.2	0.5	0.2	3.0				
	<i>Hordeum murinum</i>	29	1.2	0.5	0.2	3.0				
	<i>Dichondra donelliana</i>	29	0.9	0.3	0.2	2.0				
	<i>Briza minor</i>	29	0.2	0.1	0.2	0.2				
	<i>Carduus pycnocephalus</i>	29	0.2	0.1	0.2	0.2				
	<i>Dichelostemma capitatum</i>	29	0.1	0.1	0.2	0.2				
	<i>Melica californica</i>	29	0.1	0.1	0.2	0.2				
	<i>Nassella pulchra</i>	29	0.2	0.1	0.2	0.2				
	<i>Trifolium subterraneum</i>	29	0.2	0.1	0.2	0.2				

## Lupinus bicolor Provisional Association

**Common Name:** Miniature lupine fields

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

### Local Vegetation Description

The Miniature lupine fields Association forms an intermittent herbaceous layer. The shrub layer is sparse or absent and the tree layer is absent. *Lupinus bicolor* is characteristically present to co-dominant along with *Bromus diandrus*, *Carduus pycnocephalus*, *Chlorogalum pomeridianum*, *Eschscholzia californica*, *Lolium perenne*, and *Silene gallica*. Those herbs often present include *Aira caryophylla*, *Avena* spp., *Bromus carinatus*, *Bromus hordeaceus*, *Calystegia purpurata*, *Cynosurus echinatus*, *Erodium botrys*, *Erodium cicutarium*, *Geranium dissectum*, *Hypochaeris glabra*, *Melica californica*, *Rumex acetosella*, and *Vulpia bromoides*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.1	0.0 – 0.2	no data	
Herb	60.0	60 – 60	0.3	0 – 0.5

### Local Environmental Description

**Elevation:** Mean 381 m, Range 155 – 576 m

**Aspect:** E (1), Flat (1), NW (1)

**Slope:** Mean 11 degrees, Range 0 – 24 degrees

**Macro Topography:** Upper 1/3 of slope (2), Ridge top (1)

**Large Rock:** Mean 4.1%, Range 0.2 – 11.0%

**Small Rock:** Mean 10.1%, Range 0.2 – 29.0%

**Fines Cover:** Mean 27.5%, Range 25.0 – 30.0%

**Litter Cover:** Mean 46.0%, Range 35.0 – 68%

**Soil Texture (field assessed):** Not recorded (1), Medium to very fine, sandy loam (1), Fine sandy clay (1)

**Geology (field or map data):** Granitic (generic) (1), Greenstone (1), Volcanic flow rocks (1)

**Marin County Watersheds:** Bolinas (1), Petaluma River (1), Point Reyes (1)

### Site Impacts

This association has greater cover of exotics (average 82.2%) natives. Non-native species that occur with highest frequency and abundance include *Aira caryophylla*, *Anagallis arvensis*, *Avena* spp., *Brachypodium distachyon*, *Briza maxima*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Cerastium glomeratum*, *Cirsium vulgare*, *Cynosurus echinatus*, *Dactylis glomerata*, *Elymus caput-medusae*, *Erodium botrys*, *Erodium cicutarium*, *Galium murale*, *Galium parisiense*, *Geranium dissectum*, *Holcus lanatus*, *Hordeum murinum*, *Hypochaeris glabra*, *Hypochaeris radicata*, *Lolium perenne*, *Plantago lanceolata*, *Rumex acetosella*, *Silene gallica*, *Sonchus* spp., *Sonchus oleraceus*, *Torilis arvensis*, *Torilis nodosa*, *Trifolium glomeratum*, *Trifolium hirtum*, *Vicia sativa*, *Vulpia bromoides*, and *Vulpia myuros*.

### Classification Comments

This association is considered provisional since it is under-sampled in its expected range.

References: Boul et al. 2011, Buck-Diaz and Evens 2011b, Buck-Diaz et al. 2011, Buck-Diaz et al. 2013

Global Rarity Rank: G3

State Rarity Rank: S3

State Rare: Y

**Surveys Used for Description**

Total: N=3; Marin County (n=3): HEAD0233, PORE152, TAMG010C

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>	<i>Lupinus arboreus</i>	33	33.3	0.1	0.2	0.2				
<b>Herb</b>	<i>Bromus diandrus</i>	100	15.1	18.3	3.0	30.0	X			X
	<i>Lolium perenne</i>	100	8.5	11.7	2.0	30.0	X			X
	<b><i>Lupinus bicolor</i></b>	<b>100</b>	<b>4.9</b>	<b>5.3</b>	<b>3.0</b>	<b>10.0</b>	<b>X</b>			<b>X</b>
	<i>Eschscholzia californica</i>	100	1.1	1.1	0.1	3.0	X			X
	<i>Silene gallica</i>	100	0.4	0.5	0.2	1.0	X			X
	<i>Carduus pycnocephalus</i>	100	0.4	0.5	0.2	1.0	X			X
	<i>Chlorogalum pomeridianum</i>	100	0.2	0.2	0.1	0.3	X			X
	<i>Hypochaeris glabra</i>	67	11.5	13.0	1.0	38.0				X
	<i>Bromus hordeaceus</i>	67	7.6	9.3	10.0	18.0				X
	<i>Vulpia bromoides</i>	67	5.5	7.7	3.0	20.0				X
	<i>Rumex acetosella</i>	67	5.1	6.7	5.0	15.0				X
	<i>Geranium dissectum</i>	67	2.4	3.4	0.2	10.0				X
	<i>Aira caryophylla</i>	67	2.4	2.7	0.2	8.0				X
	<i>Erodium cicutarium</i>	67	2.4	2.7	0.2	8.0				X
	<i>Melica californica</i>	67	2.0	2.1	0.2	6.0				X
	<i>Avena</i> spp.	67	1.5	1.7	2.0	3.0				X
	<i>Cynosurus echinatus</i>	67	1.0	1.1	0.3	3.0				X
	<i>Erodium botrys</i>	67	1.0	1.1	0.3	3.0				X
	<i>Calystegia purpurata</i>	67	0.3	0.4	0.3	1.0				X
	<i>Bromus carinatus</i>	67	0.1	0.1	0.1	0.2				X
	<i>Trifolium hirtum</i>	33	13.9	14.0	42.0	42.0				
	<i>Trifolium wormskioldii</i>	33	1.9	2.7	8.0	8.0				
	<i>Stachys ajugoides</i>	33	1.2	1.7	5.0	5.0				
	<i>Achillea millefolium</i>	33	0.9	1.3	4.0	4.0				
	<i>Agoseris heterophylla</i>	33	0.9	1.0	3.0	3.0				
	<i>Briza maxima</i>	33	1.0	1.0	3.0	3.0				
	<i>Madia elegans</i>	33	0.9	1.0	3.0	3.0				
	<i>Pteridium aquilinum</i>	33	0.9	1.0	3.0	3.0				
	<i>Trifolium willdenovii</i>	33	0.9	1.0	3.0	3.0				
	<i>Vulpia myuros</i>	33	0.9	1.0	3.0	3.0				
	<i>Hordeum murinum</i>	33	0.5	0.7	2.0	2.0				
	<i>Brachypodium distachyon</i>	33	0.3	0.3	1.0	1.0				
	<i>Hordeum brachyantherum</i>	33	0.2	0.3	1.0	1.0				

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<i>Galium aparine</i>	33	0.1	0.1	0.3	0.3				
	<i>Nassella pulchra</i>	33	0.1	0.1	0.3	0.3				
	<i>Sidalcea malviflora</i>	33	0.1	0.1	0.3	0.3				
	<i>Sonchus oleraceus</i>	33	0.1	0.1	0.3	0.3				
	<i>Amsinckia</i> spp.	33	0.0	0.1	0.2	0.2				
	<i>Anagallis arvensis</i>	33	0.0	0.1	0.2	0.2				
	<i>Cerastium glomeratum</i>	33	0.1	0.1	0.2	0.2				
	<i>Cirsium brevistylum</i>	33	0.0	0.1	0.2	0.2				
	<i>Cirsium vulgare</i>	33	0.0	0.1	0.2	0.2				
	<i>Croton setigerus</i>	33	0.1	0.1	0.2	0.2				
	<i>Dactylis glomerata</i>	33	0.0	0.1	0.2	0.2				
	<i>Delphinium variegatum</i>	33	0.1	0.1	0.2	0.2				
	<i>Dichelostemma capitatum</i>	33	0.1	0.1	0.2	0.2				
	<i>Dichelostemma congestum</i>	33	0.1	0.1	0.2	0.2				
	<i>Elymus caput-medusae</i>	33	0.1	0.1	0.2	0.2				
	<i>Elymus glaucus</i>	33	0.1	0.1	0.2	0.2				
	<i>Galium murale</i>	33	0.1	0.1	0.2	0.2				
	<i>Galium parisiense</i>	33	0.1	0.1	0.2	0.2				
	<i>Holcus lanatus</i>	33	0.0	0.1	0.2	0.2				
	<i>Hypochaeris radicata</i>	33	0.0	0.1	0.2	0.2				
	<i>Lotus wrangelianus</i>	33	0.1	0.1	0.2	0.2				
	<i>Marah fabaceus</i>	33	0.0	0.1	0.2	0.2				
	<i>Plagiobothrys nothofulvus</i>	33	0.1	0.1	0.2	0.2				
	<i>Plantago lanceolata</i>	33	0.0	0.1	0.2	0.2				
	<i>Ranunculus californicus</i>	33	0.1	0.1	0.2	0.2				
	<i>Sanicula bipinnata</i>	33	0.1	0.1	0.2	0.2				
	<i>Sonchus</i> spp.	33	0.0	0.1	0.2	0.2				
	<i>Trifolium bifidum</i>	33	0.1	0.1	0.2	0.2				
	<i>Trifolium ciliolatum</i>	33	0.1	0.1	0.2	0.2				
	<i>Trifolium depauperatum</i>	33	0.1	0.1	0.2	0.2				
	<i>Trifolium glomeratum</i>	33	0.1	0.1	0.2	0.2				
	<i>Trifolium microcephalum</i>	33	0.1	0.1	0.2	0.2				
	<i>Trifolium microdon</i>	33	0.1	0.1	0.2	0.2				
	<i>Vicia sativa</i>	33	0.0	0.1	0.2	0.2				
	<i>Aphanes arvensis</i>	33	0.0	0.0	0.1	0.1				
	<i>Clarkia purpurea</i>	33	0.0	0.0	0.1	0.1				
	<i>Navarretia pubescens</i>	33	0.0	0.0	0.1	0.1				
	<i>Poa secunda</i>	33	0.0	0.0	0.1	0.1				
	<i>Sisyrinchium bellum</i>	33	0.0	0.0	0.1	0.1				
	<i>Thysanocarpus curvipes</i>	33	0.0	0.0	0.1	0.1				
	<i>Torilis arvensis</i>	33	0.0	0.0	0.1	0.1				
	<i>Torilis nodosa</i>	33	0.0	0.0	0.1	0.1				
	<i>Trifolium albopurpureum</i>	33	0.0	0.0	0.1	0.1				

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## ***Festuca idahoensis* – *Danthonia californica* Herbaceous Alliance**

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**Common Name:** Idaho fescue - California oatgrass grassland

**NVC Alliance Code:** A4210. *Festuca idahoensis* ssp. *roemeri* - *Danthonia californica* Interior Prairie, Bald & Bluff Grassland Alliance

### **Statewide Description**

*Danthonia californica*, *Festuca idahoensis*, *Festuca californica*, and/or *Festuca rubra* is dominant or co-dominant in the herbaceous layer with *Achillea millefolium*, *Aira caryophyllea*, *Anagallis arvensis*, *Bromus hordeaceus*, *Chlorogalum pomeridianum*, *Cynosurus echinatus*, *Hypochaeris radicata*, *Koeleria macrantha*, *Lolium perenne* ssp. *multiflorum*, *Nassella pulchra*, *Plantago lanceolata*, *Rumex acetosella*, *Sisyrinchium bellum* and *Vulpia bromoides*. Emergent trees or shrubs may be present at low cover, including *Baccharis pilularis*, *Elymus glaucus*, *Pseudotsuga menziesii*, *Rubus ursinus*, or *Toxicodendron diversilobum*.

Although these three character species exist in a variety of habitats across California, this alliance describes coastal prairie grasslands along the central coast and in northwestern California. On the North Coast (north of Marin County), this coastal prairie occurs in two settings: terrace prairie along the coastline at low and maritime elevations, and bald hills prairie on inland ridges and hilltops. In either phase, shrubs and trees are generally absent. Native perennial bunchgrasses mix with annual and perennial forbs creating a colorful display in late spring (Ornduff et al. 2003).

### **Local Vegetation Description**

The Idaho fescue - California oatgrass grassland Alliance forms an open to continuous herbaceous layer. The shrub layer is open and the tree layer is sparse. Characteristic herbs include *Danthonia californica*.

Those herbs often present include *Achillea millefolium*, *Aira caryophyllea*, *Anagallis arvensis*, *Avena* spp., *Bromus hordeaceus*, *Chlorogalum pomeridianum*, *Hypochaeris radicata*, *Lolium perenne*, *Nassella pulchra*, *Plantago lanceolata*, and *Sisyrinchium bellum*. Commonly associated emergent shrubs at sparse cover include *Baccharis pilularis*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 1	no data	
Hardwood	0.1	0 – 2	3.5	2 – 5
Regenerating or Shrubby Tree	0.0	0 – 0	3.5	2 – 5
Shrub	2.9	0 – 26	0.4	0 – 2
Herb	71.6	18 – 99	0.5	0 – 2

### **Local Membership Rule**

*Festuca idahoensis*, *F. californica*, *F. rubra*, *Heterotheca sessiliflora*, and/or *Danthonia californica* dominate or characterize stands. *Bromus carinatus*, *Elymus glaucus*, *Nassella pulchra*, *Plantago erecta*, and a variety of native and non-native forbs and grasses may intermix as sub-dominants. *Festuca*, *Danthonia* or *Perideridia kelloggii* and other native species share at least 10% relative cover in the herb layer, with other non-native grasses and forbs sometimes having higher cover (e.g., *Cynosurus echinatus*, *Hypochaeris radicata*, and *Vulpia bromoides*). Occasionally, the larger *Festuca californica* may replace *F. idahoensis* in somewhat shadier or less exposed sites.

### **Local Environmental Description**

**Elevation:** Mean 195 m, Range 13 – 664 m

**Aspect:** SW (26), NW (20), NE (14), SE (13), N (3), Flat (2), E (1), S (1), Variable (1)

**Slope:** Mean 15 degrees, Range 0 – 42 degrees

**Macro Topography:** Upper 1/3 of slope (32), Middle 1/3 of slope (22), Lower 1/3 of slope (7), Ridge top (2), Middle to Upper 1/3 of slope (2), Not recorded (1), Entire slope (1), Bottom (1), Upper 1/3 of slope to Ridgetop (1)

**Large Rock:** Mean 2.6%, Range 0.0 – 80.0%

**Small Rock:** Mean 7.1%, Range 0.0 – 85.0%

**Fines Cover:** Mean 18.0%, Range 0.0 – 98.0%

**Litter Cover:** Mean 54.0%, Range 0.0 – 98%

**Soil Texture (field assessed):** Not recorded (18), Moderately fine silty clay loam (8), Moderately fine sandy clay loam (6), Medium to very fine, sandy loam (6), Moderately coarse, sandy loam (6), Coarse, loamy sand (5), Moderately fine clay loam (5), Fine clay (3), Fine silty clay (3), Medium silt (3), Medium loam (2), Medium silt loam (1)

**Geology (field or map data):** Sandstone and other sedimentary (30), Franciscan melange (30), Volcanic and metavolcanic rocks (10), Ultramafic rocks, mostly serpentine (8), Serpentine (7), Ultramafic (type unknown) (4), Blueschist and semi-schist (2), Alluvium (2), Granitic (1), Siltstone (1), Mixed alluvium (1)

**Marin County Watersheds:** Bolinas (31), Lagunitas Creek (22), Walker Creek (16), San Rafael (15), Point Reyes (8), Novato (4), Inverness (1)

### **Site Impacts**

This alliance has moderate non-native plant cover (average 44.5%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*, *Anagallis arvensis*, *Brachypodium distachyon*, *Briza maxima*, *Briza minor*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Cynosurus echinatus*, *Erodium botrys*, *Geranium dissectum*, *Hypochaeris glabra*, *Hypochaeris radicata*, *Linum bienne*, *Logfia gallica*, *Plantago lanceolata*, *Rumex acetosella*, *Silene gallica*, *Sonchus asper*, *Trifolium dubium*, and *Vulpia bromoides*.

**Associations in Marin County**

- Danthonia californica* – *Nassella pulchra*
- Danthonia californica* Coastal
- Festuca californica*
- Festuca idahoensis* – (*Danthonia californica* – *Koeleria macrantha*)
- Festuca idahoensis* – *Nassella pulchra*
- Festuca idahoensis* Ultramafic
- Festuca rubra*
- Heterotheca sessiliflora* – *Danthonia californica*
- Perideridia kelloggii* – *Danthonia californica*

**Classification Comments**

None.

**References:** Evens and Kentner 2006, Jimerson 1993, Keeler-Wolf et al. 2003a, Klein et al. 2015, Michaels 2004

**Global Rarity Rank:** GNR

**State Rarity Rank:** S3

**Surveys Used for Description**

**Total: N=99; Marin County (n=99):** HEAD0038, HEAD0047, HEAD0048, HEAD0049, HEAD0053, HEAD0054, HEAD0064, HEAD0066, HEAD0069, HEAD0124, HEAD0125, HEAD0128, HEAD0138, HEAD0139, HEAD0143, HEAD0144, HEAD0146, HEAD0167, HEAD0184, HEAD0185, HEAD0221, HEAD0224, HEAD0225, HEAD0226, HEAD0229, HEAD0238, HEAD0240, HEAD0241, HEAD0244, HEAD0251, HEAD0264, HEAD0280, HEAD0281, HEAD0311, HEAD0315, HEAD0324, HEAD0331, HMRA001, HMRA012, LMW006A, MARIN224, MARIN228, MARIN237, MARIN256, MARIN262, MARIN295, MARIN302, MMWD0015, MMWD0026, MMWD0034, MMWD0036, MMWD0042, MMWD0047, MMWD0066, MMWD0601, MMWD0604, MMWD0608, MMWD0609, MOSD0344, MOSD0362, MWOS01, OSH02, OSH03, PGA177, PGA194, PGA199, PGA549, PGA550, PGA569, PGA571, PGA575, PGA579, PGA582, PGA64, PORE004, RIMO003, RIMO006, RIMO007, SFANB01C, SFANB02B, SFANB03B, SFANB04C, SFANB05B, SFANB06A, SFANB07B, SFANB09B, SFANB10B, SFANB11C, SFANB12C, SFANT10A, TAMG013C, TAMG020M, TAMG023M, TAMG026M, TAMG030M, TAMG034C, TAMG037M, TAMG039M, WRBL021

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Shrub	<i>Baccharis pilularis</i>	52	34.8	1.5	0.1	12.0				X
Herb	<b><i>Danthonia californica</i></b>	<b>80</b>	<b>8.6</b>	<b>7.8</b>	<b>0.2</b>	<b>68.0</b>	<b>X</b>			<b>X</b>
	<i>Nassella pulchra</i>	70	5.4	5.6	0.2	30.0				X
	<i>Lolium perenne</i>	64	7.2	7.5	0.2	68.0				X
	<i>Chlorogalum pomeridianum</i>	63	2.4	2.5	0.2	38.0				X
	<i>Sisyrinchium bellum</i>	62	0.6	0.7	0.2	18.0				X
	<i>Hypochaeris radicata</i>	60	2.9	4.1	0.2	50.7				X
	<i>Avena</i> spp.	58	3.0	3.5	0.2	38.0				X
	<i>Aira caryophyllea</i>	58	1.4	1.5	0.2	30.0				X
	<i>Anagallis arvensis</i>	56	0.4	0.5	0.1	8.0				X
	<i>Plantago lanceolata</i>	55	4.8	5.9	0.2	68.0				X
	<i>Bromus hordeaceus</i>	54	1.1	0.9	0.2	10.0				X



Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<i>Achillea millefolium</i>	53	0.3	0.3	0.1	3.0				X
	<i>Vulpia bromoides</i>	48	4.5	5.8	0.2	81.3				
	<i>Koeleria macrantha</i>	48	0.9	1.0	0.2	25.0				
	<i>Plantago erecta</i>	47	1.6	1.5	0.2	22.7				
	<b><i>Festuca idahoensis</i></b>	<b>46</b>	<b>12.1</b>	<b>11.1</b>	<b>0.2</b>	<b>68.0</b>				
	<i>Rumex acetosella</i>	44	1.0	0.9	0.2	15.0				
	<i>Briza maxima</i>	43	6.4	7.8	0.2	68.0				
	<i>Hypochaeris glabra</i>	43	1.7	2.2	0.2	44.0				
	<i>Cynosurus echinatus</i>	39	1.5	2.0	0.2	38.0				
	<i>Elymus glaucus</i>	36	0.5	0.6	0.2	8.0				
	<i>Silene gallica</i>	36	0.2	0.2	0.2	3.5				
	<i>Ranunculus californicus</i>	35	0.2	0.2	0.1	3.0				
	<i>Eschscholzia californica</i>	34	0.3	0.3	0.1	6.7				
	<i>Bromus carinatus</i>	33	1.3	1.2	0.1	20.0				
	<i>Bromus diandrus</i>	32	0.7	0.6	0.2	15.0				
	<i>Briza minor</i>	32	0.2	0.4	0.1	18.7				
	<i>Logfia gallica</i>	29	0.2	0.2	0.2	3.5				
	<i>Linum bienne</i>	29	0.2	0.2	0.2	3.0				
	<i>Sidalcea malviflora</i>	26	0.1	0.1	0.1	1.0				
	<i>Erodium botrys</i>	24	0.5	0.8	0.1	27.3				
	<i>Triteleia laxa</i>	24	0.2	0.2	0.1	3.0				
	<i>Brachypodium distachyon</i>	23	3.2	4.0	0.2	68.0				
	<i>Pteridium aquilinum</i>	23	0.8	0.8	0.2	10.0				
	<i>Sonchus asper</i>	23	0.1	0.2	0.1	8.0				
	<i>Calystegia purpurata</i>	23	0.1	0.1	0.1	6.0				
	<i>Trifolium dubium</i>	22	0.1	0.2	0.1	8.0				
	<i>Daucus pusillus</i>	22	0.1	0.1	0.1	3.0				
	<i>Hemizonia congesta</i>	21	0.8	0.8	0.2	18.3				
	<i>Geranium dissectum</i>	21	0.1	0.1	0.2	2.1				
	<i>Heterotheca sessiliflora</i>	20	1.1	1.0	0.1	20.0				
	<i>Acaena pinnatifida</i>	20	0.2	0.2	0.2	8.0				
	<i>Carduus pycnocephalus</i>	20	0.1	0.1	0.1	3.0				

***Danthonia californica* – *Nassella pulchra* Association**

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**Common Name:** California Oatgrass – Purple Needlegrass Grassland

**Alliance:** *Festuca idahoensis* – *Danthonia californica* Herbaceous Alliance

**Local Vegetation Description**

The California Oatgrass – Purple Needlegrass Association forms an open to continuous herbaceous layer. The shrub layer is sparse and the tree layer is sparse. Characteristic herbs include *Danthonia californica* and *Nassella pulchra* along with *Chlorogalum pomeridianum* and *Lolium perenne*. Those herbs often present include *Aira caryophyllea*, *Anagallis arvensis*, *Avena* spp., *Bromus hordeaceus*, *Hypochaeris radicata*, *Plantago lanceolata*, and *Sisyrinchium bellum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.1	0 – 2	no data	
Shrub	1.6	0 – 14	0.3	0 – 0.5
Herb	74.1	25 – 99	0.4	0 – 2

**Local Environmental Description**

**Elevation:** Mean 174 m, Range 13 – 410 m

**Aspect:** SW (12), NW (6), SE (5), NE (5), Flat (1), E (1), S (1)

**Slope:** Mean 10 degrees, Range 0 – 26 degrees

**Macro Topography:** Upper 1/3 of slope (15), Middle 1/3 of slope (8), Lower 1/3 of slope (2), Entire slope (1), Not recorded (1), Ridge top (1)

**Large Rock:** Mean 1.5%, Range 0.0 – 16.0%

**Small Rock:** Mean 6.0%, Range 0.0 – 85.0%

**Fines Cover:** Mean 18.2%, Range 0.0 – 98.0%

**Litter Cover:** Mean 59.8%, Range 2.0 – 95%

**Soil Texture (field assessed):** Not recorded (6), Moderately fine clay loam (4), Moderately coarse, sandy loam (3), Fine silty clay (3), Moderately fine silty clay loam (2), Moderately fine sandy clay loam (2), Medium to very fine, sandy loam (2), Medium silt (2), Coarse, loamy sand (2), Fine clay (2)

**Geology (field or map data):** Franciscan melange (15), Sandstone and other sedimentary (7), Ultramafic rocks, mostly serpentine (6), Serpentine (2), Blueschist and semi-schist (2), Mixed alluvium (1), Granitic (1), Alluvium (1), Volcanic and metavolcanic rocks (1), Siltstone (1)

**Marin County Watersheds:** San Rafael (10), Walker Creek (10), Bolinas (8), Lagunitas Creek (6), Point Reyes (2), Inverness (1)

**Site Impacts**

This association has greater cover of exotics (average 57.5%) than natives. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*, *Anagallis arvensis*, *Avena* spp., *Brachypodium distachyon*, *Briza maxima*, *Briza minor*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Cynosurus echinatus*, *Erodium botrys*, *Geranium dissectum*, *Holcus lanatus*, *Hypochaeris glabra*, *Hypochaeris radicata*, *Linum bienne*, *Logfia gallica*, *Lolium perenne*, *Plantago lanceolata*, *Rumex acetosella*, *Silene gallica*, *Sonchus asper*, *Trifolium dubium*, *Trifolium subterraneum*, and *Vulpia bromoides*.

**Classification Comments**

None.

References: Klein et al. 2015

Global Rarity Rank: GNR

State Rarity Rank: SNR

State Rare: Y

**Surveys Used for Description**

**Total: N=39; Marin County (n=39):** HEAD0038, HEAD0053, HEAD0054, HEAD0064, HEAD0124, HEAD0138, HEAD0139, HEAD0143, HEAD0144, HEAD0167, HEAD0184, HEAD0185, HEAD0224, HEAD0225, HEAD0226, HEAD0238, HEAD0241, HEAD0280, HEAD0281, HMRA001, HMRA012, MARIN256, MMWD0042, MMWD0604, MMWD0608, MMWD0609, MOSD0344, PGA194, PGA571, PGA64, PORE004, RIMO003, RIMO007, SFANB09B, SFANB12C, SFANT10A, TAMG013C, TAMG020M, TAMG034C

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	49	35.7	1.5	0.1	12.0				
<b>Herb</b>										
	<b><i>Danthonia californica</i></b>	<b>100</b>	<b>12.3</b>	<b>11.0</b>	<b>0.2</b>	<b>40.0</b>	<b>X</b>			<b>X</b>
	<b><i>Nassella pulchra</i></b>	<b>100</b>	<b>8.7</b>	<b>9.0</b>	<b>0.2</b>	<b>30.0</b>	<b>X</b>			<b>X</b>
	<i>Lolium perenne</i>	82	12.2	12.6	0.2	68.0	<b>X</b>			<b>X</b>
	<i>Chlorogalum pomeridianum</i>	77	2.2	2.5	0.2	38.0	<b>X</b>			<b>X</b>
	<i>Sisyrinchium bellum</i>	69	1.2	1.4	0.2	18.0				<b>X</b>
	<i>Bromus hordeaceus</i>	69	1.3	1.3	0.2	10.0				<b>X</b>
	<i>Plantago lanceolata</i>	67	8.0	10.3	0.2	50.7				<b>X</b>
	<i>Hypochaeris radicata</i>	62	3.8	5.5	0.2	50.7				<b>X</b>
	<i>Avena</i> spp.	62	3.7	4.0	0.2	38.0				<b>X</b>
	<i>Anagallis arvensis</i>	59	0.4	0.6	0.2	6.9				<b>X</b>
	<i>Aira caryophyllea</i>	56	0.7	1.4	0.2	22.0				<b>X</b>
	<i>Cynosurus echinatus</i>	49	2.4	4.0	0.2	38.0				
	<i>Plantago erecta</i>	49	2.2	1.7	0.2	22.7				
	<i>Briza minor</i>	49	0.4	0.8	0.2	18.7				
	<i>Vulpia bromoides</i>	46	3.4	5.8	0.3	81.3				
	<i>Linum bienne</i>	46	0.2	0.3	0.2	3.0				
	<i>Brachypodium distachyon</i>	44	6.9	8.8	0.2	68.0				
	<i>Hypochaeris glabra</i>	44	0.7	0.7	0.2	8.0				
	<i>Briza maxima</i>	41	7.1	8.2	0.2	68.0				
	<i>Trifolium dubium</i>	38	0.3	0.4	0.2	8.0				
	<i>Koeleria macrantha</i>	38	0.3	0.3	0.2	8.0				
	<i>Elymus glaucus</i>	36	0.2	0.3	0.2	3.0				
	<i>Silene gallica</i>	36	0.1	0.1	0.2	0.9				
	<i>Bromus diandrus</i>	33	0.8	0.8	0.2	15.0				
	<i>Achillea millefolium</i>	33	0.3	0.3	0.2	3.0				
	<i>Hemizonia congesta</i>	31	0.8	0.9	0.2	10.0				
	<i>Eschscholzia californica</i>	31	0.3	0.3	0.1	3.0				
	<i>Ranunculus californicus</i>	31	0.1	0.1	0.2	1.0				
	<i>Bromus carinatus</i>	28	0.9	1.2	0.2	18.0				

*Danthonia californica* – *Nassella pulchra* Association  
*Festuca idahoensis* – *Danthonia californica* Herbaceous Alliance

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<i>Rumex acetosella</i>	28	0.3	0.3	0.2	7.0				
	<i>Erodium botrys</i>	26	0.5	0.5	0.1	12.0				
	<i>Sonchus asper</i>	26	0.3	0.3	0.2	8.0				
	<i>Triteleia laxa</i>	26	0.2	0.3	0.1	3.0				
	<i>Lupinus nanus</i>	26	0.2	0.2	0.1	3.0				
	<i>Logfia gallica</i>	26	0.1	0.2	0.2	3.0				
	<i>Trifolium subterraneum</i>	23	0.3	0.3	0.2	3.0				
	<i>Carduus pycnocephalus</i>	23	0.1	0.1	0.1	3.0				
	<i>Geranium dissectum</i>	23	0.1	0.1	0.2	2.1				
	<i>Acaena pinnatifida</i>	21	0.3	0.5	0.2	8.0				
	<i>Holcus lanatus</i>	21	0.1	0.2	0.2	3.0				
	<i>Calystegia purpurata</i>	21	0.1	0.1	0.2	0.7				

## ***Danthonia californica* Coastal Association**

**Common Name:** California Oatgrass Valley Grassland

**Alliance:** *Festuca idahoensis* – *Danthonia californica* Herbaceous Alliance

### **Local Vegetation Description**

The California Oatgrass Valley Grassland Association forms an intermittent to continuous herbaceous layer. The shrub layer is open and the tree layer is absent. Characteristic herbs include *Danthonia californica* along with *Aira caryophyllea*, *Lolium perenne*, and *Vulpia bromoides*. Those herbs often present include *Anagallis arvensis*, *Briza minor*, *Bromus hordeaceus*, *Holcus lanatus*, *Hypochaeris radicata*, *Linum bienne*, *Plantago lanceolata*, *Rumex acetosella*, and *Sisyrinchium bellum*, and herbs that are sometimes present include *Achillea millefolium*, *Cirsium vulgare*, *Cynosurus echinatus*, *Gamochaeta ustulata*, *Geranium dissectum*, *Hordeum brachyantherum*, *Iris douglasiana*, *Juncus bufonius*, *Juncus occidentalis*, *Juncus patens*, *Lotus corniculatus*, *Sidalcea malviflora*, and *Vicia sativa*. Commonly associated emergent shrubs at sparse cover include *Baccharis pilularis*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.3	0 – 1	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	3.4	0 – 10	0.3	0 – 0.5
Herb	74.2	45 – 90	0.5	0 – 1

### **Local Environmental Description**

**Elevation:** Mean 58 m, Range 15 – 115 m

**Aspect:** SE (2), SW (2), NW (2), Flat (1)

**Slope:** Mean 7 degrees, Range 3 – 10 degrees

**Macro Topography:** Lower 1/3 of slope (3), Middle 1/3 of slope (3), Upper 1/3 of slope (1)

**Large Rock:** 0.0%

**Small Rock:** Mean 0.4%, Range 0.0 – 2.0%

**Fines Cover:** Mean 16.1%, Range 0.0 – 77.9%

**Litter Cover:** Mean 73.8%, Range 28.8 – 98%

**Soil Texture (field assessed):** Moderately fine silty clay loam (4), Coarse, loamy sand (1), Moderately fine sandy clay loam (1)

**Geology (field or map data):** Sandstone and other sedimentary (8), Alluvium (1), Serpentine (1)

**Marin County Watersheds:** Point Reyes (6), Walker Creek (2), Bolinas (1), San Rafael (1)

### **Site Impacts**

This association has greater cover of exotics (average 59.3%) natives. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*, *Anagallis arvensis*, *Briza minor*, *Bromus hordeaceus*, *Cirsium vulgare*, *Cynosurus echinatus*, *Geranium dissectum*, *Holcus lanatus*, *Hypochaeris radicata*, *Linum bienne*, *Lolium perenne*, *Lotus corniculatus*, *Plantago lanceolata*, *Rumex acetosella*, *Vicia sativa*, and *Vulpia bromoides*.

### **Classification Comments**

This new association name merges previously used concepts: *Danthonia californica* – *Aira caryophyllea* and *Danthonia californica* – (*Briza maxima* – *Vulpia bromoides*) Associations.

**References:** Keeler-Wolf et al. 2003a, Klein et al. 2015

Global Rarity Rank: GNR

State Rarity Rank: SNR

State Rare: Y

**Surveys Used for Description**

**Total: N=10; Marin County (n=10):** HEAD0128, HEAD0251, HEAD0311, HEAD0315, HEAD0324,  
HEAD0331, LMW006A, OSH02, PGA177, PGA199

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	60	42.7	2.4	0.2	8.0				X
<b>Herb</b>										
	<b><i>Danthonia californica</i></b>	<b>100</b>	<b>25.3</b>	<b>20.4</b>	<b>3.0</b>	<b>68.0</b>	<b>X</b>			<b>X</b>
	<i>Vulpia bromoides</i>	80	17.4	15.7	0.2	38.0	X			X
	<i>Lolium perenne</i>	80	6.8	5.2	0.2	21.0	X			X
	<i>Aira caryophylla</i>	80	6.2	4.7	0.2	30.0	X			X
	<i>Plantago lanceolata</i>	70	5.8	4.4	0.2	18.0				X
	<i>Rumex acetosella</i>	70	0.5	0.5	0.2	3.0				X
	<i>Holcus lanatus</i>	60	5.8	5.7	0.2	38.0				X
	<i>Anagallis arvensis</i>	60	0.1	0.1	0.2	0.2				X
	<i>Sisyrinchium bellum</i>	60	0.1	0.1	0.2	0.2				X
	<i>Hypochaeris radicata</i>	50	1.9	1.4	0.2	8.0				X
	<i>Bromus hordeaceus</i>	50	0.9	0.8	0.2	4.6				X
	<i>Briza minor</i>	50	0.5	0.4	0.2	3.0				X
	<i>Linum bienne</i>	50	0.4	0.3	0.2	2.6				X
	<i>Juncus bufonius</i>	40	1.1	1.2	0.2	8.0				
	<i>Cynosurus echinatus</i>	40	1.4	1.2	0.2	8.0				
	<i>Iris douglasiana</i>	40	0.3	0.3	0.1	2.0				
	<i>Cirsium vulgare</i>	40	0.1	0.1	0.2	0.2				
	<i>Gamochaeta ustulata</i>	40	0.1	0.1	0.2	0.2				
	<i>Hordeum brachyantherum</i>	40	0.1	0.1	0.2	0.2				
	<i>Juncus occidentalis</i>	40	0.1	0.1	0.2	0.2				
	<i>Juncus patens</i>	30	0.9	0.9	3.0	3.0				
	<i>Lotus corniculatus</i>	30	0.3	0.3	0.2	3.0				
	<i>Geranium dissectum</i>	30	0.1	0.1	0.2	0.2				
	<i>Vicia sativa</i>	30	0.1	0.1	0.2	0.2				
	<i>Achillea millefolium</i>	30	0.1	0.1	0.1	0.2				
	<i>Sidalcea malviflora</i>	30	0.1	0.1	0.1	0.2				

## ***Festuca californica* Association**

**Common Name:** California Fescue Grassland

**Alliance:** *Festuca idahoensis* – *Danthonia californica* Herbaceous Alliance

### **Local Vegetation Description**

The California Fescue Association forms an open to continuous herbaceous layer. The shrub layer is open and the tree layer is absent. The dominant herb is *Festuca californica*, and characteristic herbs include *Galium porrigens*. Those herbs often present include *Achillea millefolium*, *Ranunculus californicus*, and *Thermopsis californica*, and herbs that are sometimes present include *Aira caryophyllea*, *Anagallis arvensis*, *Avena* spp., *Bromus carinatus*, *Bromus diandrus*, *Claytonia perfoliata*, *Clinopodium douglasii*, *Dichelostemma capitatum*, *Festuca idahoensis*, *Galium aparine*, *Koeleria macrantha*, *Pentagramma triangularis*, *Plantago erecta*, *Sisyrinchium bellum*, and *Vicia villosa*. Commonly associated emergent shrubs at sparse cover include *Rubus ursinus* and *Toxicodendron diversilobum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	6.9	0 – 26	0.3	0 – 0.5
Herb	68.8	18 – 97	1.1	0.5 – 2

### **Local Environmental Description**

**Elevation:** Mean 384 m, Range 269 – 469 m

**Aspect:** NE (3), NW (2), SW (1)

**Slope:** Mean 19 degrees, Range 5 – 27 degrees

**Macro Topography:** Middle 1/3 of slope (4), Upper 1/3 of slope (1), Upper 1/3 of slope to Ridgetop (1)

**Large Rock:** Mean 14.2%, Range 0.0 – 80.0%

**Small Rock:** Mean 1.5%, Range 0.2 – 8.0%

**Fines Cover:** Mean 19.5%, Range 1.0 – 86.0%

**Litter Cover:** Mean 10.9%, Range 0.2 – 16%

**Soil Texture (field assessed):** Not recorded (2), Medium to very fine, sandy loam (2), Medium loam (1), Medium silt loam (1)

**Geology (field or map data):** Franciscan melange (3), Serpentine (1), Ultramafic (type unknown) (1), Ultramafic rocks, mostly serpentine (1)

**Marin County Watersheds:** Lagunitas Creek (5), Walker Creek (1)

### **Site Impacts**

This association has low non-native plant cover (average 12.2%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*, *Anagallis arvensis*, *Avena* spp., *Bromus diandrus*, and *Vicia villosa*.

### **Classification Comments**

None.

**References:** Evens and Kentner 2006, Klein et al. 2015

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

**Total: N=6; Marin County (n=6):** MARIN262, MARIN302, MMWD0015, MMWD0034, MMWD0036, MMWD0066

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Rubus ursinus</i>	50	33.0	5.3	1.0	26.0				X
	<i>Toxicodendron diversilobum</i>	50	16.9	2.7	0.2	15.0				X
<b>Herb</b>										
	<b><i>Festuca californica</i></b>	<b>100</b>	<b>66.0</b>	<b>50.7</b>	<b>8.0</b>	<b>97.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Galium porrigens</i>	83	0.6	0.4	0.2	1.0	<b>X</b>			<b>X</b>
	<i>Achillea millefolium</i>	50	0.4	0.2	0.2	1.0				<b>X</b>
	<i>Ranunculus californicus</i>	50	0.3	0.2	0.2	1.0				<b>X</b>
	<i>Thermopsis californica</i>	50	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Avena</i> spp.	33	5.4	4.3	1.0	25.0				
	<i>Festuca idahoensis</i>	33	7.2	3.5	0.2	21.0				
	<i>Bromus diandrus</i>	33	2.9	1.5	1.0	8.0				
	<i>Claytonia perfoliata</i>	33	0.6	0.4	0.2	2.0				
	<i>Pentagramma triangularis</i>	33	0.7	0.4	0.2	2.0				
	<i>Bromus carinatus</i>	33	0.4	0.3	1.0	1.0				
	<i>Koeleria macrantha</i>	33	0.5	0.2	0.2	1.0				
	<i>Plantago erecta</i>	33	0.5	0.2	0.2	1.0				
	<i>Vicia villosa</i>	33	0.3	0.2	0.2	1.0				
	<i>Aira caryophyllea</i>	33	0.2	0.1	0.2	0.2				
	<i>Anagallis arvensis</i>	33	0.2	0.1	0.2	0.2				
	<i>Clinopodium douglasii</i>	33	0.1	0.1	0.2	0.2				
	<i>Dichelostemma capitatum</i>	33	0.2	0.1	0.2	0.2				
	<i>Galium aparine</i>	33	0.1	0.1	0.2	0.2				
	<i>Sisyrinchium bellum</i>	33	0.1	0.1	0.2	0.2				



***Festuca idahoensis* – (*Danthonia californica* – *Koeleria macrantha*) Association**

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**Common Name:** Blue Fescue – (Creeping Ryegrass – June Grass) Grassland

**Alliance:** *Festuca idahoensis* – *Danthonia californica* Herbaceous Alliance

**Local Vegetation Description**

The Blue Fescue – (Creeping Ryegrass– June Grass) Association forms an intermittent to continuous herbaceous layer. The shrub layer is open and the tree layer is sparse to absent. Characteristic herbs include *Achillea millefolium*, *Festuca idahoensis*, and *Koeleria macrantha*. Those herbs often present include *Danthonia californica* along with *Aira caryophyllea*, *Anagallis arvensis*, *Avena* spp., *Briza maxima*, *Bromus hordeaceus*, *Chlorogalum pomeridianum*, *Elymus glaucus*, *Hypochaeris glabra*, *Hypochaeris radicata*, *Nassella pulchra* *Plantago erecta*, *Rumex acetosella*, *Sisyrinchium bellum*, and *Vulpia bromoides*. Commonly associated emergent shrubs at sparse cover include *Baccharis pilularis*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.3	0 – 2	3.5	2 – 5
Regenerating or Shrubby Tree	0.2	0 – 3	3.5	2 – 5
Shrub	3.4	0 – 10	0.6	0 – 2
Herb	69.5	35 – 95	0.5	0 – 1

**Local Environmental Description**

**Elevation:** Mean 247 m, Range 39 – 664 m

**Aspect:** NW (8), NE (5), SE (4), SW (4), N (3), Variable (1)

**Slope:** Mean 18 degrees, Range 0 – 28 degrees

**Macro Topography:** Upper 1/3 of slope (14), Middle 1/3 of slope (4), Lower 1/3 of slope (1), Ridgetop (1), Bottom (1)

**Large Rock:** Mean 1.5%, Range 0.0 – 10.0%

**Small Rock:** Mean 14.6%, Range 0.0 – 82.0%

**Fines Cover:** Mean 13.6%, Range 1.0 – 40.0%

**Litter Cover:** Mean 53.3%, Range 5.0 – 90%

**Soil Texture (field assessed):** Moderately coarse, sandy loam (3), Moderately fine sandy clay loam (3), Coarse, loamy sand (2), Medium to very fine, sandy loam (2), Fine clay (1), Medium silt (1), Moderately fine clay loam (1), Medium loam (1)

**Geology (field or map data):** Sandstone and other sedimentary (9), Franciscan melange (8), Volcanic and metavolcanic rocks (7), Ultramafic rocks, mostly serpentine (3)

**Marin County Watersheds:** Bolinas (13), Lagunitas Creek (9), Novato (4), San Rafael (1)

**Site Impacts**

This association has moderate non-native plant cover (average 27.0%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*, *Anagallis arvensis*, *Avena* spp., *Briza maxima*, *Bromus hordeaceus*, *Hypochaeris glabra*, *Hypochaeris radicata*, *Rumex acetosella*, and *Vulpia bromoides*.

**Classification Comments**

This association name has been updated to include *Koeleria macrantha*, to better align with the NVC. Some surveys were previously classified as *Festuca idahoensis* – *Bromus carinatus* Association in Evens and Kentner 2006, which is no longer recognized as a separate association.

References: Evens and Kentner 2006, Klein et al. 2015

Global Rarity Rank: GNR

State Rarity Rank: SNR

State Rare: Y

**Surveys Used for Description**

**Total: N=27; Marin County (n=27):** HEAD0047, HEAD0048, HEAD0049, HEAD0066, HEAD0069, HEAD0125, HEAD0146, HEAD0221, HEAD0229, HEAD0244, HEAD0264, MARIN228, MMWD0026, MMWD0047, MOSD0362, MWOS01, PGA550, PGA575, RIMO006, SFANB01C, SFANB04C, SFANB10B, SFANB11C, TAMG030M, TAMG037M, TAMG039M, WRBL021

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	69	40.0	1.2	0.2	6.0				X
	<i>Diplacus aurantiacus</i>	22	4.3	0.2	0.1	3.0				
<b>Herb</b>										
	<b><i>Festuca idahoensis</i></b>	<b>100</b>	<b>34.2</b>	<b>32.2</b>	<b>6.0</b>	<b>68.0</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<b><i>Koeleria macrantha</i></b>	<b>81</b>	<b>2.2</b>	<b>2.3</b>	<b>0.2</b>	<b>25.0</b>	<b>X</b>			<b>X</b>
	<i>Achillea millefolium</i>	78	0.5	0.5	0.1	3.0	<b>X</b>			<b>X</b>
	<i>Avena</i> spp.	74	2.2	2.4	0.2	15.1				<b>X</b>
	<b><i>Danthonia californica</i></b>	<b>70</b>	<b>3.7</b>	<b>4.3</b>	<b>0.2</b>	<b>18.0</b>				<b>X</b>
	<i>Aira caryophylla</i>	70	1.7	1.7	0.2	15.0				<b>X</b>
	<i>Hypochaeris glabra</i>	67	3.9	4.9	0.2	44.0				<b>X</b>
	<i>Chlorogalum pomeridianum</i>	67	2.9	3.5	0.2	26.7				<b>X</b>
	<i>Sisyrinchium bellum</i>	63	0.4	0.4	0.2	3.0				<b>X</b>
	<i>Briza maxima</i>	59	3.4	4.3	0.2	21.3				<b>X</b>
	<i>Rumex acetosella</i>	59	2.0	1.8	0.2	10.7				<b>X</b>
	<i>Hypochaeris radicata</i>	59	1.3	1.8	0.2	21.3				<b>X</b>
	<i>Vulpia bromoides</i>	56	2.2	3.6	0.2	30.7				<b>X</b>
	<i>Plantago erecta</i>	56	1.8	1.7	0.2	10.0				<b>X</b>
	<i>Nassella pulchra</i>	52	2.4	2.8	0.2	18.0				<b>X</b>
	<i>Elymus glaucus</i>	52	1.1	1.3	0.2	8.0				<b>X</b>
	<i>Bromus hordeaceus</i>	52	1.1	0.8	0.2	10.0				<b>X</b>
	<i>Anagallis arvensis</i>	52	0.6	0.7	0.1	8.0				<b>X</b>
	<i>Lolium perenne</i>	48	1.2	1.0	0.2	12.0				
	<i>Cynosurus echinatus</i>	48	1.3	1.0	0.2	10.0				
	<i>Plantago lanceolata</i>	44	2.6	3.7	0.2	68.0				
	<i>Bromus carinatus</i>	44	2.8	2.4	0.1	20.0				
	<i>Ranunculus californicus</i>	44	0.4	0.4	0.1	3.0				
	<i>Silene gallica</i>	44	0.2	0.3	0.2	3.5				
	<i>Sidalcea malviflora</i>	44	0.1	0.1	0.2	0.5				
	<i>Pteridium aquilinum</i>	41	2.1	1.6	0.2	10.0				
	<i>Stachys ajugoides</i>	41	0.6	0.7	0.2	8.0				
	<i>Eschscholzia californica</i>	41	0.2	0.3	0.1	6.7				
	<i>Logfia gallica</i>	41	0.2	0.3	0.2	3.0				

*Festuca idahoensis* – (*Danthonia californica* – *Koeleria macrantha*) Association  
*Festuca idahoensis* – *Danthonia californica* Herbaceous Alliance

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<i>Daucus pusillus</i>	41	0.2	0.2	0.2	3.0				
	<i>Sonchus asper</i>	41	0.1	0.1	0.1	0.3				
	<i>Heterotheca sessiliflora</i>	37	1.5	1.9	0.1	18.7				
	<i>Triteleia laxa</i>	37	0.3	0.3	0.2	3.0				
	<i>Bromus diandrus</i>	37	0.3	0.3	0.2	3.0				
	<i>Luzula comosa</i>	33	0.1	0.1	0.2	1.1				
	<i>Agrostis pallens</i>	30	1.6	1.6	0.2	18.0				
	<i>Lotus micranthus</i>	30	0.1	0.1	0.2	0.9				
	<i>Dudleya farinosa</i>	30	0.1	0.1	0.1	1.3				
	<i>Acaena pinnatifida</i>	30	0.1	0.1	0.2	1.0				
	<i>Geranium dissectum</i>	30	0.1	0.1	0.2	0.3				
	<i>Calystegia purpurata</i>	30	0.1	0.1	0.1	0.7				
	<i>Galium aparine</i>	30	0.1	0.1	0.1	0.3				
	<i>Wyethia angustifolia</i>	26	0.7	0.4	0.2	10.0				
	<i>Eriogonum latifolium</i>	26	0.2	0.3	0.2	3.5				
	<i>Carduus pycnocephalus</i>	26	0.1	0.1	0.1	1.0				
	<i>Cirsium vulgare</i>	26	0.1	0.1	0.2	1.0				
	<i>Madia gracilis</i>	26	0.1	0.1	0.1	0.3				
	<i>Vulpia myuros</i>	22	0.9	0.7	0.2	7.0				
	<i>Melica californica</i>	22	0.2	0.4	0.1	6.0				
	<i>Carex globosa</i>	22	0.5	0.4	0.2	3.0				
	<i>Pentagramma triangularis</i>	22	0.2	0.2	0.2	3.0				
	<i>Calystegia subacaulis</i>	22	0.1	0.1	0.2	0.5				
	<i>Erodium botrys</i>	22	0.0	0.1	0.2	0.7				
	<i>Lupinus nanus</i>	22	0.0	0.1	0.1	0.7				
	<i>Briza minor</i>	22	0.0	0.0	0.1	0.3				

***Festuca idahoensis* – *Nassella pulchra* Provisional Association**

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**Common Name:** Blue Fescue – Purple Needlegrass Grassland

**Alliance:** *Festuca idahoensis* – *Danthonia californica* Herbaceous Alliance

**Local Vegetation Description**

The Blue Fescue – Purple Needlegrass Association forms a continuous herbaceous layer. The shrub layer is open and the tree layer is sparse to absent. Characteristic herbs include *Festuca idahoensis* and *Nassella pulchra* along with *Achillea millefolium*, *Anagallis arvensis*, *Avena* spp., *Briza maxima*, *Eriogonum latifolium*, *Hypochaeris radicata*, and *Plantago erecta*. Those herbs often present include *Bromus diandrus*, *Calystegia purpurata*, *Carex brevicaulis*, *Chlorogalum pomeridianum*, *Danthonia californica*, *Erodium botrys*, *Eschscholzia californica*, *Heterotheca sessiliflora*, *Hypochaeris glabra*, *Koeleria macrantha*, *Logfia gallica*, *Lolium perenne*, *Plantago lanceolata*, *Rumex acetosella*, *Sidalcea malviflora*, and *Silene gallica*. Commonly associated emergent shrubs at sparse cover include *Baccharis pilularis*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.3	0 – 1	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	4.0	0.0 – 10	0.3	0 – 0.5
Herb	82.7	70 – 98	0.3	0 – 0.5

**Local Environmental Description**

**Elevation:** Mean 154 m, Range 74 – 344 m

**Aspect:** SW (3), SE (2)

**Slope:** Mean 19 degrees, Range 12 – 24 degrees

**Macro Topography:** no data

**Large Rock:** no data

**Small Rock:** no data

**Fines Cover:** no data

**Litter Cover:** no data

**Soil Texture (field assessed):** no data

**Geology (field or map data):** Sandstone and other sedimentary (6), Volcanic and metavolcanic rocks (2), Franciscan melange (1)

**Marin County Watersheds:** Bolinas (8), Lagunitas Creek (1)

**Site Impacts**

This association has greater cover of exotics (average 51.3%) than natives. Non-native species that occur with highest frequency and abundance include *Anagallis arvensis*, *Avena* spp., *Briza maxima*, *Bromus diandrus*, *Bromus hordeaceus*, *Cynosurus echinatus*, *Erodium botrys*, *Erodium cicutarium*, *Hypochaeris glabra*, *Hypochaeris radicata*, *Logfia gallica*, *Lolium perenne*, *Paronychia franciscana*, *Plantago lanceolata*, *Rumex acetosella*, *Silene gallica*, and *Vulpia bromoides*.

**Classification Comments**

This association is considered provisional since it is under-sampled in its expected range. It is newly described here.

**References:** none

Global Rarity Rank: GNR

State Rarity Rank: SNR

State Rare: Y

**Surveys Used for Description**

**Total: N=9; Marin County (n=9):** MMWD0601, PGA549, PGA579, PGA582, SFANB02B, SFANB03B, SFANB05B, SFANB06A, SFANB07B

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	67	32.5	1.4	0.2	6.0				X
	<i>Artemisia californica</i>	44	23.1	0.6	0.2	2.1				
	<i>Lupinus arboreus</i>	22	3.4	0.2	0.2	1.4				
<b>Herb</b>										
	<b><i>Nassella pulchra</i></b>	<b>100</b>	<b>14.1</b>	<b>13.2</b>	<b>3.0</b>	<b>30.0</b>	<b>X</b>			<b>X</b>
	<i>Hypochaeris radicata</i>	100	6.3	12.7	0.2	45.3	X			X
	<b><i>Festuca idahoensis</i></b>	<b>100</b>	<b>14.1</b>	<b>12.7</b>	<b>2.0</b>	<b>30.0</b>	<b>X</b>			<b>X</b>
	<i>Achillea millefolium</i>	100	0.3	0.4	0.2	1.3	X			X
	<i>Briza maxima</i>	78	14.5	26.4	6.0	62.7	X			X
	<i>Avena</i> spp.	78	7.1	10.9	2.7	30.0	X			X
	<i>Plantago erecta</i>	78	1.6	3.1	0.2	18.0	X			X
	<i>Anagallis arvensis</i>	78	0.3	0.5	0.2	1.3	X			X
	<i>Eriogonum latifolium</i>	78	0.2	0.3	0.2	0.7	X			X
	<i>Hypochaeris glabra</i>	67	3.8	6.4	0.2	24.0				X
	<i>Erodium botrys</i>	67	3.3	5.7	2.7	27.3				X
	<i>Plantago lanceolata</i>	67	2.1	3.8	0.3	10.0				X
	<i>Chlorogalum pomeridianum</i>	67	3.0	3.5	0.2	16.7				X
	<i>Koeleria macrantha</i>	67	1.1	1.9	0.2	6.0				X
	<i>Eschscholzia californica</i>	67	0.7	1.1	0.2	5.5				X
	<i>Rumex acetosella</i>	67	0.3	0.5	0.2	2.0				X
	<i>Lolium perenne</i>	56	6.0	9.3	0.2	29.3				X
	<i>Carex brevicaulis</i>	56	1.3	2.6	2.7	8.0				X
	<i>Heterotheca sessiliflora</i>	56	0.8	1.6	0.2	7.5				X
	<i>Danthonia californica</i>	56	0.6	1.2	0.2	6.0				X
	<i>Bromus diandrus</i>	56	0.7	1.2	0.2	8.0				X
	<i>Calystegia purpurata</i>	56	0.7	1.1	0.7	6.0				X
	<i>Silene gallica</i>	56	0.4	0.7	0.2	3.5				X
	<i>Logfia gallica</i>	56	0.3	0.6	0.2	3.5				X
	<i>Sidalcea malviflora</i>	56	0.2	0.3	0.2	1.0				X
	<i>Vulpia bromoides</i>	44	3.8	7.9	4.7	30.0				
	<i>Agrostis hallii</i>	44	1.2	2.4	2.2	8.7				
	<i>Melica californica</i>	44	0.8	0.7	0.2	2.0				
	<i>Elymus glaucus</i>	44	0.2	0.4	0.2	2.7				
	<i>Lomatium dasycarpum</i>	44	0.1	0.3	0.2	2.0				
	<i>Lupinus bicolor</i>	44	0.1	0.1	0.2	0.3				

*Festuca idahoensis* – *Nassella pulchra* Provisional Association  
*Festuca idahoensis* – *Danthonia californica* Herbaceous Alliance

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<i>Sisyrinchium bellum</i>	44	0.1	0.1	0.2	0.3				
	<i>Dichondra donelliana</i>	33	0.5	1.1	0.4	6.9				
	<i>Ranunculus californicus</i>	33	0.3	0.4	0.2	2.0				
	<i>Lotus micranthus</i>	33	0.1	0.2	0.2	0.7				
	<i>Cirsium quercetorum</i>	33	0.0	0.1	0.2	0.2				
	<i>Dudleya farinosa</i>	33	0.1	0.1	0.2	0.2				
	unknown Poaceae	22	1.8	1.2	0.7	10.0				
	<i>Bromus carinatus</i>	22	1.0	0.6	0.3	5.0				
	<i>Pteridium aquilinum</i>	22	0.2	0.1	0.2	1.0				
	<i>Cynosurus echinatus</i>	22	0.1	0.1	0.3	0.7				
	<i>Luzula comosa</i>	22	0.1	0.1	0.3	0.7				
	<i>Bromus hordeaceus</i>	22	0.1	0.1	0.3	0.4				
	<i>Erodium cicutarium</i>	22	0.0	0.1	0.2	0.3				
	<i>Cirsium occidentale</i>	22	0.0	0.0	0.2	0.2				
	<i>Dichelostemma capitatum</i>	22	0.0	0.0	0.2	0.2				
	<i>Grindelia hirsutula</i>	22	0.0	0.0	0.2	0.2				
	<i>Paronychia franciscana</i>	22	0.0	0.0	0.2	0.2				

***Festuca idahoensis* Ultramafic Provisional Association**

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**Common Name:** Blue Fescue Ultramafic Grassland

**Alliance:** *Festuca idahoensis* – *Danthonia californica* Herbaceous Alliance

**Local Vegetation Description**

The Blue Fescue Ultramafic Association forms an open to intermittent herbaceous layer. The shrub layer is sparse and the tree layer is sparse. *Festuca idahoensis* is dominant to co-dominant in the herbaceous layer, and characteristic herbs include *Lomatium utriculatum*, *Plantago erecta*, and *Sisyrinchium bellum*. Those herbs often present include *Aira caryophyllea*, *Bromus hordeaceus*, *Elymus multisetus*, *Eriogonum nudum*, *Hemizonia congesta*, *Lasthenia californica*, *Pentagramma triangularis*, *Ranunculus californicus*, and *Vulpia microstachys*. Commonly associated emergent shrubs at sparse cover include *Heteromeles arbutifolia*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.5	0 – 2	7.5	5 – 10
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0.0 – 0.2	0.8	0.5 – 1
Shrub	0.6	0.0 – 2.0	0.8	0.5 – 1
Herb	39.7	25 – 62	0.5	0 – 1

**Local Environmental Description**

**Elevation:** Mean 281 m, Range 158 – 394 m

**Aspect:** NW (5), SW (1)

**Slope:** Mean 19 degrees, Range 5 – 42 degrees

**Macro Topography:** Middle 1/3 of slope (3), Lower 1/3 of slope (2), Upper 1/3 of slope (1)

**Large Rock:** Mean 3.9%, Range 0.0 – 15.0%

**Small Rock:** Mean 5.1%, Range 0.2 – 9.0%

**Fines Cover:** Mean 45.0%, Range 28.0 – 70.0%

**Litter Cover:** Mean 35.1%, Range 9.0 – 65%

**Soil Texture (field assessed):** Not recorded (2), Clay, (class unknown) (1), Fine sandy clay (1), Moderately fine sandy clay loam (1)

**Geology (field or map data):** Serpentine (5), Franciscan melange (1)

**Marin County Watersheds:** Lagunitas Creek (1), San Rafael (1)

**Other Watersheds, Sonoma Co.:** Middle Russian River (2), Salmon Creek (1), Sonoma Creek (1)

**Site Impacts**

This association has low non-native plant cover (average 4.0%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*, *Bromus hordeaceus*, *Lolium perenne*, and *Vulpia myuros*.

**Classification Comments**

This association is considered provisional since it is under-sampled in its expected range. Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** Klein et al. 2015

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

Total: N=6; Marin County (n=2): TAMG023M, TAMG026M

Sonoma County (n=4): MILOB103, SONO0057, SONO0355, SONO0480

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Heteromeles arbutifolia</i>	50	28.4	0.4	0.2	2.0				X
	<i>Eriophyllum confertiflorum</i>	33	7.7	0.1	0.3	0.3				
	<i>Ceanothus jepsonii</i>	33	16.7	0.1	0.2	0.2				
<b>Herb</b>										
	<b><i>Festuca idahoensis</i></b>	<b>100</b>	<b>57.0</b>	<b>26.7</b>	<b>11.0</b>	<b>45.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Plantago erecta</i>	83	3.6	1.2	0.2	6.0	<b>X</b>			<b>X</b>
	<i>Lomatium utriculatum</i>	83	1.9	0.6	0.2	2.0	<b>X</b>			<b>X</b>
	<i>Sisyrinchium bellum</i>	83	0.9	0.3	0.2	1.0	<b>X</b>			<b>X</b>
	<i>Hemizonia congesta</i>	67	7.1	2.5	0.3	12.0				<b>X</b>
	<i>Elymus multisetus</i>	67	1.1	0.6	0.2	2.0				<b>X</b>
	<i>Vulpia microstachys</i>	50	1.5	0.7	1.0	2.0				<b>X</b>
	<i>Aira caryophylla</i>	50	1.1	0.4	0.3	2.0				<b>X</b>
	<i>Lasthenia californica</i>	50	0.5	0.4	0.2	2.0				<b>X</b>
	<i>Bromus hordeaceus</i>	50	0.8	0.4	0.3	1.0				<b>X</b>
	<i>Eriogonum nudum</i>	50	0.4	0.3	0.2	1.0				<b>X</b>
	<i>Ranunculus californicus</i>	50	0.7	0.3	0.3	1.0				<b>X</b>
	<i>Pentagramma triangularis</i>	50	0.2	0.1	0.2	0.3				<b>X</b>
	<i>Melica torreyana</i>	33	1.8	1.5	2.0	7.0				
	<i>Lolium perenne</i>	33	1.1	0.9	0.2	5.0				
	<i>Nassella pulchra</i>	33	0.9	0.8	0.5	4.0				
	<i>Calystegia</i> spp.	33	2.1	0.7	1.0	3.0				
	<i>Achillea millefolium</i>	33	1.7	0.5	1.0	2.0				
	<i>Vulpia myuros</i>	33	0.6	0.5	1.0	2.0				
	<i>Lomatium dasycarpum</i>	33	1.2	0.4	0.3	2.0				
	<i>Sanicula bipinnatifida</i>	33	0.7	0.2	0.2	1.0				
	<i>Daucus pusillus</i>	33	0.2	0.1	0.3	0.5				
	<i>Lessingia micradenia</i>	33	0.2	0.1	0.3	0.5				
	<i>Monardella purpurea</i>	33	0.2	0.1	0.3	0.5				
	<i>Chlorogalum pomeridianum</i>	33	0.2	0.1	0.2	0.5				
<b>Non-vascular</b>										
	Moss	33	33.3	1.8	1.0	10.0				



## ***Festuca rubra* Association**

**Common Name:** Red Fescue Coastal Headland Grassland

**Alliance:** *Festuca idahoensis* – *Danthonia californica* Herbaceous Alliance

### **Local Vegetation Description**

The Red Fescue Coastal Headland Grassland Association forms an intermittent to continuous herbaceous layer. The shrub layer is open and the tree layer is absent. The dominant herb is *Festuca rubra*, and characteristic herbs include *Achillea millefolium* and *Chlorogalum pomeridianum*. Those herbs often present include *Bromus carinatus*, *Calamagrostis ophitidis*, *Calystegia purpurata*, *Carex serratodens*, *Dudleya farinosa*, *Elymus glaucus*, *Eriogonum latifolium*, *Eschscholzia californica*, *Hypochaeris radicata*, *Koeleria macrantha*, *Lotus* spp., *Nassella pulchra*, *Perideridia kelloggii*, *Pteridium aquilinum*, *Rumex acetosella*, *Sisyrinchium bellum*, *Stachys ajugoides*, *Thermopsis californica*, and *Zigadenus micranthus*. Commonly associated emergent shrubs at sparse cover include *Artemisia californica* and *Baccharis pilularis*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	3.0	0 – 6	0.3	0 – 0.5
Herb	70.0	50 – 90	0.5	0 – 1

### **Local Environmental Description**

**Elevation:** 42 m

**Aspect:** SW (1)

**Slope:** 15 degrees

**Macro Topography:** Lower 1/3 of slope (1)

**Large Rock:** 2.0%

**Small Rock:** 2.0%

**Fines Cover:** 3.0%

**Litter Cover:** 90%

**Soil Texture (field assessed):** no data

**Geology (field or map data):** Serpentine (1)

**Marin County Watersheds:** Bolinas (1), San Rafael (1)

### **Site Impacts**

This association has low non-native plant cover (average 15.9%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Hypochaeris radicata* and *Rumex acetosella*.

### **Classification Comments**

In past sampling efforts, *Festuca idahoensis* has been mistakenly identified as *Festuca rubra*. In 2019, previous sites were revisited when possible to verify the identification. However, one of the surveys listed here could not be revisited since geocoordinates were not available.

**References:** Keeler-Wolf et al. 2003a, Michaels 2004

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

Total: N=2; Marin County (n=2): OSH03, PGA569

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	50	41.7	2.5	5.0	5.0				X
	<i>Artemisia californica</i>	50	8.3	0.5	1.0	1.0				X
<b>Herb</b>										
	<b><i>Festuca rubra</i></b>	<b>100</b>	<b>66.2</b>	<b>53.5</b>	<b>20.0</b>	<b>87.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Chlorogalum pomeridianum</i>	100	2.7	1.6	0.2	3.0	X			X
	<i>Achillea millefolium</i>	100	0.3	0.2	0.2	0.2	X			X
	<i>Rumex acetosella</i>	50	13.2	7.5	15.0	15.0				X
	<i>Dudleya farinosa</i>	50	4.4	2.5	5.0	5.0				X
	<i>Hypochaeris radicata</i>	50	4.4	2.5	5.0	5.0				X
	<i>Koeleria macrantha</i>	50	4.4	2.5	5.0	5.0				X
	<i>Pteridium aquilinum</i>	50	2.6	1.5	3.0	3.0				X
	<i>Bromus carinatus</i>	50	0.2	0.1	0.2	0.2				X
	<i>Calamagrostis ophitidis</i>	50	0.1	0.1	0.2	0.2				X
	<i>Calystegia purpurata</i>	50	0.1	0.1	0.2	0.2				X
	<i>Carex serratodens</i>	50	0.1	0.1	0.2	0.2				X
	<i>Elymus glaucus</i>	50	0.1	0.1	0.2	0.2				X
	<i>Eriogonum latifolium</i>	50	0.2	0.1	0.2	0.2				X
	<i>Eschscholzia californica</i>	50	0.2	0.1	0.2	0.2				X
	<i>Lotus</i> spp.	50	0.2	0.1	0.2	0.2				X
	<i>Nassella pulchra</i>	50	0.1	0.1	0.2	0.2				X
	<i>Perideridia kelloggii</i>	50	0.1	0.1	0.2	0.2				X
	<i>Sisyrinchium bellum</i>	50	0.1	0.1	0.2	0.2				X
	<i>Stachys ajugoides</i>	50	0.1	0.1	0.2	0.2				X
	<i>Thermopsis californica</i>	50	0.1	0.1	0.2	0.2				X
	<i>Zigadenus micranthus</i>	50	0.1	0.1	0.2	0.2				X

## ***Heterotheca sessiliflora* – *Danthonia californica* Provisional Association**

**Common Name:** Golden Aster – California Oatgrass Patches

**Alliance:** *Festuca idahoensis* – *Danthonia californica* Herbaceous Alliance

### **Local Vegetation Description**

The Golden Aster – California Oatgrass Association forms an intermittent to continuous herbaceous layer. The shrub layer is sparse and the tree layer is absent. Characteristic herbs include *Heterotheca sessiliflora* and *Danthonia californica*, along with *Acaena pinnatifida*, *Aira caryophyllea*, *Anagallis arvensis*, *Avena* spp., *Brachypodium distachyon*, *Briza minor*, *Bromus carinatus*, *Bromus hordeaceus*, *Hypochaeris radicata*, *Linum bienne*, *Logfia gallica*, *Lolium perenne*, *Nassella pulchra*, *Plantago lanceolata*, *Rumex acetosella*, *Silene gallica*, *Trifolium dubium*, *Trifolium subterraneum*, *Vicia sativa*, and *Vulpia bromoides*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.1	0.0 – 0.2	0.3	0 – 0.5
Herb	55.5	34 – 95	0.3	0 – 0.5

### **Local Environmental Description**

**Elevation:** Mean 203 m, Range 65 – 267 m

**Aspect:** SW (3), SE (1)

**Slope:** Mean 22 degrees, Range 9 – 40 degrees

**Macro Topography:** Middle to Upper 1/3 of slope (2), Upper 1/3 of slope (2)

**Large Rock:** Mean 0.3%, Range 0.0 – 1.0%

**Small Rock:** Mean 1.0%, Range 0.0 – 3.0%

**Fines Cover:** Mean 46.0%, Range 2.0 – 96%

**Litter Cover:** Mean 45.6%, Range 0.2 – 72%

**Soil Texture (field assessed):** Not recorded (3), Moderately fine sandy clay loam (1)

**Geology (field or map data):** Ultramafic (type unknown) (2), Franciscan melange (2)

**Marin County Watersheds:** Walker Creek (3)

**Other Watersheds, Sonoma Co.:** Salmon Creek (1)

### **Site Impacts**

This association has greater cover of exotics (average 70.9%) than natives. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*, *Anagallis arvensis*, *Avena* spp., *Bellardia trixago*, *Brachypodium distachyon*, *Briza maxima*, *Briza minor*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Cerastium glomeratum*, *Cynosurus echinatus*, *Erodium botrys*, *Erodium cicutarium*, *Geranium dissectum*, *Hypochaeris radicata*, *Leontodon taraxacoides*, *Linum bienne*, *Logfia gallica*, *Lolium perenne*, *Medicago* spp., *Plantago lanceolata*, *Romulea rosea*, *Rumex acetosella*, *Rytidosperma pilosum*, *Sherardia arvensis*, *Silene gallica*, *Soliva sessilis*, *Sonchus oleraceus*, *Trifolium campestre*, *Trifolium dubium*, *Trifolium glomeratum*, *Trifolium hirtum*, *Trifolium striatum*, *Trifolium subterraneum*, *Vicia sativa*, *Vulpia bromoides*, and *Vulpia myuros*.

### **Classification Comments**

This association is newly described here. It is considered provisional since it is under-sampled in its expected range. Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** none

**Global Rarity Rank:** G3

**State Rarity Rank:** S3

**State Rare:** Y

**Surveys Used for Description**

**Total: N=4; Marin County (n=3):** MARIN224, MARIN237, MARIN295

Sonoma County (n=1): HEAD0165

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	25	12.5	0.1	0.2	0.2				
	<i>Lupinus albifrons</i>	25	12.5	0.1	0.2	0.2				
<b>Herb</b>										
	<i>Aira caryophyllea</i>	100	12.4	17.2	0.2	68.0	X			X
	<b><i>Heterotheca sessiliflora</i></b>	<b>100</b>	<b>14.4</b>	<b>8.8</b>	<b>2.0</b>	<b>20.0</b>	<b>X</b>			<b>X</b>
	<i>Plantago lanceolata</i>	100	6.8	4.3	1.0	8.0	X			X
	<b><i>Danthonia californica</i></b>	<b>100</b>	<b>0.9</b>	<b>0.9</b>	<b>0.2</b>	<b>3.0</b>	<b>X</b>			<b>X</b>
	<i>Nassella pulchra</i>	100	0.9	0.9	0.2	3.0	X			X
	<i>Anagallis arvensis</i>	100	0.4	0.2	0.2	0.2	X			X
	<i>Linum bienne</i>	100	0.4	0.2	0.2	0.2	X			X
	<i>Logfia gallica</i>	100	0.4	0.2	0.2	0.2	X			X
	<i>Trifolium dubium</i>	100	0.4	0.2	0.2	0.2	X			X
	<i>Vulpia bromoides</i>	75	15.5	10.3	8.0	18.0	X			X
	<i>Brachypodium distachyon</i>	75	5.8	3.1	0.2	10.0	X			X
	<i>Bromus hordeaceus</i>	75	4.1	2.8	0.2	8.0	X			X
	<i>Hypochaeris radicata</i>	75	4.8	2.6	0.2	7.0	X			X
	<i>Lolium perenne</i>	75	2.1	1.5	1.0	3.0	X			X
	<i>Acaena pinnatifida</i>	75	0.3	0.2	0.2	0.2	X			X
	<i>Avena</i> spp.	75	0.3	0.2	0.2	0.2	X			X
	<i>Briza minor</i>	75	0.2	0.2	0.2	0.2	X			X
	<i>Bromus carinatus</i>	75	0.3	0.2	0.2	0.2	X			X
	<i>Rumex acetosella</i>	75	0.3	0.2	0.2	0.2	X			X
	<i>Silene gallica</i>	75	0.2	0.2	0.2	0.2	X			X
	<i>Trifolium subterraneum</i>	75	0.3	0.2	0.2	0.2	X			X
	<i>Vicia sativa</i>	75	0.3	0.2	0.2	0.2	X			X
	<i>Briza maxima</i>	50	13.3	5.1	0.2	20.0				X
	<i>Calystegia subacaulis</i>	50	1.5	2.1	0.2	8.0				X
	<i>Chlorogalum pomeridianum</i>	50	4.1	1.6	0.2	6.0				X
	<i>Cynosurus echinatus</i>	50	0.6	0.8	0.2	3.0				X
	<i>Sisyrinchium bellum</i>	50	0.6	0.8	0.2	3.0				X

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<i>Camissonia ovata</i>	50	0.2	0.1	0.2	0.2				X
	<i>Daucus pusillus</i>	50	0.2	0.1	0.2	0.2				X
	<i>Erodium botrys</i>	50	0.2	0.1	0.2	0.2				X
	<i>Iris macrosiphon</i>	50	0.2	0.1	0.2	0.2				X
	<i>Plantago erecta</i>	50	0.2	0.1	0.2	0.2				X
	<i>Sanicula bipinnatifida</i>	50	0.2	0.1	0.2	0.2				X
	<i>Sherardia arvensis</i>	50	0.1	0.1	0.2	0.2				X
	<i>Sidalcea malviflora</i>	50	0.2	0.1	0.2	0.2				X
	<i>Trifolium glomeratum</i>	50	0.1	0.1	0.2	0.2				X
	<i>Trifolium hirtum</i>	50	0.1	0.1	0.2	0.2				X
	<i>Trifolium striatum</i>	50	0.2	0.1	0.2	0.2				X
	<i>Triteleia laxa</i>	50	0.2	0.1	0.2	0.2				X
	<i>Pteridium aquilinum</i>	25	0.5	0.8	3.0	3.0				
	<i>Rytidosperma pilosum</i>	25	0.5	0.8	3.0	3.0				
	<i>Wyethia angustifolia</i>	25	0.9	0.5	2.0	2.0				
	<i>Grindelia stricta</i>	25	0.6	0.3	1.0	1.0				
<b>Non-vascular</b>										
	Lichen	25	25.0	0.1	0.2	0.2				

***Perideridia kelloggii* – *Danthonia californica* Provisional Association**

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**Common Name:** Yampah – Creeping Ryegrass Grassland

**Alliance:** *Festuca idahoensis* – *Danthonia californica* Herbaceous Alliance

**Local Vegetation Description**

The Yampah – Creeping Ryegrass Association forms an open to continuous herbaceous layer. The shrub layer is sparse and the tree layer is absent. The dominant herb is *Perideridia kelloggii*, and characteristic herbs include *Chlorogalum pomeridianum*, *Lolium perenne*, and *Sisyrinchium bellum*. Those herbs often present include *Danthonia californica* along with *Avena* spp., *Bromus hordeaceus*, *Cynosurus echinatus*, *Elymus glaucus*, *Lactuca saligna*, *Lotus wrangelianus*, *Ranunculus californicus*, *Ranunculus occidentalis*, *Trifolium willdenovii*, *Triteleia laxa*, and *Vicia sativa*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.1	0.0 – 0.2	0.3	0 – 0.5
Shrub	0.7	0 – 2	0.8	0.5 – 1
Herb	51.5	23 – 98	0.3	0 – 0.5

**Local Environmental Description**

**Elevation:** Mean 192 m, Range 140 – 333 m

**Aspect:** NE (2), NW (1)

**Slope:** Mean 5 degrees, Range 4 – 6 degrees

**Macro Topography:** Upper 1/3 of slope (1), Middle 1/3 of slope (1), Lower 1/3 of slope (1)

**Large Rock:** Mean 1.3%, Range 0.0 – 3.0%

**Small Rock:** Mean 20.8%, Range 0.0 – 74.0%

**Fines Cover:** Mean 8.5%, Range 1.0 – 16.0%

**Litter Cover:** Mean 49.0%, Range 10.0 – 80%

**Soil Texture (field assessed):** Moderately fine silty clay loam (1), Clay, (class unknown) (1), Fine clay (1)

**Geology (field or map data):** Serpentine (2), Franciscan melange (1), Sandstone, shale, and conglomerate (1)

**Marin County Watersheds:** San Rafael (1)

**Other Watersheds, San Mateo Co.:** San Mateo Bayside (1); **Sonoma Co.:** Middle Russian River (2)

**Site Impacts**

This association has moderate non-native plant cover (average 30.9%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Avena* spp., *Bromus diandrus*, *Bromus hordeaceus*, *Cerastium glomeratum*, *Cynosurus echinatus*, *Galium parisiense*, *Hypochaeris*, *Hypochaeris radicata*, *Lactuca saligna*, *Lolium perenne*, *Vicia sativa*, and *Vulpia bromoides*.

**Classification Comments**

This association is considered provisional since it is under-sampled in its expected range. It is newly described here. Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** none

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

Total: N=4; Marin County (n=1): HEAD0240

San Mateo County (n=1): PWSG05A

Sonoma County (n=2): SONO0348, SONO0359

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Regenerating or Shrubby Trees</b>										
	<i>Quercus agrifolia</i>	25	25.0	0.1	0.2	0.2				
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	25	25.0	0.5	2.0	2.0				
<b>Herb</b>										
	<b><i>Perideridia kelloggii</i></b>	<b>100</b>	<b>35.6</b>	<b>19.8</b>	<b>7.0</b>	<b>38.0</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<i>Lolium perenne</i>	75	16.3	17.8	0.2	68.0	<b>X</b>			<b>X</b>
	<i>Chlorogalum pomeridianum</i>	75	6.2	2.6	0.2	7.0	<b>X</b>			<b>X</b>
	<i>Sisyrinchium bellum</i>	75	1.2	0.9	0.2	3.0	<b>X</b>			<b>X</b>
	<b><i>Danthonia californica</i></b>	<b>50</b>	<b>1.8</b>	<b>2.1</b>	<b>0.2</b>	<b>8.0</b>				<b>X</b>
	<i>Bromus hordeaceus</i>	50	5.1	1.6	0.2	6.0				<b>X</b>
	<i>Cynosurus echinatus</i>	50	3.3	1.1	0.2	4.0				<b>X</b>
	<i>Elymus glaucus</i>	50	0.8	0.8	0.2	3.0				<b>X</b>
	<i>Ranunculus occidentalis</i>	50	0.9	0.3	0.2	1.0				<b>X</b>
	<i>Vicia sativa</i>	50	0.9	0.3	0.2	1.0				<b>X</b>
	<i>Avena</i> spp.	50	0.3	0.1	0.2	0.2				<b>X</b>
	<i>Lactuca saligna</i>	50	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Lotus wrangelianus</i>	50	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Ranunculus californicus</i>	50	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Trifolium willdenovii</i>	50	0.2	0.1	0.2	0.2				<b>X</b>
	<i>Triteleia laxa</i>	50	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Microseris douglasii</i>	25	6.8	5.0	20.0	20.0				
	<i>Hemizonia congesta</i>	25	1.8	2.0	8.0	8.0				
	<i>Bromus diandrus</i>	25	4.9	1.5	6.0	6.0				
	<i>Lomatium utriculatum</i>	25	3.1	1.0	4.0	4.0				
	<i>Carex serratodens</i>	25	0.7	0.8	3.0	3.0				
	<i>Hordeum brachyantherum</i>	25	1.0	0.8	3.0	3.0				
	<i>Madia elegans</i>	25	1.0	0.8	3.0	3.0				
	<i>Melica californica</i>	25	1.6	0.5	2.0	2.0				
	<i>Sanicula bipinnatifida</i>	25	0.8	0.3	1.0	1.0				
	<i>Achillea millefolium</i>	25	0.2	0.1	0.2	0.2				
	<i>Calystegia collina</i>	25	0.2	0.1	0.2	0.2				
	<i>Carex tumulicola</i>	25	0.2	0.1	0.2	0.2				
	<i>Castilleja rubicundula</i> ssp. <i>lithospermoides</i>	25	0.1	0.1	0.2	0.2				
	<i>Cerastium glomeratum</i>	25	0.2	0.1	0.2	0.2				

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<i>Clarkia</i> spp.	25	0.2	0.1	0.2	0.2				
	<i>Croton setigerus</i>	25	0.2	0.1	0.2	0.2				
	<i>Deschampsia danthonioides</i>	25	0.1	0.1	0.2	0.2				
	<i>Dichelostemma capitatum</i>	25	0.2	0.1	0.2	0.2				
	<i>Elymus trachycaulus</i>	25	0.1	0.1	0.2	0.2				
	<i>Galium parisiense</i>	25	0.2	0.1	0.2	0.2				
	<i>Hypochaeris</i> spp.	25	0.2	0.1	0.2	0.2				
	<i>Hypochaeris radicata</i>	25	0.0	0.1	0.2	0.2				
	<i>Iris macrosiphon</i>	25	0.2	0.1	0.2	0.2				
	<i>Juncus bufonius</i>	25	0.0	0.1	0.2	0.2				
	<i>Juncus phaeocephalus</i>	25	0.0	0.1	0.2	0.2				
	<i>Lasthenia californica</i>	25	0.1	0.1	0.2	0.2				
	<i>Leptosiphon parviflorus</i>	25	0.2	0.1	0.2	0.2				
	<i>Lithophragma</i>	25	0.2	0.1	0.2	0.2				
	<i>Lupinus bicolor</i>	25	0.2	0.1	0.2	0.2				
	<i>Mimulus guttatus</i>	25	0.1	0.1	0.2	0.2				
	<i>Nemophila menziesii</i>	25	0.2	0.1	0.2	0.2				
	<i>Plectritis congesta</i>	25	0.2	0.1	0.2	0.2				
	<i>Rumex</i> spp.	25	0.2	0.1	0.2	0.2				
	<i>Sidalcea diploscypha</i>	25	0.1	0.1	0.2	0.2				
	<i>Trifolium microdon</i>	25	0.1	0.1	0.2	0.2				
	<i>Vulpia bromoides</i>	25	0.1	0.1	0.2	0.2				
	<i>Vulpia microstachys</i>	25	0.1	0.1	0.2	0.2				
<b>Non-vascular</b>										
	Moss	25	25.0	0.1	0.2	0.2				



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## ***Grindelia (stricta)* Herbaceous Provisional Alliance**

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**Common Name:** Gum plant patches

**NVC Alliance Code:** A4179. *Grindelia stricta* - *Grindelia* sp. Wet Mudflat Alliance

### **Statewide Description**

*Grindelia stricta* is dominant in the herbaceous layer with *Distichlis spicata*, *Frankenia salina*, *Jaumea carnosa*, *Juncus arcticus*, *Limonium californicum*, *Sarcocornia pacifica* and *Triglochin maritima*.

*G. stricta* and subspecies of *G. stricta* are assigned to the same alliance. *Grindelia stricta* appears to be broadly tolerant of salt or brackish conditions, as in salt marsh edges or along coastal bluffs or stabilized coastal dunes.

### **Local Vegetation Description**

The Gum plant patches Alliance forms an open to continuous herbaceous layer. The shrub layer is sparse and the tree layer is absent. The dominant herb is *Grindelia stricta*, and characteristic herbs include *Sarcocornia pacifica*. Those herbs often present include *Cuscuta salina*, *Distichlis spicata*, and *Jaumea carnosa*, and herbs that are sometimes present include *Frankenia salina*, *Juncus lescurii*, *Limonium californicum*, *Polypogon monspeliensis*, and *Potentilla anserina*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.0	0 – 0.2	0.3	0 – 0.5
Herb	60.6	32 – 76	0.7	0 – 1

### **Local Membership Rule**

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

### **Local Environmental Description**

**Elevation:** Mean 5 m, Range 0 – 8 m

**Aspect:** Flat (3), SE (1), SW (1), NE (1)

**Slope:** Mean 1 degrees, Range 0 – 1 degrees

**Macro Topography:** Lower 1/3 of slope (4), Bottom to Lower 1/3 of slope (1), Edge of basin/wetland (1)

**Large Rock:** 0.0%

**Small Rock:** Mean 0.4%, Range 0.0 – 2.0%

**Fines Cover:** Mean 73.0%, Range 38.0 – 92.0%

**Litter Cover:** Mean 23.3%, Range 6.0 – 60%

**Soil Texture (field assessed):** Fine silty clay (2), Muck (2), Fine sand (1), Moderately fine silty clay loam (1)

**Geology (field or map data):** Alluvium (4), Sandstone (1), Silty alluvium (1)

**Marin County Watersheds:** Novato (2), Point Reyes (2), Bolinas (1), Lagunitas Creek (1)

### **Site Impacts**

This alliance has low non-native plant cover (average 2.5%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Polypogon monspeliensis*.

### **Associations in Marin County**

*Grindelia stricta*

### **Classification Comments**

None.

**References:** Klein et al. 2015

**Global Rarity Rank:** G2G3

**State Rarity Rank:** S2S3

### **Surveys Used for Description**

**Total: N=6; Marin County (n=6):** MARIN017, MARIN024, MARIN043, MARIN062, MARIN323, PORE165

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Herb</b>										
	<i>Grindelia stricta</i>	100	54.3	34.2	24.0	45.0	X	X		X
	<i>Sarcocornia pacifica</i>	83	24.4	17.5	5.0	43.0	X			X
	<i>Distichlis spicata</i>	67	10.7	8.5	1.0	24.0				X
	<i>Jaumea carnosa</i>	50	0.6	0.5	0.2	2.0				X
	<i>Cuscuta salina</i>	50	0.3	0.2	0.2	1.0				X
	<i>Frankenia salina</i>	33	1.4	1.2	0.2	7.0				
	<i>Juncus lescurii</i>	33	0.7	0.5	0.2	3.0				
	<i>Limonium californicum</i>	33	0.1	0.1	0.2	0.2				
	<i>Potentilla anserina</i>	33	0.1	0.1	0.2	0.2				
	<i>Polypogon monspeliensis</i>	33	0.1	0.1	0.2	0.2				

**Grindelia stricta Provisional Association**

**Common Name:** Gumweed Patches

**Alliance:** *Grindelia (stricta)* Provisional Herbaceous Alliance

**Classification Comments**

The association circumscription is the same as that of the alliance. See above for detailed description. This association is considered provisional since it is under-sampled in its expected range.

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y



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## ***Holcus lanatus* – *Anthoxanthum odoratum* Herbaceous Semi-Natural Alliance**

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**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 *Poa pratensis* – *Agrostis gigantea* – *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).

### **Local Vegetation Description**

The Common velvet grass – sweet vernal grass meadows Alliance forms an intermittent to continuous herbaceous layer. The shrub layer is open and the tree layer is sparse. Dominant herbs include *Holcus*

*lanatus*. Those herbs often present include *Cirsium vulgare*, *Lolium perenne*, and *Rumex acetosella*, and herbs that are sometimes present include *Achillea millefolium*, *Anagallis arvensis*, *Briza minor*, *Bromus diandrus*, *Bromus hordeaceus*, *Carex* spp., *Conium maculatum*, *Cynosurus echinatus*, *Geranium dissectum*, *Hordeum brachyantherum*, *Hordeum murinum*, *Hypochaeris radicata*, *Iris douglasiana*, *Juncus patens*, *Juncus phaeocephalus*, *Plantago lanceolata*, *Silene gallica*, *Silybum marianum*, *Sisyrinchium bellum*, *Trifolium subterraneum*, *Vicia sativa*, *Vicia* spp., and *Vulpia bromoides*. Commonly associated emergent shrubs at sparse cover include *Baccharis pilularis*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.3	0 – 5	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	2.0	0.0 – 12.0	0.8	0 – 2
Herb	87.8	40 – 100	0.6	0 – 2

### **Local Membership Rule**

*Holcus lanatus* and/or *Anthoxanthum odoratum* dominate individually or in combination. Other co-dominants may include *Briza maxima*, *Lolium perenne*, *Plantago lanceolata*, *Rumex acetosella*, and *Vulpia bromoides*.

### **Local Environmental Description**

**Elevation:** Mean 63 m, Range 10 – 401 m

**Aspect:** SW (4), SE (2), Flat (1), NW (1)

**Slope:** Mean 4 degrees, Range 0 – 8 degrees

**Macro Topography:** Upper 1/3 of slope (5), Bottom (1), Lower 1/3 of slope (1), Middle 1/3 of slope (1)

**Large Rock:** Mean 0.0%, Range 0.0 – 0.4%

**Small Rock:** Mean 0.2%, Range 0.0 – 1.0%

**Fines Cover:** Mean 16.0%, Range 1.0 – 60.0%

**Litter Cover:** Mean 74.0%, Range 34.0 – 91%

**Soil Texture (field assessed):** Medium to very fine, sandy loam (4), Moderately coarse, sandy loam (1), Medium to very fine, loamy sand (1), Coarse, loamy sand (1), Medium loam (1)

**Geology (field or map data):** Sandstone and other sedimentary (14), Granitic (4), Franciscan melange (2), Siltstone (1), Alluvium (1)

**Marin County Watersheds:** Point Reyes (13), Bolinas (4), Estero San Antonio (2), Inverness (2), San Rafael (1)

### **Site Impacts**

This alliance has greater cover of exotics than natives, with high non-native plant cover (average 90.5%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Anagallis arvensis*, *Briza minor*, *Bromus diandrus*, *Bromus hordeaceus*, *Cirsium vulgare*, *Conium maculatum*, *Cynosurus echinatus*, *Geranium dissectum*, *Holcus lanatus*, *Hordeum murinum*, *Hypochaeris radicata*, *Plantago lanceolata*, *Rumex acetosella*, *Silene gallica*, *Silybum marianum*, *Trifolium subterraneum*, *Vicia sativa*, and *Vulpia bromoides*.

### **Associations in Marin County**

*Holcus lanatus*

*Holcus lanatus* – *Anthoxanthum odoratum*

### **Classification Comments**

None.

**References:** Buck-Diaz et al. 2019, Keeler-Wolf et al. 2003a, Klein et al. 2015, Pickart 2006

Global Rarity Rank: GNA

State Rarity Rank: SNA

**Surveys Used for Description**

**Total: N=25; Marin County (n=25):** HEAD0073, HEAD0076, HEAD0268, HEAD0269, HEAD0312, HEAD0318, HEAD0325, PGA129, PGA1406, PGA1497, PGA210, PGA214, PGA236, PGA520, PGA529, PGA7599, PGA7599A, PGA87, PGA90, PGA96, PGA96A, PORE051, TEVA017c, TGGA003, TGGA005

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Shrub	<i>Baccharis pilularis</i>	36	28.0	1.0	0.1	7.0				
Herb	<b><i>Holcus lanatus</i></b>	<b>100</b>	<b>57.4</b>	<b>60.3</b>	<b>11.2</b>	<b>99.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Lolium perenne</i>	60	7.2	8.9	0.2	40.0				X
	<i>Cirsium vulgare</i>	60	1.0	1.0	0.1	8.0				X
	<i>Rumex acetosella</i>	56	2.3	3.0	0.2	18.0				X
	<i>Plantago lanceolata</i>	44	3.0	5.0	0.1	68.0				
	<i>Hypochaeris radicata</i>	40	0.9	0.8	0.2	8.0				
	<i>Geranium dissectum</i>	40	0.7	0.5	0.2	5.5				
	<i>Achillea millefolium</i>	36	0.9	1.1	0.1	15.0				
	<i>Vulpia bromoides</i>	32	6.1	8.0	8.0	68.0				
	<i>Cynosurus echinatus</i>	28	1.5	1.9	0.2	20.0				
	<i>Bromus hordeaceus</i>	28	1.2	1.0	0.2	8.5				
	<i>Vicia sativa</i>	28	0.3	0.5	0.2	8.0				
	<i>Conium maculatum</i>	24	1.6	1.6	1.0	20.0				
	<i>Trifolium subterraneum</i>	24	1.4	1.1	2.6	13.5				
	<i>Silybum marianum</i>	24	0.3	0.4	0.2	3.0				
	<i>Anagallis arvensis</i>	24	0.3	0.4	0.2	8.0				
	<i>Juncus phaeocephalus</i>	24	0.3	0.3	0.2	3.0				
	<i>Iris douglasiana</i>	24	0.3	0.3	0.2	3.0				
	<i>Briza minor</i>	24	0.1	0.0	0.2	0.2				
	<i>Bromus diandrus</i>	20	2.0	3.0	0.2	38.0				
	<i>Carex</i> spp.	20	0.6	0.5	0.2	12.0				
	<i>Vicia</i> spp.	20	0.5	0.5	0.2	9.0				
	<i>Hordeum brachyantherum</i>	20	0.4	0.4	0.1	7.0				
	<i>Juncus patens</i>	20	0.2	0.3	0.2	3.0				
	<i>Sisyrinchium bellum</i>	20	0.1	0.1	0.1	3.0				
	<i>Hordeum murinum</i>	20	0.2	0.1	0.2	1.8				
	<i>Silene gallica</i>	20	0.0	0.0	0.2	0.2				

## ***Holcus lanatus* Semi-natural Association**

**Common Name:** Common velvet grass Grassland

**Alliance:** *Holcus lanatus* – *Anthoxanthum odoratum* Herbaceous Semi-Natural Alliance

### **Local Vegetation Description**

The Common velvet grass Association forms an intermittent to continuous herbaceous layer. The shrub layer is open and the tree layer is open. The dominant herb is *Holcus lanatus*. Those herbs often present include *Cirsium vulgare*, *Lolium perenne*, and *Rumex acetosella*, and herbs that are sometimes present include *Achillea millefolium*, *Anagallis arvensis*, *Bromus hordeaceus*, *Carex* spp., *Conium maculatum*, *Cynosurus echinatus*, *Geranium dissectum*, *Hordeum brachyantherum*, *Hypochaeris radicata*, *Iris douglasiana*, *Juncus patens*, *Juncus phaeocephalus*, *Plantago lanceolata*, *Silene gallica*, *Silybum marianum*, *Sisyrinchium bellum*, *Vicia sativa*, and *Vulpia bromoides*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.3	0 – 5	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	2.1	0 – 12	0.8	0 – 2
Herb	87.8	40 – 100	0.6	0 – 2

### **Local Environmental Description**

**Elevation:** Mean 68 m, Range 11 – 401 m

**Aspect:** SW (4), SE (2), Flat (1), NW (1)

**Slope:** Mean 4 degrees, Range 0 – 8 degrees

**Macro Topography:** Upper 1/3 of slope (5), Bottom (1), Lower 1/3 of slope (1), Middle 1/3 of slope (1)

**Large Rock:** Mean 0.1%, Range 0.0 – 0.4%

**Small Rock:** Mean 0.3%, Range 0.0 – 1.0%

**Fines Cover:** Mean 12.6%, Range 1.0 – 60.0%

**Litter Cover:** Mean 74.5%, Range 34.0 – 91%

**Soil Texture (field assessed):** Medium to very fine, sandy loam (4), Medium loam (1), Medium to very fine, loamy sand (1), Moderately coarse, sandy loam (1), Coarse, loamy sand (1)

**Geology (field or map data):** Sandstone and other sedimentary (12), Granitic (4), Franciscan melange (2), Alluvium (1), Siltstone (1)

**Marin County Watersheds:** Point Reyes (13), Bolinas (4), Inverness (2), San Rafael (1)

### **Site Impacts**

This association has greater cover of exotics (average 89.9%) than natives. Non-native species that occur with highest frequency and abundance include *Anagallis arvensis*, *Bromus hordeaceus*, *Cirsium vulgare*, *Conium maculatum*, *Cynosurus echinatus*, *Geranium dissectum*, *Holcus lanatus*, *Hypochaeris radicata*, *Lolium perenne*, *Plantago lanceolata*, *Rumex acetosella*, *Silene gallica*, *Silybum marianum*, *Vicia sativa*, and *Vulpia bromoides*.

### **Classification Comments**

None.

**References:** Klein et al. 2015, Pickart 2006

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

**State Rare:** N

**Surveys Used for Description**

**Total: N=23; Marin County (n=23):** HEAD0073, HEAD0076, HEAD0268, HEAD0269, HEAD0312, HEAD0318, HEAD0325, PGA129, PGA1406, PGA1497, PGA210, PGA214, PGA236, PGA520, PGA529, PGA7599, PGA7599A, PGA87, PGA90, PGA96, PGA96A, PORE051, TEVA017c

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	39	30.4	1.1	0.1	7.0				
<b>Herb</b>										
	<b><i>Holcus lanatus</i></b>	<b>100</b>	<b>60.2</b>	<b>64.1</b>	<b>18.0</b>	<b>99.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Cirsium vulgare</i>	61	1.0	1.1	0.1	8.0				<b>X</b>
	<i>Lolium perenne</i>	57	7.4	9.4	0.2	40.0				<b>X</b>
	<i>Rumex acetosella</i>	52	2.2	3.0	0.2	18.0				<b>X</b>
	<i>Plantago lanceolata</i>	39	3.2	5.4	0.2	68.0				
	<i>Achillea millefolium</i>	35	1.0	1.2	0.1	15.0				
	<i>Hypochaeris radicata</i>	35	0.9	0.8	0.2	8.0				
	<i>Geranium dissectum</i>	35	0.1	0.1	0.2	0.2				
	<i>Cynosurus echinatus</i>	30	1.6	2.0	0.2	20.0				
	<i>Vicia sativa</i>	30	0.3	0.5	0.2	8.0				
	<i>Vulpia bromoides</i>	26	5.1	7.7	8.0	68.0				
	<i>Conium maculatum</i>	26	1.8	1.7	1.0	20.0				
	<i>Anagallis arvensis</i>	26	0.3	0.4	0.2	8.0				
	<i>Iris douglasiana</i>	26	0.3	0.3	0.2	3.0				
	<i>Juncus phaeocephalus</i>	26	0.3	0.3	0.2	3.0				
	<i>Carex</i> spp.	22	0.6	0.6	0.2	12.0				
	<i>Hordeum brachyantherum</i>	22	0.4	0.5	0.1	7.0				
	<i>Silybum marianum</i>	22	0.3	0.4	0.2	3.0				
	<i>Bromus hordeaceus</i>	22	0.2	0.4	0.2	8.0				
	<i>Juncus patens</i>	22	0.3	0.3	0.2	3.0				
	<i>Sisyrinchium bellum</i>	22	0.1	0.2	0.1	3.0				
	<i>Silene gallica</i>	22	0.0	0.0	0.2	0.2				



***Holcus lanatus* – *Anthoxanthum odoratum* Semi-natural Association**

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**Common Name:** Common velvet grass – sweet vernal grass Grassland

**Alliance:** *Holcus lanatus* – *Anthoxanthum odoratum* Herbaceous Semi-Natural Alliance

**Local Vegetation Description**

The Common velvet grass – sweet vernal grass Association forms a continuous herbaceous layer. The shrub layer is open and the tree layer is absent. *Holcus lanatus* and *Anthoxanthum odoratum* are co-dominant to dominant, and other characteristic non-native herbs include *Cirsium vulgare*, *Hypochaeris radicata*, and *Rumex acetosella*. Those herbs often present include *Anagallis arvensis*, *Briza maxima*, *Briza minor*, *Bromus diandrus*, *Bromus hordeaceus*, *Calystegia* spp., *Carduus pycnocephalus*, *Geranium dissectum*, *Leontodon taraxacoides*, *Plantago lanceolata*, *Pteridium aquilinum*, *Sonchus asper*, and *Vulpia bromoides*. Commonly associated emergent shrubs at sparse cover include *Baccharis pilularis*, *Frangula californica*, and *Rubus ursinus*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	6.2	1 – 18	no data	
Herb	85.0	85 – 85	no data	

**Local Environmental Description**

**Elevation:** Mean 23 m, Range 10 – 35 m

**Aspect:** SW (3)

**Slope:** Mean 3 degrees, Range 0 – 9 degrees

**Macro Topography:** Lower 1/3 of slope (4)

**Large Rock:** 0.0%

**Small Rock:** Mean 0.2%, Range 0 – 1.0%

**Fines Cover:** Mean 10.3%, Range 0 – 31.2%

**Litter Cover:** Mean 80.8%, Range 69 – 88%

**Soil Texture (field assessed):** Medium to very fine, loamy sand (1), Medium to very fine, sandy loam (1), Moderately fine silty clay loam (1), Coarse, loamy sand (1)

**Geology (field or map data):** Alluvium (2), Sandstone and other sedimentary (2), Sandstone, shale, and conglomerate (2)

**Marin County Watersheds:** Estero San Antonio (2)

**Other Watersheds, Sonoma Co.:** Gualala River (4)

**Site Impacts**

This association has greater cover of exotics (average 91.3%) than natives. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*, *Anagallis arvensis*, *Anthoxanthum odoratum*, *Avena* spp., *Briza maxima*, *Briza minor*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Cirsium vulgare*, *Geranium dissectum*, *Holcus lanatus*, *Hordeum marinum*, *Hordeum murinum*, *Hypochaeris radicata*, *Leontodon taraxacoides*, *Linum bienne*, *Lolium perenne*, *Plantago lanceolata*, *Ranunculus muricatus*, *Rumex acetosella*, *Sonchus asper*, *Trifolium subterraneum*, and *Vulpia bromoides*.

**Classification Comments**

Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** Buck-Diaz et al. 2019, Keeler-Wolf et al. 2003a, Klein et al. 2015

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

**State Rare:** N

**Surveys Used for Description**

Total: N=6; Marin County (n=2): TGGA003, TGGA005

Sonoma County (n=4): HEAD0099, HEAD0100, HEAD0290, HEAD0292

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Rubus ursinus</i>	67	56.3	7.0	3.0	18.0				X
	<i>Baccharis pilularis</i>	50	8.9	0.5	0.1	3.0				X
	<i>Frangula californica</i>	50	1.4	0.1	0.2	0.2				X
<b>Herb</b>										
	<b><i>Holcus lanatus</i></b>	<b>100</b>	<b>30.5</b>	<b>35.0</b>	<b>3.0</b>	<b>68.0</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<i>Hypochaeris radicata</i>	83	1.0	1.5	0.1	8.0	<b>X</b>			<b>X</b>
	<i>Rumex acetosella</i>	83	1.6	1.4	0.1	3.0	<b>X</b>			<b>X</b>
	<i>Cirsium vulgare</i>	83	0.5	0.6	0.2	3.0	<b>X</b>			<b>X</b>
	<b><i>Anthoxanthum odoratum</i></b>	<b>67</b>	<b>30.8</b>	<b>35.3</b>	<b>18.0</b>	<b>88.0</b>				<b>X</b>
	<i>Vulpia bromoides</i>	67	9.6	10.1	0.1	38.0				<b>X</b>
	<i>Leontodon taraxacoides</i>	67	2.0	3.1	0.1	18.0				<b>X</b>
	<i>Geranium dissectum</i>	67	2.7	1.8	0.2	5.5				<b>X</b>
	<i>Plantago lanceolata</i>	67	0.2	0.1	0.1	0.4				<b>X</b>
	<i>Bromus hordeaceus</i>	50	6.1	5.8	8.2	18.0				<b>X</b>
	<i>Bromus diandrus</i>	50	2.3	2.3	1.1	8.0				<b>X</b>
	<i>Calystegia</i> spp.	50	1.4	1.9	0.1	8.0				<b>X</b>
	<i>Briza maxima</i>	50	0.4	0.6	0.2	3.0				<b>X</b>
	<i>Pteridium aquilinum</i>	50	0.5	0.6	0.1	3.0				<b>X</b>
	<i>Carduus pycnocephalus</i>	50	0.3	0.2	0.2	0.7				<b>X</b>
	<i>Anagallis arvensis</i>	50	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Briza minor</i>	50	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Sonchus asper</i>	50	0.1	0.1	0.1	0.2				<b>X</b>
	<i>Trifolium subterraneum</i>	33	3.9	2.7	2.6	13.5				
	<i>Lolium perenne</i>	33	1.8	1.2	1.7	5.6				
	<i>Hordeum murinum</i>	33	0.7	0.5	0.9	1.8				
	<i>Vicia</i> spp.	33	0.6	0.4	0.4	2.1				
	<i>Ranunculus muricatus</i>	33	0.3	0.2	0.4	0.7				
	<i>Hordeum marinum</i>	33	0.2	0.2	0.2	0.8				
	<i>Avena</i> spp.	33	0.1	0.1	0.2	0.5				
	<i>Aira caryophyllea</i>	33	0.1	0.1	0.2	0.2				
	<i>Elymus glaucus</i>	33	0.1	0.1	0.2	0.2				
	<i>Fragaria chiloensis</i>	33	0.1	0.1	0.2	0.2				
	<i>Galium aparine</i>	33	0.1	0.1	0.2	0.2				
	<i>Heracleum maximum</i>	33	0.1	0.1	0.2	0.2				
	<i>Stachys ajugoides</i>	33	0.1	0.1	0.2	0.2				
	<i>Linum bienne</i>	33	0.0	0.1	0.1	0.2				

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## ***Hydrocotyle (ranunculoides, umbellata)* Herbaceous Alliance**

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**Common Name:** Mats of floating pennywort

**NVC Alliance Code:** N/A.

### **Statewide Description**

*Hydrocotyle ranunculoides* or *H. umbellata* is dominant or co-dominant floating on the water surface or as terrestrial herbs with *Agrostis stolonifera*, *Argentina egedii*, *Bolboschoenus maritimus*, *Cotula coronopifolia*, *Eleocharis macrostachya*, *Festuca arundinacea*, *Holcus lanatus*, *Lemna minuta*, *Oenanthe sarmentosa*, and *Schoenoplectus pungens*.

### **Local Vegetation Description**

The Mats of floating pennywort Alliance forms an intermittent to continuous herbaceous layer. The shrub layer is absent and the tree layer is absent. *Hydrocotyle ranunculoides* is typically dominant and those herbs often present include *Azolla filiculoides*, *Glyceria* spp., *Lemna* spp., *Polygonum punctatum*, *Scirpus microcarpus*, and *Torreyochloa pallida*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.0	0 – 0	no data	
Herb	72.5	60 – 85	0.3	0 – 0.5

### Local Membership Rule

*Hydrocotyle ranunculoides* dominant on the water surface of coastal lagoons, ponds, freshwater lakes, and wet marshes growing with *Lemna* spp. and *Scirpus microcarpus*.

### Local Environmental Description

**Elevation:** Mean 20 m, Range 14 – 25 m

**Large Rock:** 0%

**Aspect:** Flat (1)

**Small Rock:** 0%

**Slope:** 0 degrees

**Fines Cover:** 89%

**Macro Topography:** Lower 1/3 of slope (1)

**Litter Cover:** 0%

**Soil Texture (field assessed):** Muck (1)

**Geology (field or map data):** Franciscan melange (1), Sandstone and other sedimentary (1)

**Marin County Watersheds:** Point Reyes (1), Walker Creek (1)

### Site Impacts

This alliance has very low non-native plant cover (average 0.0%) relative to native cover. No non-native species were recorded in the two surveys.

### Associations in Marin County

*Hydrocotyle ranunculoides*

### Classification Comments

This alliance will be inducted into the NVC or combined with other existing native aquatic mat alliances.

**References:** Pickart 2006

**Global Rarity Rank:** G4

**State Rarity Rank:** S3?

### Surveys Used for Description

**Total: N=2; Marin County (n=2):** MARIN104, PGA86

### Alliance Stand Table

Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Herb										
	<i>Hydrocotyle ranunculoides</i>	100	85.7	57.5	55.0	60.0	X	X		X
	<i>Scirpus microcarpus</i>	50	8.3	6.0	12.0	12.0				X
	<i>Glyceria</i> spp.	50	3.5	2.5	5.0	5.0				X
	<i>Azolla filiculoides</i>	50	0.8	0.5	1.0	1.0				X
	<i>Lemna</i> spp.	50	0.8	0.5	1.0	1.0				X
	<i>Polygonum punctatum</i>	50	0.8	0.5	1.0	1.0				X
	<i>Torreyochloa pallida</i>	50	0.2	0.1	0.2	0.2				X

### *Hydrocotyle ranunculoides* Association

**Common Name:** Marsh Pennywort Mats

**Alliance:** *Hydrocotyle* (*ranunculoides*, *umbellata*) Herbaceous Alliance

### Classification Comments

The association circumscription is the same as that of the alliance. See above for detailed description.

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y



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

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**Common Name:** Soft and western rush – sedge marshes

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

**Statewide Description**

*Juncus effusus*, *J. patens*, *J. phaeocephalus*, *Carex densa*, *C. pansa*, *C. praegracilis*, *C. serratodens* or other rushes and sedges co-dominate or dominate in the herbaceous layer with *Achillea millefolium*, *Argentina egedii*, *Artemisia pycnocephala*, *Briza maxima*, *Bromus tectorum*, *Camissonia cheiranthifolia*, *Cardionema ramosissimum*, *Carex* spp., *Carpobrotus chilensis*, *Cirsium vulgare*, *Epilobium ciliatum*, *Erigeron glaucus*, *Helminthotheca echioides*, *Holcus lanatus*, *Juncus arcticus*, *Juncus bufonius*, *Juncus lescurii*, *Juncus phaeocephalus*, *Lactuca serriola*, *Lolium perenne*, *Lotus* spp., *Luzula comosa*, *Plantago* spp., *Poa douglasii*, *Pteridium aquilinum*, *Senecio minimus*, *Trifolium* spp., *Typha latifolia*, and *Urtica dioica*. Emergent shrubs may be present at low cover, including *Baccharis pilularis*, *Lotus scoparius*, or *Rubus armeniacus*.

Several *Juncus* species overlap ecologically in moist coastal terraces, seeps, swales, drainages, 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 grazing. However, *Juncus phaeocephalus*, *J. occidentalis*, and other *Juncus* or *Carex* species may also occur in similar settings.

Stands of various *Juncus* spp. and *Carex* spp. occur scattered across California in seasonally or temporarily wet flats and depressions. Ecological relationships with other caespitose to somewhat rhizomatous rushes and sedges along the coast appear close, therefore the species which were previously treated in separate alliances have been combined along with other rushes and sedges. These

settings are typically only seasonally wet, and they are often invaded by non-native plants such as *Holcus lanatus*, *Lolium perenne*, etc., though they have a mosaic of various native sedge and rush species.

### **Local Vegetation Description**

The Soft and western rush – sedge marshes Alliance forms an open to continuous herbaceous layer. The shrub layer is sparse to open and the tree layer is sparse. Those herbs often present include *Holcus lanatus*, *Juncus effusus*, and *Juncus patens*, and herbs that are sometimes present include *Anagallis arvensis*, *Briza minor*, *Carex* spp., *Cirsium vulgare*, *Geranium dissectum*, *Hordeum brachyantherum*, *Hypochaeris radicata*, *Juncus arcticus*, *Juncus bufonius*, *Juncus phaeocephalus*, *Lolium perenne*, *Mentha pulegium*, *Oenanthe sarmentosa*, *Plantago lanceolata*, *Potentilla anserina*, *Rumex acetosella*, *Rumex crispus*, *Sonchus asper*, and *Vulpia bromoides*. Commonly associated emergent shrubs at sparse cover include *Baccharis pilularis* and *Rubus ursinus*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.3	0 – 20	7.5	5 – 10
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	1.9	0.0 – 20.0	0.9	0 – 5
Herb	84.5	5 – 100	0.6	0 – 2

### **Local Membership Rule**

*Carex amplifolia*, *C. densa*, *C. pansa*, *C. praegracilis*, *C. serratodens*, *C. subbracteata*, *C. tumulicola*, *Juncus effusus*, *J. patens*, *J. covillei*, *J. hesperius*, *J. occidentalis*, and/or *J. phaeocephalus* dominate individually or in combination near the coast or farther inland. Co-dominant species may include *Holcus lanatus*, *Hypochaeris radicata*, *Juncus bufonius*, *Lolium perenne*, and *Vulpia bromoides*.

### **Local Environmental Description**

**Elevation:** Mean 89 m, Range 3 – 619 m

**Aspect:** NW (23), SW (22), SE (19), Flat (10), NE (8)

**Slope:** Mean 4 degrees, Range 0 – 20 degrees

**Macro Topography:** Lower 1/3 of slope (27), Middle 1/3 of slope (19), Bottom (12), Upper 1/3 of slope (10), Edge of basin/wetland (5), Ridge top (3), Bottom to Lower 1/3 of slope (2), Toeslope (1), Middle to Upper 1/3 of slope (1)

**Large Rock:** Mean 0.4%, Range 0.0 – 16.0%

**Small Rock:** Mean 0.9%, Range 0.0 – 45.0%

**Fines Cover:** Mean 27.1%, Range 0.0 – 100.0%

**Litter Cover:** Mean 43.3%, Range 0.0 – 98%

**Soil Texture (field assessed):** Moderately fine silty clay loam (8), Medium loam (7), Muck (7), Fine sandy clay (6), Medium silt (6), Fine silty clay (6), Fine clay (5), Not recorded (5), Moderately fine sandy clay loam (4), Moderately fine clay loam (4), Medium to very fine, loamy sand (3), Medium to very fine, sandy loam (3), Medium silt loam (3), Coarse, loamy sand (3), Moderately coarse, sandy loam (2), Loam, (class unknown) (1), Medium sand (1), Sand, (class unknown) (1), (1)

**Geology (field or map data):** Sandstone and other sedimentary (65), Franciscan melange (27), Granitic (8), Alluvium (7), Large landslides (5), Mixed sedimentary (2), Shale (2), Siltstone (2), Granitic (generic) (2), Volcanic and metavolcanic rocks (1), Sandstone (1), Ultramafic rocks, mostly serpentine (1)

**Marin County Watersheds:** Point Reyes (50), Bolinas (19), Lagunitas Creek (15), Walker Creek (15), Novato (7), Inverness (5), San Rafael (5), Estero San Antonio (4), Estero Americano (3)

## **Site Impacts**

This alliance has moderate non-native plant cover (average 29.2%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Anagallis arvensis*, *Briza minor*, *Cirsium vulgare*, *Geranium dissectum*, *Holcus lanatus*, *Hypochaeris radicata*, *Mentha pulegium*, *Plantago lanceolata*, *Rumex acetosella*, *Rumex crispus*, *Sonchus asper*, and *Vulpia bromoides*.

## **Associations in Marin County**

*Carex amplifolia* – *Carex gynodynamis*  
*Carex densa*  
*Carex pansa*  
*Carex praegracilis Coastal*  
*Carex serratodens*  
*Carex tumulicola*  
*Juncus covillei*  
*Juncus effusus*  
*Juncus patens*  
*Juncus patens* – *Holcus lanatus*  
*Juncus patens* – *Juncus occidentalis*  
*Juncus phaeocephalus*

## **Classification Comments**

A variable array of wetland sedges and rushes occur as dominants or co-dominants in this more broadly defined wet meadow alliance, which may fluctuate in abundance and composition year-to-year depending on amount of inundation. While the NVC currently includes *Juncus effusus* var. *brunneus* (= *Juncus hesperius*) in an alliance with *Carex obnupta*, we recommend this other combination of sedges and rushes in this separate alliance, which is being vetted for inclusion in the NVC. The period of inundation (hydroperiod) for this alliance is somewhat shorter than the other alliance with *Carex obnupta*.

**References:** Buck-Diaz et al. 2012, Buck-Diaz et al. 2019, Evens and Kentner 2006, Evens and San 2005, Keeler-Wolf et al. 2003a, Klein et al. 2007, Klein et al. 2015, Moran 2004a, McBride and Stone 1976, Rodriguez et al. 2017

**Global Rarity Rank:** G4?

**State Rarity Rank:** S4?

## **Surveys Used for Description**

**Total: N=130; Marin County (n=130):** GGNRA301, GGNRA389, HEAD0031, HEAD0063, HEAD0065, HEAD0070, HEAD0077, HEAD0140, HEAD0141, HEAD0142, HEAD0153, HEAD0154, HEAD0172, HEAD0177, HEAD0243, HEAD0246, HEAD0250, HEAD0265, HEAD0302, HEAD0303, HEAD0304, HEAD0309, HEAD0355, HEAD0356, HEAD0376, HEAD0397, HEAD0399, HEAD0401, HEAD0403, HEAD0407, HEAD0408, HEAD0421, HEAD0422, MARIN009, MARIN014, MARIN044, MARIN055, MARIN067, MARIN068, MARIN083, MARIN085, MARIN087, MARIN115, MARIN125, MARIN127, MARIN146, MARIN225, MARIN230, MARIN250, MARIN275, MARIN287, MARIN289, MARIN291, MARIN298, MARIN299, MARIN309, MARIN413, MARIN415, MMWD0023, MMWD0024, MMWD0037, MMWD0044, MMWD0059, MMWD0061, MMWD0070, MMWD0081, MMWD0084, MMWD0085, MMWD0087, MTBP001, MTBP003, MTBP004, MTBP006, PGA01AP01, PGA01AP03, PGA01AP04, PGA118, PGA145, PGA146, PGA191A, PGA201, PGA203-1, PGA2261, PGA2263, PGA238, PGA281, PGA290, PGA297, PGA297A, PGA3054, PGA326, PGA333, PGA341A, PGA3438, PGA3594, PGA372A, PGA3732-1, PGA382, PGA4196, PGA446A, PGA472, PGA5038, PGA528, PGA531, PGA5346, PGA5380, PGA5972, PGA6489, PGA6499, PGA7762, PGA83, PORE027, PORE037, PORE072, PORE103, PORE115, PORE163, PORE181, PORE196, PORE201, SFANF03, SFANF08, SFANF09, TEVA010a, TEVA011b2, TEVA015a, TEVA018a, TEVA018b, TEVA018c, TEVA09a

### Alliance Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	26	17.4	0.8	0.2	9.0				
	<i>Rubus ursinus</i>	26	16.6	0.9	0.1	15.0				
<b>Herb</b>										
	<i>Holcus lanatus</i>	69	10.5	11.4	0.2	68.0				X
	<b><i>Juncus effusus</i></b>	<b>53</b>	<b>16.9</b>	<b>16.8</b>	<b>0.2</b>	<b>85.0</b>				X
	<b><i>Juncus patens</i></b>	<b>52</b>	<b>9.9</b>	<b>9.7</b>	<b>0.2</b>	<b>90.0</b>				X
	<i>Lolium perenne</i>	45	4.6	4.7	0.2	76.0				
	<i>Cirsium vulgare</i>	39	0.3	0.3	0.1	5.0				
	<b><i>Juncus phaeocephalus</i></b>	<b>36</b>	<b>7.0</b>	<b>6.5</b>	<b>0.2</b>	<b>65.0</b>				
	<i>Potentilla anserina</i>	31	2.0	2.3	0.2	38.0				
	<i>Anagallis arvensis</i>	28	0.1	0.1	0.2	3.0				
	<i>Oenanthe sarmentosa</i>	26	1.4	1.8	0.2	37.5				
	<i>Plantago lanceolata</i>	25	1.5	1.5	0.2	38.0				
	<i>Juncus bufonius</i>	25	0.8	1.0	0.2	38.0				
	<i>Geranium dissectum</i>	25	0.1	0.2	0.2	8.0				
	<i>Rumex crispus</i>	23	0.2	0.2	0.2	10.0				
	<i>Hordeum brachyantherum</i>	22	0.4	0.6	0.2	20.0				
	<i>Rumex acetosella</i>	22	0.3	0.4	0.1	15.0				
	<i>Briza minor</i>	21	0.1	0.2	0.1	8.0				
	<i>Sonchus asper</i>	21	0.1	0.1	0.2	4.0				
	<i>Mentha pulegium</i>	20	1.8	1.7	0.2	80.0				
	<i>Vulpia bromoides</i>	20	1.4	1.4	0.2	68.0				
	<b><i>Juncus arcticus</i></b>	<b>20</b>	<b>1.2</b>	<b>1.3</b>	<b>0.2</b>	<b>37.5</b>				
	<i>Hypochaeris radicata</i>	20	0.6	0.7	0.2	18.0				



***Carex amplifolia* – *Carex gynodynamis* Provisional Association**

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**Common Name:** Bigleaf Sedge – Wonder Woman Sedge Wet Meadow

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

**Local Vegetation Description**

The Bigleaf Sedge – Wonder Woman Sedge Wet Meadow Association forms a continuous herbaceous layer in the single survey available. The shrub layer is sparse and the tree layer is absent. Dominant or co-dominant herbs comprise *Carex* spp. including *Carex amplifolia* and *C. gynodynamis*, and characteristic herbs include *Anagallis arvensis*, *Cirsium hydrophilum* var. *vaseyi*, *Deschampsia cespitosa*, *Equisetum telmateia*, *Festuca californica*, *Galium aparine*, *Iris macrosiphon*, *Juncus* spp., *Lotus formosissimus*, *Ranunculus californicus*, *Rumex salicifolius*, *Sisyrinchium bellum*, and *Zigadenus fremontii*. Commonly associated emergent shrubs at sparse cover include *Rubus ursinus*, *Baccharis pilularis*, and *Toxicodendron diversilobum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	NA	no data	
Hardwood	0.0	NA	no data	
Regenerating or Shrubby Tree	0.0	NA	no data	
Shrub	1.0	NA	no data	
Herb	73.0	NA	0.8	0.5 – 1

**Local Environmental Description**

**Elevation:** 463 m (1)

**Aspect:** NW (1)

**Slope:** 0 degrees (1)

**Macro Topography:** Ridge top (1)

**Large Rock:** 0.0%

**Small Rock:** 0.2%

**Fines Cover:** 0.2%

**Litter Cover:** 4%

**Soil Texture (field assessed):** Medium silt (1)

**Geology (field or map data):** Franciscan melange (1)

**Marin County Watersheds:** Lagunitas Creek (1)

**Site Impacts**

This association has very low non-native plant cover (average 0.3%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Anagallis arvensis*.

**Classification Comments**

This survey was placed in a *Carex subfusca* – *Carex amplifolia* Association in Evens and Kentner 2005. This association is new and is considered provisional since it is under-sampled in its expected range.

**References:** Evens and Kentner 2006

**Global Rarity Rank:** G3

**State Rarity Rank:** S2?

**State Rare:** Y

**Surveys Used for Description**

**Total: N=1; Marin County (n=1):** MMWD0081

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Rubus ursinus</i>	100	71.4	1.0	1.0	1.0	X	X		X
	<i>Baccharis pilularis</i>	100	14.3	0.2	0.2	0.2	X			X
	<i>Toxicodendron diversilobum</i>	100	14.3	0.2	0.2	0.2	X			X
<b>Herb</b>										
	<b><i>Carex amplifolia</i></b>	<b>100</b>	<b>56.9</b>	<b>39.0</b>	<b>39.0</b>	<b>39.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<b><i>Carex gynodynama</i></b>	<b>100</b>	<b>13.1</b>	<b>9.0</b>	<b>9.0</b>	<b>9.0</b>	<b>X</b>			<b>X</b>
	<i>Juncus</i> spp.	100	13.1	9.0	9.0	9.0	X			X
	<i>Ranunculus californicus</i>	100	8.7	6.0	6.0	6.0	X			X
	<i>Equisetum telmateia</i>	100	2.9	2.0	2.0	2.0	X			X
	<i>Cirsium hydrophilum</i> var. <i>vaseyi</i>	100	1.5	1.0	1.0	1.0	X			X
	<i>Iris macrosiphon</i>	100	1.5	1.0	1.0	1.0	X			X
	<i>Anagallis arvensis</i>	100	0.3	0.2	0.2	0.2	X			X
	<i>Deschampsia cespitosa</i>	100	0.3	0.2	0.2	0.2	X			X
	<i>Festuca californica</i>	100	0.3	0.2	0.2	0.2	X			X
	<i>Galium aparine</i>	100	0.3	0.2	0.2	0.2	X			X
	<i>Lotus formosissimus</i>	100	0.3	0.2	0.2	0.2	X			X
	<i>Rumex salicifolius</i>	100	0.3	0.2	0.2	0.2	X			X
	<i>Sisyrinchium bellum</i>	100	0.3	0.2	0.2	0.2	X			X
	<i>Zigadenus fremontii</i>	100	0.3	0.2	0.2	0.2	X			X

## **Carex densa Provisional Association**

**Common Name:** Dense Sedge Patches

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

### **Local Vegetation Description**

The Dense Sedge Association forms a continuous herbaceous layer. The shrub layer is sparse and the tree layer is sparse. The dominant or co-dominant herb is *Carex densa*, and characteristic herbs include *Anagallis arvensis*, *Bromus hordeaceus*, *Geranium dissectum*, *Holcus lanatus*, *Ranunculus californicus*, and *Vicia sativa*. Those herbs often present include *Cerastium glomeratum*, *Cirsium vulgare*, *Cyperus eragrostis*, *Juncus* spp., *Juncus bufonius*, *Linum bienne*, *Lolium perenne*, *Mentha pulegium*, *Plantago lanceolata*, *Rumex acetosella*, *Sisyrinchium bellum*, *Trifolium dubium*, and *Trifolium subterraneum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.1	0 – 0.2	no data	
Shrub	0.3	0.0 – 1	no data	
Herb	78.0	66 – 95	0.6	0 – 1

### **Local Environmental Description**

**Elevation:** Mean 233 m, Range 154 – 404 m

**Aspect:** Flat (1), NW (1), SE (1), SW (1)

**Slope:** Mean 6 degrees, Range 2 – 10 degrees

**Macro Topography:** Lower 1/3 of slope (2), Bottom (1), Upper 1/3 of slope (1)

**Large Rock:** Mean 4.3%, Range 0.0 – 16.0%

**Small Rock:** Mean 3.3%, Range 0.0 – 13.0%

**Fines Cover:** Mean 35.0%, Range 4.0 – 96.0%

**Litter Cover:** Mean 19.0%, Range 2.0 – 50%

**Soil Texture (field assessed):** Fine clay (1), Medium to very fine, sandy loam (1), Moderately coarse, sandy loam (1), Moderately fine silty clay loam (1)

**Geology (field or map data):** Franciscan melange (4)

**Marin County Watersheds:** Lagunitas Creek (2), Walker Creek (2)

### **Site Impacts**

This association has moderate non-native plant cover (average 29.4%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Alopecurus pratensis*, *Anagallis arvensis*, *Anthoxanthum odoratum*, *Avena* spp., *Briza minor*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Cerastium glomeratum*, *Cirsium vulgare*, *Cynosurus echinatus*, *Erodium botrys*, *Geranium dissectum*, *Holcus lanatus*, *Hordeum marinum*, *Hypochaeris radicata*, *Lactuca saligna*, *Leontodon taraxacoides*, *Linum bienne*, *Lolium perenne*, *Lotus corniculatus*, *Lythrum hyssopifolium*, *Mentha pulegium*, *Picris echioides*, *Plantago lanceolata*, *Poa annua*, *Prunus cerasifera*, *Ranunculus repens*, *Romulea rosea*, *Rumex acetosella*, *Rumex conglomeratus*, *Rumex crispus*, *Rumex pulcher*, *Taraxacum officinale*, *Trifolium dubium*, *Trifolium subterraneum*, *Vicia sativa*, and *Vulpia bromoides*.

### **Classification Comments**

This association is considered provisional since it is under-sampled in its expected range.

**References:** Evens and Kentner 2006, Sawyer et al. 2009

Global Rarity Rank: GNR

State Rarity Rank: SNR

State Rare: Y

**Surveys Used for Description**

Total: N=4; Marin County (n=4): HEAD0070, MARIN225, MMWD0037, MMWD0070

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Regenerating or Shrubby Trees</b>										
	<i>Prunus cerasifera</i>	25	25.0	0.1	0.2	0.2				
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	25	20.8	0.3	1.0	1.0				
	<i>Toxicodendron diversilobum</i>	25	4.2	0.1	0.2	0.2				
<b>Herb</b>										
	<b><i>Carex densa</i></b>	<b>100</b>	<b>38.1</b>	<b>35.3</b>	<b>8.0</b>	<b>68.0</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<i>Holcus lanatus</i>	100	0.3	0.2	0.2	0.2	<b>X</b>			<b>X</b>
	<i>Ranunculus californicus</i>	75	4.1	2.6	0.2	10.0	<b>X</b>			<b>X</b>
	<i>Bromus hordeaceus</i>	75	1.7	1.1	0.2	4.0	<b>X</b>			<b>X</b>
	<i>Geranium dissectum</i>	75	0.8	0.6	0.2	2.0	<b>X</b>			<b>X</b>
	<i>Anagallis arvensis</i>	75	0.5	0.4	0.2	1.0	<b>X</b>			<b>X</b>
	<i>Vicia sativa</i>	75	0.2	0.2	0.2	0.2	<b>X</b>			<b>X</b>
	<i>Lolium perenne</i>	50	4.5	5.5	4.0	18.0				<b>X</b>
	<i>Plantago lanceolata</i>	50	3.8	2.6	0.2	10.0				<b>X</b>
	<i>Mentha pulegium</i>	50	1.7	2.3	1.0	8.0				<b>X</b>
	<i>Trifolium subterraneum</i>	50	2.7	2.3	3.0	6.0				<b>X</b>
	<i>Juncus bufonius</i>	50	2.3	1.6	0.2	6.0				<b>X</b>
	<i>Trifolium dubium</i>	50	0.6	0.8	0.2	3.0				<b>X</b>
	<i>Sisyrinchium bellum</i>	50	1.2	0.8	1.0	2.0				<b>X</b>
	<i>Cerastium glomeratum</i>	50	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Cirsium vulgare</i>	50	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Cyperus eragrostis</i>	50	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Juncus</i> spp.	50	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Linum bienne</i>	50	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Rumex acetosella</i>	50	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Anthoxanthum odoratum</i>	25	7.4	5.0	20.0	20.0				
	<i>Juncus phaeocephalus</i>	25	2.9	4.5	18.0	18.0				
	<i>Zigadenus micranthus</i>	25	6.9	4.3	17.0	17.0				
	<i>Trifolium</i> spp.	25	2.6	4.0	16.0	16.0				
	<i>Juncus xiphioides</i>	25	3.2	2.3	9.0	9.0				
	<i>Hordeum brachyantherum</i>	25	1.3	2.0	8.0	8.0				
	<i>Avena</i> spp.	25	2.8	1.8	7.0	7.0				
	<i>Juncus occidentalis</i>	25	2.6	1.8	7.0	7.0				
	<i>Carex</i> spp.	25	1.9	1.3	5.2	5.2				
	<i>Carex subbracteata</i>	25	1.9	1.3	5.0	5.0				
	<i>Briza minor</i>	25	0.5	0.8	3.0	3.0				

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<i>Vulpia bromoides</i>	25	0.5	0.8	3.0	3.0				
	<i>Alopecurus pratensis</i>	25	0.1	0.1	0.2	0.2				
	<i>Camissonia ovata</i>	25	0.1	0.1	0.2	0.2				
	<i>Cardamine californica</i>	25	0.1	0.1	0.2	0.2				
	<i>Carduus pycnocephalus</i>	25	0.0	0.1	0.2	0.2				
	<i>Cynoglossum grande</i>	25	0.1	0.1	0.2	0.2				
	<i>Cynosurus echinatus</i>	25	0.0	0.1	0.2	0.2				
	<i>Danthonia californica</i>	25	0.1	0.1	0.2	0.2				
	<i>Eleocharis macrostachya</i>	25	0.1	0.1	0.2	0.2				
	<i>Epilobium</i> spp.	25	0.1	0.1	0.2	0.2				
	<i>Erodium botrys</i>	25	0.1	0.1	0.2	0.2				
	<i>Festuca</i> spp.	25	0.1	0.1	0.2	0.2				
	<i>Galium porrigens</i>	25	0.1	0.1	0.2	0.2				
	<i>Hemizonia congesta</i>	25	0.1	0.1	0.2	0.2				
	<i>Hesperivax sparsiflora</i>	25	0.1	0.1	0.2	0.2				
	<i>Hordeum marinum</i>	25	0.0	0.1	0.2	0.2				
	<i>Hypochaeris radicata</i>	25	0.0	0.1	0.2	0.2				
	<i>Juncus effusus</i>	25	0.0	0.1	0.2	0.2				
	<i>Juncus patens</i>	25	0.1	0.1	0.2	0.2				
	<i>Lactuca saligna</i>	25	0.0	0.1	0.2	0.2				
	<i>Leontodon taraxacoides</i>	25	0.1	0.1	0.2	0.2				
	<i>Lotus corniculatus</i>	25	0.1	0.1	0.2	0.2				
	<i>Lotus humistratus</i>	25	0.1	0.1	0.2	0.2				
	<i>Lotus wrangelianus</i>	25	0.1	0.1	0.2	0.2				
	<i>Lythrum hyssopifolium</i>	25	0.0	0.1	0.2	0.2				
	<i>Mimulus guttatus</i>	25	0.1	0.1	0.2	0.2				
	<i>Picris echioides</i>	25	0.0	0.1	0.2	0.2				
	<i>Plantago erecta</i>	25	0.1	0.1	0.2	0.2				
	<i>Poa annua</i>	25	0.1	0.1	0.2	0.2				
	<i>Ranunculus orthorhynchus</i>	25	0.0	0.1	0.2	0.2				
	<i>Ranunculus repens</i>	25	0.0	0.1	0.2	0.2				
	<i>Romulea rosea</i>	25	0.1	0.1	0.2	0.2				
	<i>Rumex conglomeratus</i>	25	0.1	0.1	0.2	0.2				
	<i>Rumex crispus</i>	25	0.1	0.1	0.2	0.2				
	<i>Rumex pulcher</i>	25	0.0	0.1	0.2	0.2				
	<i>Stachys ajugoides</i>	25	0.1	0.1	0.2	0.2				
	<i>Taraxacum officinale</i>	25	0.0	0.1	0.2	0.2				
	<i>Trifolium wormskioldii</i>	25	0.1	0.1	0.2	0.2				
	<i>Triteleia hyacinthina</i>	25	0.0	0.1	0.2	0.2				
	<i>Triteleia peduncularis</i>	25	0.0	0.1	0.2	0.2				

## **Carex pansa Provisional Association**

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**Common Name:** Sand Dune Sedge Patches

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

### **Local Vegetation Description**

The Sand Dune Sedge Association forms a continuous herbaceous layer in the single survey available. The shrub layer is absent and the tree layer is absent. *Carex pansa* is dominant or co-dominant in stands. Other herbs can include *Avena* spp., *Bromus diandrus*, *Carduus pycnocephalus*, *Cirsium vulgare*, *Conium maculatum*, *Galium aparine*, *Holcus lanatus*, and *Juncus patens*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	NA	no data	
Hardwood	0.0	NA	no data	
Regenerating or Shrubby Tree	0.0	NA	no data	
Shrub	0.0	NA	no data	
Herb	90	NA	no data	

### **Local Environmental Description**

**Elevation:** 15 m

**Aspect:** Flat (1)

**Slope:** 0 degrees (1)

**Macro Topography:** no data

**Large Rock:** no data

**Small Rock:** no data

**Fines Cover:** no data

**Litter Cover:** no data

**Soil Texture (field assessed):** no data

**Geology (field or map data):** Sandstone and other sedimentary (1)

**Marin County Watersheds:** Bolinas (1)

### **Site Impacts**

This association has greater cover of exotics (average 56.5%) than natives. Non-native species that occur with highest frequency and abundance include *Avena* spp., *Bromus diandrus*, *Carduus pycnocephalus*, *Cirsium vulgare*, *Conium maculatum*, and *Holcus lanatus*.

### **Classification Comments**

This association is considered provisional since it is under-sampled in its expected range.

**References:** McBride and Stone 1976, Rodriguez et al. 2017

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

### **Surveys Used for Description**

**Total: N=1; Marin County (n=1):** TEVA018c

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Herb</b>										
	<i>Galium aparine</i>	100	26.1	30.0	30.0	30.0	X			X
	<i>Holcus lanatus</i>	100	21.7	25.0	25.0	25.0	X			X
	<b><i>Carex pansa</i></b>	<b>100</b>	<b>13.0</b>	<b>15.0</b>	<b>15.0</b>	<b>15.0</b>	<b>X</b>			<b>X</b>
	<i>Conium maculatum</i>	100	13.0	15.0	15.0	15.0	X			X
	<i>Avena</i> spp.	100	8.7	10.0	10.0	10.0	X			X
	<i>Bromus diandrus</i>	100	4.3	5.0	5.0	5.0	X			X
	<i>Carduus pycnocephalus</i>	100	4.3	5.0	5.0	5.0	X			X
	<i>Cirsium vulgare</i>	100	4.3	5.0	5.0	5.0	X			X
	<i>Juncus patens</i>	100	4.3	5.0	5.0	5.0	X			X

## ***Carex praegracilis* Coastal Provisional Association**

**Common Name:** Field Sedge Coastal Patches

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

### **Local Vegetation Description**

The Field Sedge Coastal Association forms a continuous herbaceous layer. The shrub layer is sparse and the tree layer is absent. The dominant to co-dominant herb is *Carex praegracilis*. Those herbs often present include *Carex densa*, *Chlorogalum pomeridianum*, *Galium aparine*, and *Sonchus asper*, and herbs that are sometimes present include *Avena* spp., *Briza maxima*, *Carduus pycnocephalus*, *Carex* spp., *Carex serratodens*, *Cirsium vulgare*, *Dipsacus* spp., *Elymus glaucus*, *Geranium dissectum*, *Holcus lanatus*, *Hordeum brachyantherum*, *Juncus* spp., *Juncus arcticus*, *Juncus xiphioides*, *Lactuca saligna*, *Lolium perenne*, *Nassella pulchra*, *Picris echioides*, *Rumex pulcher*, and *Sisyrinchium bellum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	1.0	0.0 – 5	no data	
Herb	94.4	88 – 98	0.8	0.5 – 1

### **Local Environmental Description**

**Elevation:** Mean 71 m, Range 6 – 151 m

**Aspect:** Flat (2), SE (2), NE (1), NW (1), SW (1)

**Slope:** Mean 4 degrees, Range 0 – 12 degrees

**Macro Topography:** Lower 1/3 of slope (5), Bottom (1), Upper 1/3 of slope (1)

**Large Rock:** Mean 0.9%, Range 0.0 – 6.0%

**Small Rock:** Mean 0.1%, Range 0.0 – 1.0%

**Fines Cover:** Mean 15.6%, Range 0.2 – 95.0%

**Litter Cover:** Mean 68.6%, Range 2.0 – 97%

**Soil Texture (field assessed):** Fine silty clay (3), Fine clay (1), Moderately fine silty clay loam (1), Muck (1), Not recorded (1)

**Geology (field or map data):** Franciscan melange (5), Alluvium (1), Ultramafic rocks, e.g. serpentine (1)

**Marin County Watersheds:** San Rafael (5), Bolinas (1), Lagunitas Creek (1)

### **Site Impacts**

This association has low non-native plant cover (average 4.8%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Avena* spp., *Briza maxima*, *Carduus pycnocephalus*, *Cirsium vulgare*, *Dipsacus* spp., *Geranium dissectum*, *Holcus lanatus*, *Lactuca saligna*, *Lolium perenne*, *Picris echioides*, *Rumex pulcher*, and *Sonchus asper*.

### **Classification Comments**

This association is considered provisional since it is under-sampled in its expected range.

**References:** Klein et al. 2015, Rodriguez et al. 2017

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y



**Surveys Used for Description**

**Total: N=7; Marin County (n=7):** HEAD0140, HEAD0141, HEAD0142, MARIN014, MARIN044, MARIN275, MMWD0084

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	29	20.5	0.9	3.0	3.0				
	<i>Toxicodendron diversilobum</i>	29	8.0	0.5	0.2	3.0				
<b>Herb</b>										
	<b><i>Carex praegracilis</i></b>	<b>100</b>	<b>78.4</b>	<b>76.3</b>	<b>38.0</b>	<b>97.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Carex densa</i>	57	3.8	3.2	0.2	22.0				<b>X</b>
	<i>Chlorogalum pomeridianum</i>	57	0.6	0.5	0.2	3.0				<b>X</b>
	<i>Galium aparine</i>	57	0.5	0.5	0.2	3.0				<b>X</b>
	<i>Sonchus asper</i>	57	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Lolium perenne</i>	43	0.2	0.2	0.2	1.0				
	<i>Cirsium vulgare</i>	43	0.1	0.1	0.2	0.2				
	<i>Lactuca saligna</i>	43	0.1	0.1	0.2	0.2				
	<i>Carex</i> spp.	29	6.0	5.5	0.2	38.0				
	<i>Dipsacus</i> spp.	29	3.1	2.7	1.0	18.0				
	<i>Elymus glaucus</i>	29	0.9	0.9	3.0	3.0				
	<i>Carex serratodens</i>	29	0.4	0.5	0.2	3.0				
	<i>Holcus lanatus</i>	29	0.5	0.5	0.2	3.0				
	<i>Hordeum brachyantherum</i>	29	0.4	0.5	0.2	3.0				
	<i>Juncus</i> spp.	29	0.5	0.5	0.2	3.0				
	<i>Nassella pulchra</i>	29	0.4	0.5	0.2	3.0				
	<i>Juncus arcticus</i>	29	0.3	0.3	1.0	1.0				
	<i>Juncus xiphioides</i>	29	0.2	0.2	0.2	1.0				
	<i>Avena</i> spp.	29	0.1	0.1	0.2	0.2				
	<i>Briza maxima</i>	29	0.1	0.1	0.2	0.2				
	<i>Carduus pycnocephalus</i>	29	0.1	0.1	0.2	0.2				
	<i>Geranium dissectum</i>	29	0.1	0.1	0.2	0.2				
	<i>Picris echioides</i>	29	0.1	0.1	0.2	0.2				
	<i>Rumex pulcher</i>	29	0.1	0.1	0.2	0.2				
	<i>Sisyrinchium bellum</i>	29	0.0	0.0	0.1	0.2				

## **Carex serratodens Provisional Association**

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**Common Name:** Twotooth Sedge Patches

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

### **Local Vegetation Description**

The Twotooth Sedge Association forms an open to continuous herbaceous layer. The shrub layer is sparse and the tree layer is absent. The co-dominant to dominant herb is *Carex serratodens*. Those herbs often present include *Anagallis arvensis* and *Elymus triticoides*, and herbs that are sometimes present include *Avena* spp., *Cirsium vulgare*, *Epilobium* spp., *Hordeum brachyantherum*, *Juncus arcticus*, *Juncus occidentalis*, *Lactuca saligna*, *Lotus wrangelianus*, *Mimulus guttatus*, *Trifolium fucatum*, and *Trifolium variegatum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.9	0 – 4	1.0	0.5 – 2
Herb	67.6	29 – 87	0.9	0 – 2

### **Local Environmental Description**

**Elevation:** Mean 323 m, Range 112 – 586 m

**Aspect:** SE (3), SW (3), NW (1)

**Slope:** Mean 10 degrees, Range 2 – 20 degrees

**Macro Topography:** Middle 1/3 of slope (4), Upper 1/3 of slope (1), Bottom to Lower 1/3 of slope (1), Middle to Upper 1/3 of slope (1)

**Large Rock:** Mean 0.1%, Range 0.0 – 0.2%

**Small Rock:** Mean 7.5%, Range 0.0 – 45.0%

**Fines Cover:** Mean 16.7%, Range 0.0 – 61.0%

**Litter Cover:** Mean 56.7%, Range 10.0 – 97%

**Soil Texture (field assessed):** Muck (2), Fine clay (2), Medium silt (1), Coarse, loamy sand (1), Moderately fine clay loam (1)

**Geology (field or map data):** Franciscan melange (4), Serpentine (2), Ultramafic rocks, mostly serpentine (1)

**Marin County Watersheds:** Lagunitas Creek (3)

**Other Watersheds, San Mateo Co.:** San Mateo Bayside (1); **Sonoma Co.:** Lower Russian River (1), Middle Russian River (1), Sonoma Creek (1)

### **Site Impacts**

This association has low non-native plant cover (average 7.9%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Anagallis arvensis*, *Avena* spp., *Cirsium vulgare*, and *Lactuca saligna*.

### **Classification Comments**

This association is considered provisional since it is under-sampled in its expected range. Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** Klein et al. 2007, Klein et al. 2015

Global Rarity Rank: GNR

State Rarity Rank: SNR

State Rare: Y

**Surveys Used for Description**

Total: N=7; Marin County (n=3): MARIN087, MARIN250, MMWD0044

San Mateo County (n=1): SMAT0294

Sonoma County (n=3): SONO0354, SONO0477, SONO0543

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	43	32.0	0.3	0.2	1.0				
	<i>Toxicodendron diversilobum</i>	29	12.6	0.2	0.2	1.0				
<b>Herb</b>										
	<b><i>Carex serratodens</i></b>	<b>100</b>	<b>56.7</b>	<b>39.1</b>	<b>4.0</b>	<b>70.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Elymus triticoides</i>	57	5.6	2.8	0.2	12.0				<b>X</b>
	<i>Anagallis arvensis</i>	57	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Juncus arcticus</i>	43	4.8	1.6	1.0	9.0				
	<i>Mimulus guttatus</i>	43	0.2	0.2	0.2	1.0				
	<i>Lactuca saligna</i>	43	0.2	0.1	0.2	0.2				
	<i>Juncus occidentalis</i>	29	6.9	5.7	0.2	40.0				
	<i>Cirsium vulgare</i>	29	0.3	0.2	0.2	1.0				
	<i>Avena</i> spp.	29	0.1	0.1	0.2	0.2				
	<i>Epilobium</i> spp.	29	0.1	0.1	0.2	0.2				
	<i>Hordeum brachyantherum</i>	29	0.1	0.1	0.2	0.2				
	<i>Lotus wrangelianus</i>	29	0.1	0.1	0.2	0.2				
	<i>Trifolium fucatum</i>	29	0.1	0.1	0.2	0.2				
	<i>Trifolium variegatum</i>	29	0.1	0.1	0.2	0.2				

## **Carex tumulicola Provisional Association**

**Common Name:** Splitawn Sedge Patches

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

### **Local Vegetation Description**

The Splitawn Sedge Association forms an intermittent to continuous herbaceous layer. The shrub layer is open and the tree layer is absent. The co-dominant to dominant herb is *Carex tumulicola*, and other characteristic herbs include *Cirsium vulgare*, *Geranium dissectum*, and *Holcus lanatus*. Those herbs often present include *Carex gynodynamis*, *Elymus glaucus*, *Plantago lanceolata*, *Sonchus asper*, and *Vicia sativa*, and herbs that are sometimes present include *Achillea millefolium*, *Aira caryophyllea*, *Anagallis arvensis*, *Briza maxima*, *Briza minor*, *Bromus carinatus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Carex ovalis*, *Chlorogalum pomeridianum*, *Danthonia californica*, *Deschampsia cespitosa*, *Galium aparine*, *Hypochaeris radicata*, *Iris douglasiana*, *Juncus* spp., *Juncus patens*, *Linum bienne*, *Lolium perenne*, *Lotus humistratus*, *Luzula comosa*, *Myosotis discolor*, *Nassella lepida*, *Nassella pulchra*, *Poa pratensis*, *Potentilla* spp., *Ranunculus californicus*, *Rumex acetosella*, *Sisyrinchium bellum*, and *Vulpia bromoides*. Commonly associated emergent shrubs at sparse to open cover include *Rubus ursinus*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	2.6	0 – 13	0.3	0 – 0.5
Herb	76.6	35 – 95	0.5	0 – 1

### **Local Environmental Description**

**Elevation:** Mean 48 m, Range 8 – 116 m

**Aspect:** SW (4), NE (2), Flat (1), NW (1)

**Slope:** Mean 6 degrees, Range 0 – 18 degrees

**Macro Topography:** Lower 1/3 of slope (6), Bottom (1), Middle 1/3 of slope (1), Upper 1/3 of slope (1)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** Mean 6.1%, Range 0.0 – 37.0%

**Litter Cover:** Mean 85.0%, Range 60.0 – 96%

**Soil Texture (field assessed):** Moderately fine silty clay loam (4), Not recorded (2), Moderately fine sandy clay loam (1), Fine sandy clay (1)

**Geology (field or map data):** Franciscan melange (5), Alluvium (3), Sandstone and other sedimentary (1)

**Marin County Watersheds:** Walker Creek (2), Bolinas (1), Lagunitas Creek (1)

**Other Watersheds, Sonoma Co.:** Lower Russian River (2), Salmon Creek (2), Estero Americano (1)

### **Site Impacts**

This association has moderate non-native plant cover (average 38.1%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*, *Anagallis arvensis*, *Briza maxima*, *Briza minor*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Cirsium vulgare*, *Geranium dissectum*, *Holcus lanatus*, *Hypochaeris radicata*, *Linum bienne*, *Lolium perenne*, *Myosotis discolor*, *Plantago lanceolata*, *Poa pratensis*, *Rumex acetosella*, *Sonchus asper*, *Vicia sativa*, and *Vulpia bromoides*.

**Classification Comments**

This association is considered provisional since it is under-sampled in its expected range. It is newly described here. Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** none

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

**Total: N=9; Marin County (n=4):** HEAD0031, MARIN115, MARIN289, MARIN309

Sonoma County (n=5): HEAD0017, HEAD0018, HEAD0019, HEAD0340, SONO0752

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Rubus ursinus</i>	56	33.0	2.5	0.2	13.0				X
	<i>Baccharis pilularis</i>	44	20.3	1.0	0.2	3.0				
	<i>Toxicodendron diversilobum</i>	22	0.5	0.0	0.1	0.2				
<b>Herb</b>										
	<b><i>Carex tumulicola</i></b>	<b>100</b>	<b>42.4</b>	<b>38.0</b>	<b>8.0</b>	<b>90.0</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<i>Cirsium vulgare</i>	89	0.4	0.5	0.1	3.0	<b>X</b>			<b>X</b>
	<i>Holcus lanatus</i>	78	28.2	25.6	4.0	68.0	<b>X</b>			<b>X</b>
	<i>Geranium dissectum</i>	78	0.4	0.5	0.2	3.0	<b>X</b>			<b>X</b>
	<i>Vicia sativa</i>	67	0.2	0.1	0.2	0.2				<b>X</b>
	<i>Elymus glaucus</i>	56	2.0	1.8	0.2	8.0				<b>X</b>
	<i>Plantago lanceolata</i>	56	1.1	1.0	0.2	8.0				<b>X</b>
	<i>Carex gynodynema</i>	56	1.0	0.7	0.2	3.0				<b>X</b>
	<i>Sonchus asper</i>	56	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Juncus patens</i>	44	2.0	2.4	0.2	18.0				
	<i>Briza maxima</i>	44	2.3	1.8	0.2	8.0				
	<i>Vulpia bromoides</i>	44	1.2	1.0	0.2	3.0				
	<i>Galium aparine</i>	44	0.6	0.6	0.2	3.0				
	<i>Myosotis discolor</i>	44	0.5	0.4	0.2	3.0				
	<i>Rumex acetosella</i>	44	0.4	0.4	0.2	3.0				
	<i>Bromus hordeaceus</i>	44	0.2	0.2	0.2	1.0				
	<i>Anagallis arvensis</i>	44	0.1	0.1	0.2	0.2				
	<i>Deschampsia cespitosa</i>	33	3.5	2.7	8.0	8.0				
	<i>Bromus carinatus</i>	33	1.0	0.9	0.2	8.0				
	<i>Danthonia californica</i>	33	0.7	0.7	0.2	3.2				
	<i>Carduus pycnocephalus</i>	33	0.4	0.4	0.2	3.0				
	<i>Briza minor</i>	33	0.1	0.1	0.2	0.2				
	<i>Carex ovalis</i>	33	0.1	0.1	0.2	0.2				
	<i>Hypochaeris radicata</i>	33	0.1	0.1	0.2	0.2				
	<i>Lolium perenne</i>	33	0.1	0.1	0.2	0.2				

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<i>Nassella pulchra</i>	33	0.1	0.1	0.2	0.2				
	<i>Sisyrinchium bellum</i>	33	0.1	0.1	0.2	0.2				
	<i>Linum bienne</i>	33	0.1	0.1	0.1	0.2				
	<i>Iris douglasiana</i>	22	2.6	2.3	3.0	18.0				
	<i>Lotus humistratus</i>	22	0.6	0.4	0.2	3.0				
	<i>Chlorogalum pomeridianum</i>	22	0.1	0.1	0.2	1.0				
	<i>Achillea millefolium</i>	22	0.0	0.0	0.2	0.2				
	<i>Aira caryophylla</i>	22	0.1	0.0	0.2	0.2				
	<i>Juncus</i> spp.	22	0.1	0.0	0.2	0.2				
	<i>Luzula comosa</i>	22	0.0	0.0	0.2	0.2				
	<i>Nassella lepida</i>	22	0.1	0.0	0.2	0.2				
	<i>Poa pratensis</i>	22	0.0	0.0	0.2	0.2				
	<i>Potentilla</i> spp.	22	0.1	0.0	0.2	0.2				
	<i>Ranunculus californicus</i>	22	0.1	0.0	0.2	0.2				

## Juncus covillei Provisional Association

**Common Name:** Coville's Rush Patches

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

### Local Vegetation Description

The Coville's Rush Association forms a continuous herbaceous layer in our single sample. The shrub layer is absent and the tree layer is absent. The dominant herb is *Juncus covillei*, and other characteristic herbs include *Rumex crispus*. Herbs that are often present include *Deschampsia danthonioides*, *Mentha pulegium*, and *Raphanus sativus*. Commonly associated non-vascular plants include Moss.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.0	0 – 0	no data	
Herb	83.0	70 – 99	0.6	0 – 1

### Local Environmental Description

**Elevation:** Mean 208 m, Range 3 – 619 m

**Aspect:** Flat (2), NW (1)

**Slope:** Mean 1 degree, Range 0 – 2 degrees

**Macro Topography:** Bottom (2), Middle 1/3 of slope (1)

**Large Rock:** Mean 0.0%, Range 0.0 – 0.0%

**Small Rock:** Mean 0.0%, Range 0.0 – 0.0%

**Fines Cover:** Mean 3.8%, Range 0.2 – 11%

**Litter Cover:** Mean 70.7%, Range 17 – 98%

**Soil Texture (field assessed):** Medium to very fine, loamy sand (2), Muck (1)

**Geology (field or map data):** Alluvium (2), Franciscan melange (1)

**Marin County Watersheds:** Novato (2). Lagunitas Creek (1)

### Site Impacts

This association has moderate non-native plant cover (average 23.1%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Atriplex prostrata*, *Lolium perenne*, *Mentha pulegium*, *Raphanus sativus*, and *Rumex crispus*.

### Classification Comments

This association is newly described here and is considered provisional since it is under-sampled in its expected range.

**References:** none

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

### Surveys Used for Description

**Total: N=3; Marin County (n=3):** MARIN413, MARIN415, MMWD0061

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Herb</b>										
	<i>Juncus covillei</i>	100	58.3	51.3	25.0	99.0	X	X		X
	<i>Rumex crispus</i>	100	0.3	0.2	0.2	0.2	X			X
	<i>Deschampsia danthonioides</i>	67	0.1	0.1	0.2	0.2				X
	<i>Mentha pulegium</i>	67	0.2	0.1	0.2	0.2				X
	<i>Raphanus sativus</i>	67	0.1	0.1	0.2	0.2				X
	<i>Lolium perenne</i>	33	21.9	18.3	55.0	55.0				
	<i>Juncus articulatus</i>	33	15.8	10.0	30.0	30.0				
	<i>Croton setigerus</i>	33	1.2	1.0	3.0	3.0				
	<i>Atriplex prostrata</i>	33	0.3	0.3	1.0	1.0				
	<i>Bidens frondosa</i>	33	0.1	0.1	0.2	0.2				
	<i>Carex gynodynama</i>	33	0.1	0.1	0.2	0.2				
	<i>Carex</i> spp.	33	0.1	0.1	0.2	0.2				
	<i>Cirsium hydrophilum</i> var. <i>vaseyi</i>	33	0.1	0.1	0.2	0.2				
	<i>Epilobium</i> spp.	33	0.1	0.1	0.2	0.2				
	<i>Erechtites minimus</i>	33	0.1	0.1	0.2	0.2				
	<i>Galium triflorum</i>	33	0.1	0.1	0.2	0.2				
	<i>Helenium</i> spp.	33	0.1	0.1	0.2	0.2				
	<i>Hoita</i> spp.	33	0.1	0.1	0.2	0.2				
	<i>Holcus lanatus</i>	33	0.1	0.1	0.2	0.2				
	<i>Hypericum anagalloides</i>	33	0.1	0.1	0.2	0.2				
	<i>Lotus formosissimus</i>	33	0.1	0.1	0.2	0.2				
	<i>Lythrum hyssopifolium</i>	33	0.1	0.1	0.2	0.2				
	<i>Mimulus moschatus</i>	33	0.1	0.1	0.2	0.2				
	<i>Plantago subnuda</i>	33	0.1	0.1	0.2	0.2				
	<i>Polypogon monspeliensis</i>	33	0.1	0.1	0.2	0.2				
	<i>Potentilla anserina</i>	33	0.1	0.1	0.2	0.2				
	<i>Veronica americana</i>	33	0.1	0.1	0.2	0.2				
<b>Non-vascular</b>										
	Moss	33	33.3	0.1	0.2	0.2				



## ***Juncus effusus* Association**

**Common Name:** Soft rush Patches

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

### **Local Vegetation Description**

The Soft rush Association forms an intermittent to continuous herbaceous layer. The shrub layer is open to absent and the tree layer is open to absent. The dominant herb is *Juncus effusus*. Those herbs often present include *Holcus lanatus* and *Potentilla anserina*, and herbs that are sometimes present include *Carex obnupta*, *Cirsium vulgare*, *Juncus arcticus*, *Juncus patens*, *Juncus phaeocephalus*, *Lolium perenne*, *Mimulus guttatus*, *Oenanthe sarmentosa*, and *Rumex crispus*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.8	0 – 20	7.5	5 – 10
Regenerating or Shrubby Tree	0.1	0 – 3	no data	
Shrub	3.1	0 – 20	1.0	0 – 5
Herb	91.5	45 – 100	0.8	0 – 2

### **Local Environmental Description**

**Elevation:** Mean 64 m, Range 4 – 517 m

**Aspect:** SW (5), NW (4), SE (4), NE (3), Flat (2)

**Slope:** Mean 3 degrees, Range 0 – 10 degrees

**Macro Topography:** Bottom (4), Edge of basin/wetland (3), Middle 1/3 of slope (3), Bottom to Lower 1/3 of slope (2), Upper 1/3 of slope (2), Lower 1/3 of slope (1)

**Large Rock:** Mean 0.2%, Range 0.0 – 2.0%

**Small Rock:** Mean 0.6%, Range 0.0 – 8.0%

**Fines Cover:** Mean 30.1%, Range 0.0 – 100.0%

**Litter Cover:** Mean 41.0%, Range 1.0 – 95%

**Soil Texture (field assessed):** Medium silt loam (2), Moderately fine sandy clay loam (2), Medium to very fine, sandy loam (2), Fine sandy clay (2), Fine silty clay (1), Moderately coarse, sandy loam (1), Moderately fine silty clay loam (1), Muck (1), Medium silt (1)

**Geology (field or map data):** Sandstone and other sedimentary (24), Granitic (5), Franciscan melange (3), Granitic (generic) (2), Large landslides (2), Alluvium (2), Sandstone (1), Siltstone (1)

**Marin County Watersheds:** Point Reyes (22), Bolinas (6), Inverness (5), Lagunitas Creek (2), Novato (2), Walker Creek (2), Estero Americano (1)

### **Site Impacts**

This association has moderate non-native plant cover (average 22.7%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Cirsium vulgare*, *Holcus lanatus*, *Lolium perenne*, and *Rumex crispus*.

### **Classification Comments**

None.

**References:** Buck-Diaz et al. 2012, Buck-Diaz et al. 2019, Evens and Kentner 2006, Evens and San 2005, Keeler-Wolf et al. 2003a, Klein et al. 2007, Klein et al. 2015, Moran 2004a

**Global Rarity Rank:** G4

**State Rarity Rank:** S4?

**State Rare:** N

**Surveys Used for Description**

**Total: N=43; Marin County (n=43):** HEAD0265, HEAD0304, HEAD0403, HEAD0421, MARIN009, MARIN085, MARIN125, MARIN127, MMWD0024, MTBP001, MTBP003, PGA01AP01, PGA01AP04, PGA146, PGA191A, PGA203-1, PGA2261, PGA2263, PGA238, PGA281, PGA297, PGA297A, PGA3438, PGA3594, PGA382, PGA4196, PGA446A, PGA528, PGA531, PGA5346, PGA5972, PGA6499, PGA7762, PORE027, PORE072, PORE115, PORE201, SFANF03, SFANF08, SFANF09, TEVA010a, TEVA015a, TEVA09a

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Rubus ursinus</i>	35	26.0	1.7	0.2	15.0				
	<i>Baccharis pilularis</i>	28	15.7	0.9	0.2	9.0				
<b>Herb</b>										
	<b><i>Juncus effusus</i></b>	<b>100</b>	<b>44.0</b>	<b>44.1</b>	<b>1.0</b>	<b>85.0</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<i>Holcus lanatus</i>	74	13.4	14.9	0.2	62.5				<b>X</b>
	<i>Potentilla anserina</i>	51	3.5	3.9	0.2	25.0				<b>X</b>
	<i>Oenanthe sarmentosa</i>	49	3.6	4.6	0.2	37.5				
	<i>Juncus patens</i>	47	2.3	3.5	0.2	63.3				
	<i>Rumex crispus</i>	33	0.5	0.5	0.2	10.0				
	<i>Cirsium vulgare</i>	28	0.1	0.1	0.2	3.0				
	<i>Carex obnupta</i>	26	2.6	2.7	0.1	30.0				
	<i>Juncus arcticus</i>	26	2.0	2.4	0.2	37.5				
	<i>Juncus phaeocephalus</i>	26	1.6	1.8	0.2	18.0				
	<i>Mimulus guttatus</i>	23	0.3	0.4	0.2	4.0				
	<i>Lolium perenne</i>	21	1.5	1.9	0.2	35.0				

## ***Juncus patens* Association**

**Common Name:** Spreading Rush Patches

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

### **Local Vegetation Description**

The Spreading Rush Association forms an intermittent to continuous herbaceous layer. The shrub layer is open and the tree layer is absent. The dominant herb is *Juncus patens*. Those herbs often present include *Cirsium vulgare*, and herbs that are sometimes present include *Galium aparine*, *Gamochaeta ustulata*, *Holcus lanatus*, *Hordeum brachyantherum*, *Hypochaeris radicata*, *Iris douglasiana*, *Juncus arcticus*, *Juncus effusus*, *Lolium perenne*, *Oenanthe sarmentosa*, *Plantago lanceolata*, *Sonchus asper*, and *Stachys ajugoides*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	2.7	0 – 15	1.7	0 – 5
Herb	82.8	55 – 99	0.9	0 – 2

### **Local Environmental Description**

**Elevation:** Mean 92 m, Range 13 – 605 m

**Aspect:** SW (2), SE (2), Flat (1), NW (1)

**Slope:** Mean 2 degrees, Range 0 – 9 degrees

**Macro Topography:** Middle 1/3 of slope (4), Lower 1/3 of slope (1), Ridge top (1)

**Large Rock:** 0.0%

**Small Rock:** Mean 0.0%, Range 0.0 – 0.2%

**Fines Cover:** Mean 19.0%, Range 0.0 – 97.0%

**Litter Cover:** Mean 56.5%, Range 2.0 – 89%

**Soil Texture (field assessed):** Moderately fine clay loam (1), Moderately fine sandy clay loam (1), Moderately fine silty clay loam (1), Fine clay (1), Coarse, loamy sand (1), Medium loam (1)

**Geology (field or map data):** Sandstone and other sedimentary (8), Granitic (2), Franciscan melange (1), Volcanic and metavolcanic rocks (1)

**Marin County Watersheds:** Point Reyes (7), Bolinas (4), Lagunitas Creek (1)

### **Site Impacts**

This association has moderate non-native plant cover (average 30.0%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Cirsium vulgare*, *Holcus lanatus*, *Hypochaeris radicata*, *Lolium perenne*, *Plantago lanceolata*, and *Sonchus asper*.

### **Classification Comments**

None.

**References:** Keeler-Wolf et al. 2003a, Klein et al. 2015

**Global Rarity Rank:** G4

**State Rarity Rank:** S4?

**State Rare:** N

### **Surveys Used for Description**

**Total: N=13; Marin County (n=13):** HEAD0177, HEAD0246, HEAD0302, HEAD0309, MARIN083, MMWD0059, PGA145, PGA326, PGA333, PGA6489, TEVA011b2, TEVA018a, TEVA018b

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Rubus ursinus</i>	38	18.3	0.4	0.2	5.0				
	<i>Baccharis pilularis</i>	31	24.5	1.2	2.0	7.0				
<b>Herb</b>										
	<b><i>Juncus patens</i></b>	<b>100</b>	<b>46.7</b>	<b>36.9</b>	<b>3.0</b>	<b>90.0</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<i>Cirsium vulgare</i>	54	0.5	0.5	0.2	3.0				<b>X</b>
	<i>Holcus lanatus</i>	46	4.5	5.1	0.2	38.0				
	<i>Lolium perenne</i>	38	9.5	12.1	0.2	76.0				
	<i>Juncus effusus</i>	38	6.2	5.6	0.2	30.0				
	<i>Iris douglasiana</i>	31	1.3	1.2	0.2	8.0				
	<i>Hordeum brachyantherum</i>	31	0.8	1.0	0.2	8.0				
	<i>Plantago lanceolata</i>	23	3.1	2.9	8.0	18.0				
	<i>Galium aparine</i>	23	1.9	2.0	1.0	20.0				
	<i>Oenanthe sarmentosa</i>	23	1.1	1.0	0.2	10.0				
	<i>Hypochaeris radicata</i>	23	0.8	0.6	0.2	8.0				
	<i>Juncus arcticus</i>	23	0.6	0.4	0.2	5.0				
	<i>Stachys ajugoides</i>	23	0.3	0.3	0.2	3.0				
	<i>Gamochaeta ustulata</i>	23	0.1	0.0	0.2	0.2				
	<i>Sonchus asper</i>	23	0.1	0.0	0.2	0.2				

## Juncus patens – Holcus lanatus Provisional Association

**Common Name:** Spreading Rush – Common Velvetgrass Patches

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

### Local Vegetation Description

The Spreading Rush – Common Velvetgrass Association forms an intermittent to continuous herbaceous layer. The shrub layer is sparse and the tree layer is sparse or absent. *Juncus patens* is usually co-dominant with *Holcus lanatus* in the herb layer, and other characteristic herbs include *Cirsium vulgare*. Those herbs often present include *Geranium dissectum*, *Hordeum brachyantherum*, *Juncus effusus*, and *Lolium perenne*, and herbs that are sometimes present include *Anagallis arvensis*, *Carex* spp., *Conium maculatum*, *Deschampsia cespitosa*, *Elymus glaucus*, *Erechtites minimus*, *Galium aparine*, *Hypochaeris radicata*, *Iris douglasiana*, *Juncus arcticus*, *Juncus bufonius*, *Juncus phaeocephalus*, *Leontodon taraxacoides*, *Lythrum hyssopifolium*, *Mentha pulegium*, *Myosotis discolor*, *Oenanthe sarmentosa*, *Ranunculus californicus*, *Rumex acetosella*, *Rumex crispus*, *Sonchus asper*, *Stachys ajugoides*, *Trifolium wormskoldii*, and *Vulpia bromoides*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.2	0 – 1	no data	
Regenerating or Shrubby Tree	0.0	0.0 – 0.2	no data	
Shrub	1.8	0 – 15	0.3	0 – 0.5
Herb	87.3	48 – 100	0.5	0 – 1

### Local Environmental Description

**Elevation:** Mean 61 m, Range 5 – 121 m

**Aspect:** SE (5), NW (2), SW (1)

**Slope:** Mean 6 degrees, Range 1 – 11 degrees

**Macro Topography:** Lower 1/3 of slope (3), Middle 1/3 of slope (2), Edge of basin/wetland (1), Toeslope (1), Upper 1/3 of slope (1)

**Large Rock:** 0.0%

**Fines Cover:** Mean 49.0%, Range 2.0 – 96%

**Small Rock:** 0.0%

**Litter Cover:** Mean 35.4%, Range 0.0 – 87%

**Soil Texture (field assessed):** Medium loam (4), Medium silt loam (1), Moderately fine clay loam (1), Moderately fine silty clay loam (1), Muck (1)

**Geology (field or map data):** Sandstone and other sedimentary (8), Shale (2), Franciscan melange (1), Granitic (1)

**Marin County Watersheds:** Point Reyes (6), Bolinas (3), Estero San Antonio (2), Estero Americano (1)

### Site Impacts

This association has moderate non-native plant cover (average 41.7%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Anagallis arvensis*, *Cirsium vulgare*, *Conium maculatum*, *Erechtites minimus*, *Geranium dissectum*, *Holcus lanatus*, *Hypochaeris radicata*, *Leontodon taraxacoides*, *Lolium perenne*, *Lythrum hyssopifolium*, *Mentha pulegium*, *Myosotis discolor*, *Rumex acetosella*, *Rumex crispus*, *Sonchus asper*, and *Vulpia bromoides*.

### Classification Comments

This association is considered provisional since it is under-sampled in its expected range.

**References:** Klein et al. 2015

Global Rarity Rank: GNR

State Rarity Rank: SNR

State Rare: N

**Surveys Used for Description**

**Total: N=13; Marin County (n=13):** GGNRA301, GGNRA389, HEAD0077, HEAD0303, HEAD0401, MARIN230, MARIN298, PGA01AP03, PGA118, PGA5038, PGA5380, PORE037, PORE103

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	38	24.4	0.4	0.2	4.0				
	<i>Rubus ursinus</i>	31	21.7	1.3	0.2	15.0				
<b>Herb</b>										
	<b><i>Juncus patens</i></b>	<b>100</b>	<b>31.4</b>	<b>36.6</b>	<b>10.0</b>	<b>75.0</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<b><i>Holcus lanatus</i></b>	<b>100</b>	<b>24.6</b>	<b>27.5</b>	<b>4.0</b>	<b>65.0</b>	<b>X</b>			<b>X</b>
	<i>Cirsium vulgare</i>	77	1.0	1.0	0.2	5.0	<b>X</b>			<b>X</b>
	<i>Juncus effusus</i>	69	6.2	6.1	0.2	20.0				<b>X</b>
	<i>Lolium perenne</i>	69	4.0	4.2	0.2	20.0				<b>X</b>
	<i>Hordeum brachyantherum</i>	62	0.7	0.9	0.2	7.0				<b>X</b>
	<i>Geranium dissectum</i>	54	0.5	0.8	0.2	8.0				<b>X</b>
	<i>Rumex crispus</i>	46	0.3	0.3	0.2	3.0				
	<i>Mentha pulegium</i>	38	2.2	2.7	0.2	15.0				
	<i>Stachys ajugoides</i>	38	1.3	1.6	0.2	10.0				
	<i>Anagallis arvensis</i>	38	0.1	0.1	0.2	0.2				
	<i>Sonchus asper</i>	38	0.1	0.1	0.2	0.2				
	<i>Juncus phaeocephalus</i>	31	3.2	3.3	0.2	18.0				
	<i>Juncus bufonius</i>	31	1.4	2.0	0.2	18.0				
	<i>Iris douglasiana</i>	31	2.2	1.7	0.2	12.0				
	<i>Conium maculatum</i>	31	0.8	1.0	0.2	10.0				
	<i>Lythrum hyssopifolium</i>	31	0.6	0.5	0.2	3.0				
	<i>Vulpia bromoides</i>	31	0.4	0.5	0.2	3.0				
	<i>Galium aparine</i>	31	0.1	0.1	0.2	0.2				
	<i>Hypochaeris radicata</i>	31	0.1	0.1	0.2	0.2				
	<i>Rumex acetosella</i>	31	0.1	0.1	0.2	0.2				
	<i>Erechtites minimus</i>	23	4.7	4.3	0.2	55.0				
	<i>Oenanthe sarmentosa</i>	23	0.7	1.2	0.2	15.0				
	<i>Juncus arcticus</i>	23	0.8	1.0	0.4	10.0				
	<i>Deschampsia cespitosa</i>	23	0.8	0.9	0.1	12.0				
	<i>Carex</i> spp.	23	0.7	0.9	0.2	8.0				
	<i>Elymus glaucus</i>	23	0.3	0.3	0.2	4.0				
	<i>Leontodon taraxacoides</i>	23	0.3	0.2	0.2	2.0				
	<i>Ranunculus californicus</i>	23	0.2	0.1	0.2	1.0				
	<i>Myosotis discolor</i>	23	0.1	0.0	0.2	0.2				
	<i>Trifolium wormskioldii</i>	23	0.1	0.0	0.2	0.2				

*Juncus patens* – *Holcus lanatus* Provisional Association  
*Juncus (effusus, patens)* – *Carex (pansa, praegracilis)* Herbaceous Alliance

## ***Juncus patens* – *Juncus occidentalis* Provisional Association**

**Common Name:** Spreading Rush – Western Rush Patches

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

### **Local Vegetation Description**

The Spreading Rush – Western Rush Association forms an intermittent to continuous herbaceous layer. The shrub layer is sparse and the tree layer is absent. *Juncus occidentalis* is characteristically present and often co-dominant, and other characteristic herbs include *Anagallis arvensis*, *Briza minor*, *Bromus hordeaceus*, *Danthonia californica*, *Geranium dissectum*, *Hypochaeris radicata*, *Juncus bufonius*, *Juncus patens*, *Linum bienne*, *Lolium perenne*, *Plantago lanceolata*, *Sisyrinchium bellum*, and *Vulpia bromoides*. Those herbs often present include *Aira caryophyllea*, *Carex densa*, *Cynosurus echinatus*, *Eryngium armatum*, *Hemizonia congesta*, *Holcus lanatus*, *Hordeum marinum*, *Lotus corniculatus*, *Lythrum hyssopifolium*, *Mentha pulegium*, *Ranunculus californicus*, and *Trifolium dubium*, and herbs that are sometimes present include *Carex tumulicola*, *Leontodon taraxacoides*, *Medicago* spp., *Nassella pulchra*, *Romulea rosea*, *Rumex acetosella*, *Trifolium resupinatum*, and *Trifolium subterraneum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.3	0 – 2	no data	
Herb	78.2	49 – 95	0.3	0 – 0.5

### **Local Environmental Description**

**Elevation:** Mean 49 m, Range 32 – 69 m

**Aspect:** SW (3), NE (2), SE (1)

**Slope:** Mean 7 degrees, Range 1 – 12 degrees

**Macro Topography:** Middle 1/3 of slope (4), Lower 1/3 of slope (2)

**Large Rock:** 0.0%

**Small Rock:** Mean 0.3%, Range 0.0 – 1.0%

**Fines Cover:** Mean 27.8%, Range 1.0 – 95.0%

**Litter Cover:** Mean 34.2%, Range 1.0 – 85%

**Soil Texture (field assessed):** Moderately fine clay loam (2), Not recorded (1), Medium loam (1), Fine sandy clay (1), Moderately fine silty clay loam (1)

**Geology (field or map data):** Sandstone and other sedimentary (4), Franciscan melange (2)

**Marin County Watersheds:** Walker Creek (4), Bolinas (2)

### **Site Impacts**

This association has greater cover of exotics (average 72.9%) than natives. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*, *Anagallis arvensis*, *Briza minor*, *Bromus hordeaceus*, *Cynosurus echinatus*, *Geranium dissectum*, *Holcus lanatus*, *Hordeum marinum*, *Hypochaeris radicata*, *Leontodon taraxacoides*, *Linum bienne*, *Lolium perenne*, *Lotus corniculatus*, *Lythrum hyssopifolium*, *Medicago* spp., *Mentha pulegium*, *Plantago lanceolata*, *Romulea rosea*, *Rumex acetosella*, *Trifolium dubium*, *Trifolium resupinatum*, *Trifolium subterraneum*, and *Vulpia bromoides*.

### **Classification Comments**

This association is considered provisional since it is under-sampled in its expected range.

References: Klein et al. 2015

Global Rarity Rank: GNR

State Rarity Rank: SNR

State Rare: Y

**Surveys Used for Description**

Total: N=6; Marin County (n=6): HEAD0153, HEAD0154, HEAD0355, HEAD0376, HEAD0422, MARIN287

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Herb	<i>Vulpia bromoides</i>	100	19.9	18.7	0.2	68.0	X			X
	<b><i>Juncus occidentalis</i></b>	<b>100</b>	<b>13.4</b>	<b>12.2</b>	<b>3.0</b>	<b>38.0</b>	<b>X</b>			<b>X</b>
	<i>Plantago lanceolata</i>	100	12.8	10.9	0.2	38.0	X			X
	<i>Hypochaeris radicata</i>	100	7.0	7.4	0.2	18.0	X			X
	<i>Lolium perenne</i>	100	5.8	4.7	0.2	8.0	X			X
	<i>Danthonia californica</i>	100	2.9	1.9	0.2	5.0	X			X
	<i>Juncus bufonius</i>	100	1.4	1.6	0.2	3.0	X			X
	<i>Linum bienne</i>	100	1.0	1.1	0.2	3.0	X			X
	<i>Briza minor</i>	100	0.2	0.2	0.2	0.2	X			X
	<i>Sisyrinchium bellum</i>	100	0.2	0.2	0.2	0.2	X			X
	<b><i>Juncus patens</i></b>	<b>83</b>	<b>2.3</b>	<b>2.4</b>	<b>0.2</b>	<b>8.0</b>	<b>X</b>			<b>X</b>
	<i>Bromus hordeaceus</i>	83	0.8	0.6	0.2	3.0	X			X
	<i>Anagallis arvensis</i>	83	0.2	0.2	0.2	0.2	X			X
	<i>Geranium dissectum</i>	83	0.2	0.2	0.2	0.2	X			X
	<i>Holcus lanatus</i>	67	3.1	2.7	0.2	8.0				X
	<i>Cynosurus echinatus</i>	67	1.7	1.9	0.2	8.0				X
	<i>Lotus corniculatus</i>	67	1.7	1.9	0.2	8.0				X
	<i>Carex densa</i>	67	0.5	0.6	0.2	3.0				X
	<i>Lythrum hyssopifolium</i>	67	0.5	0.6	0.2	3.0				X
	<i>Hemizonia congesta</i>	50	1.1	1.4	0.2	8.0				X
	<i>Aira caryophylla</i>	50	0.1	0.1	0.2	0.2				X
	<i>Eryngium armatum</i>	50	0.1	0.1	0.2	0.2				X
	<i>Hordeum marinum</i>	50	0.1	0.1	0.2	0.2				X
	<i>Mentha pulegium</i>	50	0.1	0.1	0.2	0.2				X
	<i>Ranunculus californicus</i>	50	0.1	0.1	0.2	0.2				X
	<i>Trifolium dubium</i>	50	0.1	0.1	0.2	0.2				X
	<i>Leontodon taraxacoides</i>	33	16.6	17.7	38.0	68.0				
	<i>Carex tumulicola</i>	33	0.1	0.1	0.2	0.2				
	<i>Medicago</i> spp.	33	0.1	0.1	0.2	0.2				
	<i>Nassella pulchra</i>	33	0.1	0.1	0.2	0.2				
	<i>Romulea rosea</i>	33	0.1	0.1	0.2	0.2				
	<i>Rumex acetosella</i>	33	0.1	0.1	0.2	0.2				
	<i>Trifolium resupinatum</i>	33	0.1	0.1	0.2	0.2				
	<i>Trifolium subterraneum</i>	33	0.1	0.1	0.2	0.2				

*Juncus patens* – *Juncus occidentalis* Provisional Association  
*Juncus (effusus, patens)* – *Carex (pansa, praegracilis)* Herbaceous Alliance



## ***Juncus phaeocephalus* Association**

**Common Name:** Brown-headed rush Patches

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

### **Local Vegetation Description**

The Brown-headed rush Association forms an intermittent to continuous herbaceous layer. The shrub layer is sparse and the tree layer is absent. The co-dominant to dominant herb is *Juncus phaeocephalus*, and characteristic herbs include *Holcus lanatus*. Those herbs often present include *Briza minor*, *Juncus bufonius*, and *Lolium perenne*, and herbs that are sometimes present include *Anagallis arvensis*, *Bromus hordeaceus*, *Carex* spp., *Carex densa*, *Carex obnupta*, *Cirsium vulgare*, *Cynosurus echinatus*, *Danthonia californica*, *Eryngium armatum*, *Geranium dissectum*, *Hordeum brachyantherum*, *Hypochaeris radicata*, *Iris douglasiana*, *Juncus effusus*, *Juncus patens*, *Leontodon taraxacoides*, *Lotus corniculatus*, *Lythrum hyssopifolium*, *Mentha pulegium*, *Plantago lanceolata*, *Plantago subnuda*, *Potentilla anserina*, *Ranunculus californicus*, *Rumex acetosella*, *Rumex pulcher*, *Sisyrinchium bellum*, *Trifolium dubium*, *Trifolium subterraneum*, *Trifolium wormskioldii*, and *Vulpia bromoides*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	1.3	0 – 15	0.8	0 – 2
Herb	77.2	37 – 97	0.5	0 – 2

### **Local Environmental Description**

**Elevation:** Mean 72 m, Range 5 – 207 m

**Aspect:** NW (9), SW (5), SE (2), NE (1), Flat (1)

**Slope:** Mean 3 degrees, Range 0 – 16 degrees

**Macro Topography:** Lower 1/3 of slope (8), Middle 1/3 of slope (4), Upper 1/3 of slope (3), Bottom (2), Ridge top (1), Edge of basin/wetland (1)

**Large Rock:** Mean 0.1%, Range 0.0 – 1.0%

**Small Rock:** 0.0%

**Fines Cover:** Mean 39.4%, Range 0.0 – 99.0%

**Litter Cover:** Mean 40.5%, Range 0.0 – 93%

**Soil Texture (field assessed):** Medium silt (3), Fine silty clay (2), Fine clay (2), Moderately fine sandy clay loam (1), Not recorded (1), Muck (1), Moderately fine silty clay loam (1), Sand, (class unknown) (1), Medium to very fine, loamy sand (1), Medium loam (1), Coarse, loamy sand (1), (1), Medium sand (1)

**Geology (field or map data):** Sandstone and other sedimentary (15), Large landslides (3), Franciscan melange (2), Mixed sedimentary (1), Alluvium (1), Siltstone (1)

**Marin County Watersheds:** Point Reyes (10), Walker Creek (5), Novato (3), Estero San Antonio (2), Bolinas (1), Estero Americano (1), Lagunitas Creek (1)

### Site Impacts

This association has moderate non-native plant cover (average 35.4%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Anagallis arvensis*, *Briza minor*, *Bromus hordeaceus*, *Cirsium vulgare*, *Cynosurus echinatus*, *Geranium dissectum*, *Holcus lanatus*, *Hypochaeris radicata*, *Leontodon taraxacoides*, *Lolium perenne*, *Lotus corniculatus*, *Lythrum hyssopifolium*, *Mentha pulegium*, *Plantago lanceolata*, *Rumex acetosella*, *Rumex pulcher*, *Trifolium dubium*, *Trifolium subterraneum*, and *Vulpia bromoides*.

### Classification Comments

None.

**References:** Buck-Diaz et al. 2019, Klein et al. 2015, Rodriguez et al. 2017

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

### Surveys Used for Description

**Total: N=24; Marin County (n=24):** HEAD0063, HEAD0065, HEAD0172, HEAD0243, HEAD0250, HEAD0356, HEAD0397, HEAD0399, HEAD0408, MARIN055, MARIN067, MARIN068, MARIN146, MARIN291, MARIN299, MTBP004, MTBP006, PGA201, PGA290, PGA3054, PGA3732-1, PGA472, PORE163, PORE196

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Herb										
	<i>Juncus phaeocephalus</i>	100	31.1	27.7	3.0	65.0	X		X	X
	<i>Holcus lanatus</i>	75	10.0	10.3	0.2	45.0	X			X
	<i>Lolium perenne</i>	71	7.1	6.9	0.2	68.0				X
	<i>Briza minor</i>	54	0.4	0.5	0.1	8.0				X
	<i>Juncus bufonius</i>	50	2.8	3.4	0.2	38.0				X
	<i>Potentilla anserina</i>	42	2.9	3.7	0.2	38.0				
	<i>Vulpia bromoides</i>	42	1.5	1.7	0.2	18.0				
	<i>Trifolium wormskioldii</i>	42	0.4	0.3	0.2	3.0				
	<i>Plantago lanceolata</i>	38	1.4	2.2	0.2	38.0				
	<i>Leontodon taraxacoides</i>	33	1.9	1.7	0.1	19.0				
	<i>Juncus patens</i>	33	1.5	1.3	0.2	9.0				
	<i>Rumex acetosella</i>	33	0.5	0.7	0.1	8.0				
	<i>Lythrum hyssopifolium</i>	33	0.2	0.2	0.2	3.0				
	<i>Hypochaeris radicata</i>	29	1.1	1.3	0.2	8.0				
	<i>Danthonia californica</i>	29	0.7	0.8	0.2	12.0				
	<i>Iris douglasiana</i>	29	0.5	0.5	0.2	7.0				
	<i>Rumex pulcher</i>	29	0.2	0.2	0.2	3.0				
	<i>Anagallis arvensis</i>	29	0.1	0.1	0.2	0.2				
	<i>Geranium dissectum</i>	29	0.1	0.1	0.2	0.2				
	<i>Cirsium vulgare</i>	29	0.1	0.1	0.1	0.2				
	<i>Carex obnupta</i>	25	2.4	3.0	0.2	35.0				
	<i>Mentha pulegium</i>	25	1.6	1.8	0.2	38.0				
	<i>Bromus hordeaceus</i>	25	1.3	1.7	0.2	18.0				
	<i>Carex</i> spp.	25	1.0	0.9	0.2	8.0				

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

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<i>Lotus corniculatus</i>	25	0.6	0.6	0.2	8.0				
	<i>Eryngium armatum</i>	25	0.5	0.5	0.2	8.0				
	<i>Trifolium dubium</i>	25	0.4	0.5	0.2	8.0				
	<i>Carex densa</i>	25	0.1	0.2	0.2	3.0				
	<i>Cynosurus echinatus</i>	21	0.8	1.2	0.2	18.0				
	<i>Trifolium subterraneum</i>	21	1.2	1.2	0.2	8.0				
	<i>Plantago subnuda</i>	21	0.8	1.1	0.2	18.0				
	<i>Juncus effusus</i>	21	0.4	0.6	0.2	12.0				
	<i>Hordeum brachyantherum</i>	21	0.4	0.5	0.2	8.0				
	<i>Sisyrinchium bellum</i>	21	0.3	0.4	0.2	8.0				
	<i>Ranunculus californicus</i>	21	0.1	0.1	0.2	2.0				

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

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**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*, *L. gracilis*, *Plantago erecta*, *Vulpia microstachys* and/or other native annuals are seasonally dominant individually, co-dominant, or are characteristic in the herbaceous layer with *Achillea millefolium*, *Achnatherum lemmonii*, *Agrostis elliotiana*, *Avena barbata*, *Bromus hordeaceus*, *Calycadenia multiglandulosa*, *Calycadenia truncata*, *Castilleja exserta*, *Chlorogalum pomeridianum*, *Cryptantha flaccida*, *Eriogonum nudum*, *Eschscholzia californica*, *Hemizonia congesta*, *Hesperoxys 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, yet many other native annual species can also be representative. 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, and/or a variety of other native annuals may also be diagnostic.

### **Local Vegetation Description**

The California goldfields – dwarf plantain – small fescue flower fields Alliance forms an open to continuous herbaceous layer. The shrub layer is sparse and the tree layer is absent. Characteristic non-native herbs include *Avena* spp. and *Bromus hordeaceus*, while diagnostic native annual herbs include *Plantago erecta*, *Lasthenia californica*, *L. gracilis*, *Vulpia microstachys*, among others. Those herbs often present include *Chlorogalum pomeridianum*, *Eschscholzia californica*, *Lolium perenne*, *Nassella pulchra*, and herbs that are sometimes present include *Achillea millefolium*, *Aira caryophylla*, *Anagallis arvensis*, *Brachypodium distachyon*, *Calycadenia multiglandulosa*, *Crassula connata*, *Cynosurus echinatus*, *Danthonia californica*, *Daucus pusillus*, *Dichelostemma capitatum*, *Eriogonum nudum*, *Erodium botrys*, *Hemizonia congesta*, *Hordeum marinum*, *Hypochaeris glabra*, *Hypochaeris radicata*, *Juncus bufonius*, *Lotus wrangelianus*, *Poa secunda*, *Ranunculus californicus*, *Silene gallica*, *Sisyrinchium bellum*, *Trifolium albopurpureum*, *Trifolium willdenovii*, *Vulpia bromoides*, and *Vulpia myuros*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.1	0 – 1	0.3	0 – 0.5
Herb	36.7	10 – 80	0.3	0 – 0.5

### **Local Membership Rule**

*Lasthenia californica*, *Calycadenia* spp., *Hemizonia congesta*, *Hesperervax sparsiflora*, *Lomatium*, *Lotus humistratus*, *Micropus californicus*, *Plantago erecta*, and/or *Vulpia microstachys* dominate individually or in combination as characteristic plants in the herbaceous layer. *Lasthenia californica*, *Plantago erecta*, and/or *Vulpia microstachys* are often present, sometimes with sparse cover.

### **Local Environmental Description**

**Elevation:** Mean 233 m, Range 58 – 653 m

**Aspect:** SW (13), SE (9), NE (5), NW (3)

**Slope:** Mean 14 degrees, Range 1 – 32 degrees

**Macro Topography:** Upper 1/3 of slope (15), Middle 1/3 of slope (10), Lower 1/3 of slope (2), Middle to Upper 1/3 of slope (2), Upper 1/3 of slope to Ridgetop (1)

**Large Rock:** Mean 13.3%, Range 0.0 – 70.0%

**Small Rock:** Mean 23.5%, Range 0.0 – 75.0%

**Fines Cover:** Mean 32.8%, Range 3.0 – 95.0%

**Litter Cover:** Mean 25.7%, Range 0.2 – 88%

**Soil Texture (field assessed):** Not recorded (6), Moderately fine clay loam (5), Moderately fine sandy clay loam (5), Coarse, loamy sand (4), Medium loam (3), Fine clay (2), Fine silty clay (1), Fine sandy clay (1), Medium to very fine, sandy loam (1)

**Geology (field or map data):** Ultramafic (type unknown) (9), Franciscan melange (4), Blueschist and semi-schist (4), Large landslides (3), Sandstone and other sedimentary (3), Serpentine (3), Ultramafic rocks, mostly serpentine (2), Andesite (2), Volcanic flow rocks (1)

**Marin County Watersheds:** Lagunitas Creek (10), Novato (10), San Rafael (5), Petaluma River (2), Walker Creek (2), Bolinas (1), Estero Americano (1)

**Site Impacts**

This alliance has moderate non-native plant cover (average 42.0%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*, *Anagallis arvensis*, *Brachypodium distachyon*, *Bromus hordeaceus*, *Cynosurus echinatus*, *Erodium botrys*, *Hordeum marinum*, *Hypochaeris glabra*, *Hypochaeris radicata*, *Silene gallica*, *Vulpia bromoides*, and *Vulpia myuros*.

**Associations in Marin County**

- Hemizonia congesta* – *Lolium perenne*
- Lasthenia californica* – *Plantago erecta* – *Hesperavex sparsiflora*
- Lotus humistratus* – *Plantago erecta* – *Lomatium* spp.
- Plantago erecta* – *Lolium perenne* lichen-rocky
- Vulpia microstachys* – *Plantago erecta* – *Calycadenia (truncata, multiglandulosa)*

**Classification Comments**

None.

**References:** Buck and Evens 2010, Buck-Diaz and Evens 2011b, Buck-Diaz et al. 2011, Buck-Diaz et al. 2012, Buck-Diaz et al. 2013, Buck-Diaz et al. 2019, Evens and Kentner 2006, Evens and San 2004, Klein et al. 2007, Klein et al. 2015, McCarten 1991, Rodriguez 2015, Rodriguez-Rojo et al. 2001a, Taylor et al. 1992, VegCAMP 2015b

**Global Rarity Rank:** G4                      **State Rarity Rank:** S4

**Surveys Used for Description**

**Total: N=31; Marin County (n=31):** HEAD0034, HEAD0084, HEAD0232, HEAD0234, HEAD0406, MARIN210, MARIN211, MARIN213, MARIN214, MARIN219, MARIN221, MARIN226, MARIN238, MARIN239, MARIN251, MARIN253, MARIN293, MMWD0021, MMWD0025, MMWD0039, MMWD0095, MOSD0274, MOSD0285, MOSD0286, MOSD0330, MOSD0335, MOSD0388, MTBP007, MTBP008, PGA543, RIMO008

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Herb	<i>Bromus hordeaceus</i>	81	4.3	1.7	0.2	10.0	X			X
	<i>Avena</i> spp.	77	7.3	3.2	0.2	31.0	X			X
	<b><i>Plantago erecta</i></b>	<b>68</b>	<b>7.5</b>	<b>2.5</b>	<b>0.2</b>	<b>15.0</b>				<b>X</b>
	<i>Chlorogalum pomeridianum</i>	65	2.0	0.8	0.2	15.0				X
	<i>Nassella pulchra</i>	65	0.7	0.2	0.2	1.0				X
	<i>Lolium perenne</i>	61	7.5	3.1	0.2	24.0				X
	<i>Eschscholzia californica</i>	58	1.1	0.3	0.2	3.0				X
	<i>Hemizonia congesta</i>	42	9.5	6.1	0.2	68.0				
	<i>Lotus wrangelianus</i>	42	1.6	0.6	0.2	14.0				
	<i>Silene gallica</i>	42	0.4	0.2	0.2	3.0				

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<i>Hypochaeris glabra</i>	39	0.9	0.4	0.2	3.0				
	<i>Anagallis arvensis</i>	35	0.7	0.2	0.2	3.0				
	<b><i>Vulpia microstachys</i></b>	<b>35</b>	<b>0.8</b>	<b>0.2</b>	<b>0.2</b>	<b>4.0</b>				
	<i>Sisyrinchium bellum</i>	32	0.4	0.2	0.2	3.0				
	<i>Eriogonum nudum</i>	32	0.3	0.1	0.2	1.0				
	<i>Hypochaeris radicata</i>	29	1.4	0.9	0.2	18.0				
	<i>Vulpia bromoides</i>	29	1.4	0.8	0.2	8.0				
	<i>Erodium botrys</i>	29	2.3	0.8	0.2	12.0				
	<i>Juncus bufonius</i>	29	0.9	0.5	0.2	10.0				
	<i>Achillea millefolium</i>	29	0.4	0.1	0.2	1.0				
	<i>Aira caryophylla</i>	29	0.2	0.1	0.2	1.0				
	<i>Ranunculus californicus</i>	29	0.2	0.1	0.2	0.4				
	<i>Dichelostemma capitatum</i>	29	0.2	0.1	0.2	0.2				
	<i>Calycadenia multiglandulosa</i>	26	6.8	1.9	0.2	20.0				
	<i>Hordeum marinum</i>	26	1.3	0.5	0.2	10.0				
	<i>Cynosurus echinatus</i>	26	0.4	0.4	0.2	8.0				
	<i>Poa secunda</i>	26	0.2	0.1	0.2	0.2				
	<i>Brachypodium distachyon</i>	23	2.3	0.9	0.2	16.0				
	<i>Trifolium albopurpureum</i>	23	0.8	0.2	0.2	6.0				
	<i>Vulpia myuros</i>	23	0.3	0.2	0.2	3.0				
	<i>Crassula connata</i>	23	0.5	0.2	0.2	3.0				
	<i>Danthonia californica</i>	23	0.3	0.1	0.2	1.0				
	<i>Daucus pusillus</i>	23	0.2	0.1	0.2	1.0				
	<i>Trifolium willdenovii</i>	23	0.1	0.1	0.2	0.4				
	<b>Non-vascular</b>									
	Lichen	32	21.6	2.7	0.2	44.2				
	Moss	32	11.5	0.9	0.2	13.0				



## ***Hemizonia congesta* – *Lolium perenne* Association**

**Common Name:** Hayfield Tarweed – Italian Ryegrass Patches

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

### **Local Vegetation Description**

The Hayfield Tarweed – Italian Ryegrass Association forms an open to continuous herbaceous layer. The shrub layer is usually absent and the tree layer is absent. Characteristic herbs include *Avena spp.*, *Lolium perenne*, and *Hemizonia congesta*. Those herbs often present include *Anagallis arvensis*, *Bromus hordeaceus*, *Chlorogalum pomeridianum*, *Hordeum marinum*, *Leontodon taraxacoides*, *Lotus wrangelianus*, and *Nassella pulchra*, and herbs that are sometimes present include *Aira caryophyllea*, *Briza minor*, *Castilleja densiflora*, *Centaurium muehlenbergii*, *Cynosurus echinatus*, *Dichelostemma capitatum*, *Eschscholzia californica*, *Gilia capitata*, *Hypochaeris glabra*, *Hypochaeris radicata*, *Juncus bufonius*, *Lactuca saligna*, *Medicago spp.*, *Plantago erecta*, *Plantago lanceolata*, *Ranunculus californicus*, *Silene gallica*, *Sisyrinchium bellum*, *Trifolium hirtum*, *Triteleia laxa*, and *Vulpia bromoides*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.1	0.0 – 0.2	no data	
Herb	45.6	10 – 80	0.3	0 – 0.5

### **Local Environmental Description**

**Elevation:** Mean 164 m, Range 58 – 327 m

**Aspect:** SW (8), NW (2), SE (1)

**Slope:** Mean 11 degrees, Range 1 – 20 degrees

**Macro Topography:** Middle 1/3 of slope (5), Upper 1/3 of slope (5), Lower 1/3 of slope (1)

**Large Rock:** Mean 8.5%, Range 0.0 – 45.0%

**Small Rock:** Mean 10.1%, Range 0.0 – 55.0%

**Fines Cover:** Mean 38.3%, Range 3.0 – 95.0%

**Litter Cover:** Mean 39.7%, Range 2.0 – 88%

**Soil Texture (field assessed):** Moderately fine sandy clay loam (2), Not recorded (2), Medium to very fine, sandy loam (1), Medium loam (1), Fine clay (1), Coarse, loamy sand (1), Moderately fine clay loam (1)

**Geology (field or map data):** Blueschist and semi-schist (3), Franciscan melange (2), Large landslides (2), Sandstone and other sedimentary (2), Ultramafic (type unknown) (2)

**Marin County Watersheds:** Novato (6), Walker Creek (2), Estero Americano (1), Lagunitas Creek (1), San Rafael (1)

### **Site Impacts**

This association has moderate non-native plant cover (average 44.9%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*, *Anagallis arvensis*, *Avena spp.*, *Briza minor*, *Bromus hordeaceus*, *Cynosurus echinatus*, *Hordeum marinum*, *Hypochaeris glabra*, *Hypochaeris radicata*, *Lactuca saligna*, *Leontodon taraxacoides*, *Lolium perenne*, *Medicago spp.*, *Plantago lanceolata*, *Silene gallica*, *Trifolium hirtum*, and *Vulpia bromoides*.



### Classification Comments

None.

**References:** Evens and San 2004, Klein et al. 2015

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** N

### Surveys Used for Description

**Total: N=11; Marin County (n=11):** HEAD0034, HEAD0084, HEAD0232, HEAD0406, MARIN221, MARIN251, MARIN293, MOSD0285, MOSD0388, MTBP007, MTBP008

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Herb										
	<i>Hemizonia congesta</i>	100	26.6	17.3	3.0	68.0	X			X
	<i>Avena</i> spp.	82	5.7	2.7	0.2	20.0	X			X
	<i>Lolium perenne</i>	73	10.2	5.1	0.2	24.0				X
	<i>Bromus hordeaceus</i>	73	0.4	0.2	0.2	1.0				X
	<i>Leontodon taraxacoides</i>	55	7.7	5.1	0.2	18.0				X
	<i>Hordeum marinum</i>	55	3.5	1.5	0.2	10.0				X
	<i>Chlorogalum pomeridianum</i>	55	1.0	0.4	0.2	3.0				X
	<i>Anagallis arvensis</i>	55	0.2	0.1	0.2	0.2				X
	<i>Lotus wrangelianus</i>	55	0.2	0.1	0.2	0.2				X
	<i>Nassella pulchra</i>	55	0.2	0.1	0.2	0.2				X
	<i>Vulpia bromoides</i>	45	1.5	1.3	0.2	8.0				
	<i>Juncus bufonius</i>	45	1.9	1.1	0.2	10.0				
	<i>Eschscholzia californica</i>	45	1.9	0.6	0.2	3.0				
	<i>Sisyrinchium bellum</i>	45	0.4	0.3	0.2	3.0				
	<i>Aira caryophyllea</i>	45	0.2	0.1	0.2	0.2				
	<i>Cynosurus echinatus</i>	36	0.9	1.0	0.2	8.0				
	<i>Centaureum muehlenbergii</i>	36	0.4	0.1	0.2	1.0				
	<i>Briza minor</i>	36	0.1	0.1	0.2	0.2				
	<i>Hypochaeris glabra</i>	36	0.1	0.1	0.2	0.2				
	<i>Silene gallica</i>	36	0.1	0.1	0.2	0.2				
	<i>Triteleia laxa</i>	36	0.1	0.1	0.2	0.2				
	<i>Hypochaeris radicata</i>	27	1.6	1.9	0.2	18.0				
	<i>Plantago erecta</i>	27	2.7	0.9	3.0	4.0				
	<i>Plantago lanceolata</i>	27	0.7	0.7	2.0	3.0				
	<i>Gilia capitata</i>	27	1.8	0.6	0.2	3.0				
	<i>Castilleja densiflora</i>	27	0.1	0.1	0.2	0.2				
	<i>Dichelostemma capitatum</i>	27	0.1	0.1	0.2	0.2				
	<i>Lactuca saligna</i>	27	0.1	0.1	0.2	0.2				
	<i>Medicago</i> spp.	27	0.1	0.1	0.2	0.2				
	<i>Ranunculus californicus</i>	27	0.1	0.1	0.2	0.2				
	<i>Trifolium hirtum</i>	27	0.1	0.1	0.2	0.2				

***Lasthenia californica* – *Plantago erecta* – *Hesperervax sparsiflora* Association**

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**Common Name:** California goldfields – dwarf plantain – erect evax Patches

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

**Local Vegetation Description**

The California goldfields – dwarf plantain – erect evax Association forms an open to intermittent herbaceous layer. The shrub layer is sparse and the tree layer is absent. Characteristic herbs include *Lasthenia californica* and *Plantago erecta*. Those herbs often present include *Achillea millefolium*, *Chlorogalum pomeridianum*, *Eschscholzia californica*, *Hesperervax sparsiflora*, *Layia platyglossa*, *Lolium perenne*, *Lotus wrangelianus*, *Melica torreyana*, *Nassella lepida*, *Nassella pulchra*, *Silene gallica*, and *Vulpia microstachys*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.2	0.0 – 1	0.3	0 – 0.5
Herb	39.1	23 – 60	0.3	0 – 0.5

**Local Environmental Description**

**Elevation:** Mean 136 m, Range 36 – 207 m

**Aspect:** NE (4), NW (2), SW (2)

**Slope:** Mean 10 degrees, Range 2 – 26 degrees

**Macro Topography:** Upper 1/3 of slope (4), Middle 1/3 of slope (2), Lower 1/3 of slope (1), Ridge top (1)

**Large Rock:** Mean 4.9%, Range 0.0 – 16.0%

**Small Rock:** Mean 25.3%, Range 0.0 – 75.0%

**Fines Cover:** Mean 28.0%, Range 3.0 – 74.0%

**Litter Cover:** Mean 26.4%, Range 2.0 – 72%

**Soil Texture (field assessed):** Moderately fine sandy clay loam (2), Unknown (1), Moderately fine clay loam (1), Fine silty clay (1), Fine clay (1), Coarse sand (1), Moderately fine silty clay loam (1)

**Geology (field or map data):** Serpentine (4), Ultramafic rocks, mostly serpentine (2), Sandstone, shale, and conglomerate (1), Ultramafic (type unknown) (1)

**Marin County Watersheds:** San Rafael (2), Lagunitas Creek (1)

**Other Watersheds, San Mateo Co.:** Palo Alto (1), San Mateo Bayside (1); **Sonoma Co.:** Gualala River (1), Lower Russian River (1), Sonoma Creek (1)

**Site Impacts**

This association has moderate non-native plant cover (average 22.0%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*, *Bromus hordeaceus*, *Holcus lanatus*, *Lactuca saligna*, *Lactuca serriola*, *Lolium perenne*, *Silene gallica*, and *Vulpia bromoides*.

**Classification Comments**

Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** Buck and Evens 2010, Buck-Diaz et al. 2019, Evens and San 2004, McCarten 1991, Rodriguez-Rojo et al. 2001a

Global Rarity Rank: GNR

State Rarity Rank: SNR

State Rare: Y

**Surveys Used for Description**

Total: N=8; Marin County (n=3): MARIN210, MOSD0330, MOSD0335

San Mateo County (n=2): SCLAR123, SMAT0058

Sonoma County (n=3): HEAD0294, HEAD0387, HEAD0412

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Herb										
	<i>Lasthenia californica</i>	100	14.2	9.0	0.2	38.0	X			X
	<i>Plantago erecta</i>	88	19.9	7.1	0.2	18.0	X			X
	<i>Lolium perenne</i>	63	12.9	5.7	0.2	18.0				X
	<i>Hesperervax sparsiflora</i>	63	1.4	1.1	0.2	8.0				X
	<i>Achillea millefolium</i>	63	1.2	0.6	0.2	3.0				X
	<i>Vulpia microstachys</i>	50	4.3	2.4	0.2	15.0				X
	<i>Eschscholzia californica</i>	50	1.6	1.1	0.2	5.0				X
	<i>Nassella pulchra</i>	50	1.2	0.7	0.2	3.0				X
	<i>Nassella lepida</i>	50	0.7	0.6	0.2	4.0				X
	<i>Chlorogalum pomeridianum</i>	50	1.7	0.5	0.2	2.0				X
	<i>Layia platyglossa</i>	50	1.1	0.3	0.2	2.0				X
	<i>Melica torreyana</i>	50	1.1	0.3	0.1	2.0				X
	<i>Lotus wrangelianus</i>	50	0.3	0.1	0.2	0.2				X
	<i>Silene gallica</i>	50	0.2	0.1	0.2	0.2				X
	<i>Bromus hordeaceus</i>	38	1.9	1.4	0.2	8.0				
	<i>Bromus carinatus</i>	38	2.8	1.2	0.2	5.0				
	<i>Elymus multisetus</i>	38	1.7	0.8	0.2	3.0				
	<i>Daucus pusillus</i>	38	0.6	0.6	0.2	4.0				
	<i>Platystemon californicus</i>	38	0.7	0.6	0.2	4.0				
	<i>Trifolium albopurpureum</i>	38	0.5	0.4	0.2	3.0				
	<i>Calystegia subacaulis</i>	38	0.3	0.2	0.2	1.0				
	<i>Danthonia californica</i>	38	0.6	0.2	0.2	1.0				
	<i>Poa secunda</i>	38	0.3	0.2	0.2	1.0				
	<i>Aira caryophyllea</i>	38	0.1	0.1	0.2	0.2				
	<i>Epilobium minutum</i>	38	0.2	0.1	0.2	0.2				
	<i>Pentagramma triangularis</i>	38	0.3	0.1	0.2	0.2				
	<i>Sanicula bipinnatifida</i>	38	0.3	0.1	0.2	0.2				
	<i>Koeleria macrantha</i>	38	0.2	0.1	0.1	0.2				
	<i>Trifolium microcephalum</i>	25	1.5	1.4	3.0	8.0				
	<i>Brodiaea terrestris</i>	25	1.2	1.0	0.2	8.0				
	<i>Vulpia bromoides</i>	25	2.4	1.0	0.2	8.0				
	<i>Holcus lanatus</i>	25	0.9	0.4	0.2	3.0				
	<i>Lomatium dasycarpum</i>	25	1.7	0.4	1.0	2.0				

*Lasthenia californica* – *Plantago erecta* – *Hesperervax sparsiflora* Association  
*Lasthenia californica* – *Plantago erecta* – *Vulpia microstachys* Herbaceous Alliance

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<i>Trifolium willdenovii</i>	25	0.4	0.3	0.2	2.0				
	<i>Eriogonum nudum</i>	25	0.2	0.2	0.2	1.0				
	<i>Sisyrinchium bellum</i>	25	0.7	0.2	0.2	1.0				
	<i>Agrostis</i> spp.	25	0.1	0.1	0.2	0.2				
	<i>Calycadenia multiglandulosa</i>	25	0.2	0.1	0.2	0.2				
	<i>Castilleja densiflora</i>	25	0.2	0.1	0.2	0.2				
	<i>Dichelostemma capitatum</i>	25	0.1	0.1	0.2	0.2				
	<i>Eriogonum luteolum</i>	25	0.1	0.1	0.2	0.2				
	<i>Hemizonia congesta</i>	25	0.2	0.1	0.2	0.2				
	<i>Lactuca saligna</i>	25	0.1	0.1	0.2	0.2				
	<i>Lactuca serriola</i>	25	0.2	0.1	0.2	0.2				
	<i>Minuartia douglasii</i>	25	0.2	0.1	0.2	0.2				
	<i>Monardella purpurea</i>	25	0.2	0.1	0.2	0.2				
	<i>Ranunculus californicus</i>	25	0.2	0.1	0.2	0.2				
	<i>Trifolium microdon</i>	25	0.1	0.1	0.2	0.2				
<b>Non-vascular</b>										
	Moss	25	13.3	2.5	0.2	20.0				

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

**Common Name:** Short Podded Lotus – Dwarf Plantain – Lomatium Patches

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

**Local Vegetation Description**

The Short Podded Lotus – Dwarf Plantain – Lomatium Association forms an open to intermittent herbaceous layer. The shrub layer is sparse and the tree layer is absent. Characteristic herbs include *Lotus humistratus*, *Plantago erecta*, along with *Avena* spp., *Briza maxima*, *Bromus diandrus*, *Bromus hordeaceus*, *Bromus madritensis*, *Dichelostemma capitatum*, *Eschscholzia californica*, *Logfia gallica*, and *Trifolium willdenovii*. Those herbs often present include *Cryptantha* spp., *Erodium botrys*, *Gilia tricolor*, *Hypochaeris glabra*, *Hypochaeris radicata*, *Lomatium dasycarpum*, *Lupinus bicolor*, *Nassella pulchra*, *Rumex acetosella*, *Sherardia arvensis*, and *Trifolium microcephalum*. Commonly associated non-vascular plants include Moss.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.3	0.0 – 1	1.5	1 – 2
Herb	28.5	19 – 35	0.3	0 – 0.5

**Local Environmental Description**

**Elevation:** Mean 372 m, Range 197 – 557 m

**Aspect:** SW (2), NE (1), SE (1)

**Slope:** Mean 37 degrees, Range 31 – 45 degrees

**Macro Topography:** Ridge top (1), Upper 1/3 of slope (1), Upper 1/3 of slope to Ridgetop (1), Middle to Upper 1/3 of slope (1)

**Large Rock:** Mean 30.2%, Range 0.2 – 65.0%

**Small Rock:** Mean 37.5%, Range 13.0 – 70.2%

**Fines Cover:** Mean 16.0%, Range 0.0 – 28.0%

**Litter Cover:** Mean 12.0%, Range 1.0 – 32%

**Soil Texture (field assessed):** Moderately coarse, sandy loam (1), Not recorded (1)

**Geology (field or map data):** Franciscan melange (1), Ultramafic (type unknown) (1), Serpentine (1), Mixed sedimentary (1)

**Marin County Watersheds:** Lagunitas Creek (1)

**Other Watersheds, Sonoma Co.:** Lower Russian River (3)

**Site Impacts**

This association has moderate non-native plant cover (average 40.7%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*, *Avena* spp., *Brachypodium distachyon*, *Briza maxima*, *Bromus diandrus*, *Bromus hordeaceus*, *Bromus madritensis*, *Carduus pycnocephalus*, *Centaurea melitensis*, *Erodium botrys*, *Galium parisiense*, *Gastridium phleoides*, *Hypericum perforatum*, *Hypochaeris glabra*, *Hypochaeris radicata*, *Lamarckia aurea*, *Logfia gallica*, *Petrorhagia dubia*, *Rumex acetosella*, *Senecio vulgaris*, *Sherardia arvensis*, *Silene gallica*, *Vicia hirsuta*, and *Vulpia myuros*.

**Classification Comments**

This association is considered provisional since it is under-sampled in its expected range. Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** Klein et al. 2015

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

**Total: N=4; Marin County (n=1):** MARIN219

Sonoma County (n=3): HEAD0380, SONO0473, SONO0474

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>	<i>Arctostaphylos manzanita</i>	25	25.0	0.1	0.2	0.2				
<b>Herb</b>	<b><i>Lotus humistratus</i></b>	<b>100</b>	<b>14.1</b>	<b>4.6</b>	<b>0.2</b>	<b>8.0</b>	<b>X</b>			<b>X</b>
	<i>Bromus madritensis</i>	100	9.2	2.8	0.2	5.0	<b>X</b>			<b>X</b>
	<i>Dichelostemma capitatum</i>	100	1.3	0.4	0.2	1.0	<b>X</b>			<b>X</b>
	<i>Logfia gallica</i>	100	0.7	0.2	0.2	0.2	<b>X</b>			<b>X</b>
	<i>Avena</i> spp.	75	11.9	5.3	0.2	18.0	<b>X</b>			<b>X</b>
	<i>Trifolium willdenovii</i>	75	6.2	2.1	0.2	8.0	<b>X</b>			<b>X</b>
	<i>Bromus diandrus</i>	75	1.7	0.6	0.1	2.0	<b>X</b>			<b>X</b>
	<i>Eschscholzia californica</i>	75	1.1	0.4	0.2	1.0	<b>X</b>			<b>X</b>
	<b><i>Plantago erecta</i></b>	<b>75</b>	<b>1.1</b>	<b>0.4</b>	<b>0.2</b>	<b>1.0</b>	<b>X</b>			<b>X</b>
	<i>Bromus hordeaceus</i>	75	0.5	0.2	0.2	0.2	<b>X</b>			<b>X</b>
	<i>Briza maxima</i>	75	0.5	0.1	0.1	0.2	<b>X</b>			<b>X</b>
	<i>Erodium botrys</i>	50	10.5	2.8	4.0	7.0				<b>X</b>
	<b><i>Lomatium dasycarpum</i></b>	<b>50</b>	<b>7.6</b>	<b>2.6</b>	<b>0.2</b>	<b>10.0</b>				<b>X</b>
	<i>Trifolium microcephalum</i>	50	5.0	2.3	1.0	8.0				<b>X</b>
	<i>Gilia tricolor</i>	50	5.1	1.1	0.2	4.0				<b>X</b>
	<i>Hypochaeris glabra</i>	50	1.8	0.8	0.2	3.0				<b>X</b>
	<i>Hypochaeris radicata</i>	50	1.6	0.6	0.2	2.0				<b>X</b>
	<i>Cryptantha</i> spp.	50	0.4	0.1	0.2	0.2				<b>X</b>
	<i>Lupinus bicolor</i>	50	0.4	0.1	0.2	0.2				<b>X</b>
	<i>Nassella pulchra</i>	50	0.3	0.1	0.2	0.2				<b>X</b>
	<i>Rumex acetosella</i>	50	0.4	0.1	0.2	0.2				<b>X</b>
	<i>Sherardia arvensis</i>	50	0.4	0.1	0.2	0.2				<b>X</b>
	<i>Lotus micranthus</i>	25	7.9	2.5	10.0	10.0				
	<i>Streptanthus glandulosus</i>	25	1.6	0.8	3.0	3.0				
	<i>Trichostema lanceolatum</i>	25	2.5	0.5	2.0	2.0				
	<i>Lupinus nanus</i>	25	0.8	0.3	1.0	1.0				
	<i>Trifolium macraei</i>	25	0.8	0.3	1.0	1.0				
	<i>Aira caryophyllea</i>	25	0.2	0.1	0.2	0.2				

*Lotus humistratus* – *Plantago erecta* – *Lomatium* spp. Provisional Association  
*Lasthenia californica* – *Plantago erecta* – *Vulpia microstachys* Herbaceous Alliance

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<i>Brachypodium distachyon</i>	25	0.1	0.1	0.2	0.2				
	<i>Carduus pycnocephalus</i>	25	0.2	0.1	0.2	0.2				
	<i>Cheilanthes covillei</i>	25	0.2	0.1	0.2	0.2				
	<i>Chlorogalum pomeridianum</i>	25	0.2	0.1	0.2	0.2				
	<i>Chorizanthe membranacea</i>	25	0.1	0.1	0.2	0.2				
	<i>Croton setigerus</i>	25	0.1	0.1	0.2	0.2				
	<i>Dudleya cymosa</i>	25	0.2	0.1	0.2	0.2				
	<i>Elymus multisetus</i>	25	0.2	0.1	0.2	0.2				
	<i>Eriogonum nudum</i>	25	0.2	0.1	0.2	0.2				
	<i>Galium parisiense</i>	25	0.1	0.1	0.2	0.2				
	<i>Gastroidium phleoides</i>	25	0.1	0.1	0.2	0.2				
	<i>Heterotheca sessiliflora</i>	25	0.2	0.1	0.2	0.2				
	<i>Hypericum perforatum</i>	25	0.2	0.1	0.2	0.2				
	<i>Lamarckia aurea</i>	25	0.1	0.1	0.2	0.2				
	<b><i>Lomatium dissectum</i> var. <i>multifidum</i></b>	<b>25</b>	<b>0.1</b>	<b>0.1</b>	<b>0.2</b>	<b>0.2</b>				
	<i>Minuartia douglasii</i>	25	0.2	0.1	0.2	0.2				
	<i>Pentachaeta aurea</i>	25	0.1	0.1	0.2	0.2				
	<i>Pentagramma triangularis</i>	25	0.1	0.1	0.2	0.2				
	<i>Petrorhagia dubia</i>	25	0.1	0.1	0.2	0.2				
	<i>Plagiobothrys nothofulvus</i>	25	0.2	0.1	0.2	0.2				
	<i>Polypodium californicum</i>	25	0.2	0.1	0.2	0.2				
	<i>Sanicula bipinnatifida</i>	25	0.2	0.1	0.2	0.2				
	<i>Selaginella bigelovii</i>	25	0.2	0.1	0.2	0.2				
	<i>Senecio vulgaris</i>	25	0.1	0.1	0.2	0.2				
	<i>Silene gallica</i>	25	0.2	0.1	0.2	0.2				
	<i>Trichostema laxum</i>	25	0.1	0.1	0.2	0.2				
	<i>Vicia hirsuta</i>	25	0.1	0.1	0.2	0.2				
	<i>Vulpia myuros</i>	25	0.2	0.1	0.2	0.2				
	<i>Centaurea melitensis</i>	25	0.1	0.0	0.1	0.1				
	<i>Koeleria macrantha</i>	25	0.1	0.0	0.1	0.1				
	<b><i>Lomatium</i> spp.</b>	<b>25</b>	<b>0.1</b>	<b>0.0</b>	<b>0.1</b>	<b>0.1</b>				
	<i>Minuartia californica</i>	25	0.1	0.0	0.1	0.1				
	<i>Pellaea andromedifolia</i>	25	0.1	0.0	0.1	0.1				
<b>Non-vascular</b>										
	Moss	50	37.5	3.1	0.2	12.0				<b>X</b>
	Lichen	25	12.5	0.1	0.2	0.2				

## ***Plantago erecta* – *Lolium perenne* lichen-rocky Association**

**Common Name:** Dwarf Plantain – Italian Ryegrass / Lichen Outcrops

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

### **Local Vegetation Description**

The Dwarf Plantain – Italian Ryegrass / Lichen Association forms an open to intermittent herbaceous layer. The shrub layer is sparse or absent and the tree layer is absent. Characteristic herbs include *Lolium perenne* and *Plantago erecta* along with *Bromus hordeaceus*, *Chlorogalum pomeridianum*, and *Eschscholzia californica*. Those herbs often present include *Avena* spp., *Cynosurus echinatus*, *Dichelostemma capitatum*, *Erodium botrys*, and *Nassella pulchra*, and herbs that are sometimes present include *Achyrachaena mollis*, *Brachypodium distachyon*, *Carduus pycnocephalus*, *Crassula connata*, *Croton setigerus*, *Erodium cicutarium*, *Gastroidium phleoides*, *Hypochaeris glabra*, *Hypochaeris radicata*, *Juncus bufonius*, *Lasthenia californica*, *Lomatium utriculatum*, *Lotus* spp., *Silene gallica*, *Trifolium bifidum*, *Trifolium dubium*, *Trifolium hirtum*, *Trifolium microcephalum*, *Trifolium willdenovii*, *Vulpia microstachys*, and *Vulpia myuros*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.0	0.0 – 0.2	0.3	0 – 0.5
Herb	42.2	30 – 51	0.3	0 – 0.5

### **Local Environmental Description**

**Elevation:** Mean 169 m, Range 72 – 390 m

**Aspect:** SW (2), SE (2), NW (1)

**Slope:** Mean 12 degrees, Range 5 – 20 degrees

**Macro Topography:** Upper 1/3 of slope (3), Lower 1/3 of slope (1), Middle 1/3 of slope (1)

**Large Rock:** Mean 20.6%, Range 0.0 – 55.0%

**Small Rock:** Mean 17.0%, Range 9.0 – 28.0%

**Fines Cover:** Mean 21.6%, Range 4.0 – 69.0%

**Litter Cover:** Mean 38.8%, Range 20.0 – 64%

**Soil Texture (field assessed):** Moderately fine clay loam (2), Fine sandy clay (1), Moderately fine sandy clay loam (1)

**Geology (field or map data):** Blueschist and semi-schist (1), Volcanic flow rocks (1), Franciscan melange (1), Andesite (1), Large landslides (1)

**Marin County Watersheds:** Novato (2), Petaluma River (1), San Rafael (1)

**Other Watersheds, Sonoma Co.:** Estero Americano (1)

### **Site Impacts**

This association has greater cover of exotics (average 72.4%) than natives. Non-native species that occur with highest frequency and abundance include *Avena* spp., *Brachypodium distachyon*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Cynosurus echinatus*, *Erodium botrys*, *Erodium cicutarium*, *Gastroidium phleoides*, *Hypochaeris glabra*, *Hypochaeris radicata*, *Lolium perenne*, *Silene gallica*, *Trifolium dubium*, *Trifolium hirtum*, and *Vulpia myuros*.



**Classification Comments**

Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** Buck and Evens 2010, Evens and San 2004, McCarten 1991

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** N

**Surveys Used for Description**

**Total: N=5; Marin County (n=4):** HEAD0234, MARIN213, MOSD0274, MOSD0286

Sonoma County (n=1): SONO0677

**Association Stand Table** \*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Herb										
	<i>Plantago erecta</i>	100	4.1	1.7	0.2	3.0	X			X
	<i>Lolium perenne</i>	80	17.8	6.8	3.0	15.0	X			X
	<i>Chlorogalum pomeridianum</i>	80	11.0	5.1	0.2	15.0	X			X
	<i>Bromus hordeaceus</i>	80	7.0	2.8	0.2	8.0	X			X
	<i>Eschscholzia californica</i>	80	0.4	0.2	0.2	0.2	X			X
	<i>Avena</i> spp.	60	12.2	4.0	0.2	10.0				X
	<i>Erodium botrys</i>	60	1.3	0.7	0.2	3.0				X
	<i>Dichelostemma capitatum</i>	60	0.6	0.3	0.2	1.0				X
	<i>Nassella pulchra</i>	60	1.0	0.3	0.2	1.0				X
	<i>Cynosurus echinatus</i>	60	0.3	0.1	0.2	0.2				X
	<i>Brachypodium distachyon</i>	40	5.4	1.6	0.2	8.0				
	<i>Gastridium phleoides</i>	40	2.9	1.6	0.2	8.0				
	<i>Hypochaeris radicata</i>	40	2.2	1.0	0.2	5.0				
	<i>Hypochaeris glabra</i>	40	2.4	1.0	2.0	3.0				
	<i>Juncus bufonius</i>	40	1.2	0.6	0.2	3.0				
	<i>Silene gallica</i>	40	1.2	0.6	0.2	3.0				
	<i>Trifolium microcephalum</i>	40	1.2	0.6	0.2	3.0				
	<i>Vulpia myuros</i>	40	1.2	0.6	0.2	3.0				
	<i>Lomatium utriculatum</i>	40	1.0	0.4	0.2	2.0				
	<i>Achyrrachaena mollis</i>	40	0.6	0.2	0.2	1.0				
	<i>Erodium cicutarium</i>	40	0.5	0.2	0.2	1.0				
	<i>Carduus pycnocephalus</i>	40	0.2	0.1	0.2	0.2				
	<i>Crassula connata</i>	40	0.2	0.1	0.2	0.2				
	<i>Croton setigerus</i>	40	0.2	0.1	0.2	0.2				
	<i>Lasthenia californica</i>	40	0.2	0.1	0.2	0.2				
	<i>Lotus</i> spp.	40	0.2	0.1	0.2	0.2				
	<i>Trifolium bifidum</i>	40	0.2	0.1	0.2	0.2				
	<i>Trifolium dubium</i>	40	0.2	0.1	0.2	0.2				
	<i>Trifolium hirtum</i>	40	0.2	0.1	0.2	0.2				
	<i>Trifolium willdenovii</i>	40	0.2	0.1	0.2	0.2				
	<i>Vulpia microstachys</i>	40	0.2	0.1	0.2	0.2				

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

**Common Name:** Small Fescue – Dwarf Plantain – Rosin Weed Grassland

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

**Local Vegetation Description**

The Small Fescue – Dwarf Plantain – Rosin Weed Association forms an open to intermittent herbaceous layer. The shrub layer is sparse and the tree layer is sparse. Characteristic herbs include *Calycadenia multiglandulosa* and *Plantago erecta* along with *Avena* spp., *Bromus hordeaceus*, and *Nassella pulchra*. Those herbs often present include *Anagallis arvensis*, *Calystegia purpurata*, *Chlorogalum pomeridianum*, *Daucus pusillus*, *Eriogonum nudum*, *Eschscholzia californica*, *Lolium perenne*, *Poa secunda*, and *Vulpia microstachys*. Commonly associated non-vascular plants include Moss.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.1	0.0 – 0.8	no data	
Shrub	0.0	0 – 0	no data	
Herb	33.4	19 – 55	0.3	0 – 0.5

**Local Environmental Description**

**Elevation:** Mean 322 m, Range 157 – 653 m

**Aspect:** SE (5), NE (2), SW (1)

**Slope:** Mean 17 degrees, Range 6 – 31 degrees

**Macro Topography:** Upper 1/3 of slope (4), Middle 1/3 of slope (3), Middle to Upper 1/3 of slope (1)

**Large Rock:** Mean 14.6%, Range 0.4 – 40.0%

**Small Rock:** Mean 33.0%, Range 11.0 – 72.0%

**Fines Cover:** Mean 35.5%, Range 5.0 – 76.0%

**Litter Cover:** Mean 7.0%, Range 0.2 – 28%

**Soil Texture (field assessed):** Coarse, loamy sand (3), Moderately fine sandy clay loam (2), Not recorded (2), Medium loam (1)

**Geology (field or map data):** Serpentine (3), Ultramafic (type unknown) (3), Franciscan melange (2)

**Marin County Watersheds:** Lagunitas Creek (7), San Rafael (1)

**Site Impacts**

This association has moderate non-native plant cover (average 32.0%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*, *Anagallis arvensis*, *Avena* spp., *Bromus diandrus*, *Bromus hordeaceus*, *Cerastium glomeratum*, *Cynosurus echinatus*, *Hypochaeris glabra*, *Lolium perenne*, and *Silene gallica*.

**Classification Comments**

None.

**References:** Evens and Kentner 2006, Evens and San 2004, Klein et al. 2007, Klein et al. 2015

**Global Rarity Rank:** G2

**State Rarity Rank:** S2?

**State Rare:** Y

**Surveys Used for Description**

**Total: N=8; Marin County (n=8):** MARIN214, MARIN226, MARIN253, MMWD0021, MMWD0025, MMWD0039, MMWD0095, RIMO008

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Herb</b>										
	<i>Bromus hordeaceus</i>	100	8.6	3.7	0.2	10.0	X			X
	<b><i>Plantago erecta</i></b>	<b>100</b>	<b>6.2</b>	<b>2.7</b>	<b>0.2</b>	<b>10.0</b>	X			X
	<b><i>Calycadenia multiglandulosa</i></b>	<b>88</b>	<b>26.4</b>	<b>7.3</b>	<b>1.0</b>	<b>20.0</b>	X			X
	<i>Avena</i> spp.	88	10.2	5.9	0.2	31.0	X			X
	<i>Nassella pulchra</i>	75	1.4	0.4	0.2	1.0	X			X
	<i>Lolium perenne</i>	63	5.3	1.5	0.2	4.0				X
	<i>Eschscholzia californica</i>	63	0.8	0.2	0.2	1.0				X
	<i>Anagallis arvensis</i>	50	2.0	0.7	0.2	3.0				X
	<i>Daucus pusillus</i>	50	0.7	0.2	0.2	1.0				X
	<i>Calystegia purpurata</i>	50	0.6	0.2	0.2	1.0				X
	<i>Chlorogalum pomeridianum</i>	50	0.3	0.1	0.2	0.2				X
	<i>Eriogonum nudum</i>	50	0.3	0.1	0.2	0.2				X
	<i>Poa secunda</i>	50	0.4	0.1	0.2	0.2				X
	<b><i>Vulpia microstachys</i></b>	<b>50</b>	<b>0.3</b>	<b>0.1</b>	<b>0.2</b>	<b>0.2</b>				X
	<i>Elymus multisetus</i>	38	2.7	0.6	0.2	4.0				
	<i>Hesperervax sparsiflora</i>	38	2.0	0.4	0.2	3.0				
	<i>Lotus humistratus</i>	38	1.0	0.4	0.2	2.0				
	<i>Lotus wrangelianus</i>	38	1.3	0.4	0.2	2.0				
	<i>Lomatium dasycarpum</i>	38	1.0	0.3	0.2	2.0				
	<i>Aira caryophyllea</i>	38	0.6	0.2	0.2	1.0				
	<i>Danthonia californica</i>	38	0.6	0.2	0.2	1.0				
	<i>Melica californica</i>	38	0.3	0.1	0.2	0.4				
	<i>Ranunculus californicus</i>	38	0.2	0.1	0.2	0.4				
	<i>Sisyrinchium bellum</i>	38	0.3	0.1	0.2	0.4				
	<i>Silene gallica</i>	38	0.2	0.1	0.2	0.2				
	<i>Bromus diandrus</i>	25	2.2	0.9	2.0	5.0				
	<i>Trifolium albopurpureum</i>	25	2.6	0.8	0.2	6.0				
	<i>Lessingia micradenia</i>	25	2.4	0.5	0.2	4.0				
	<i>Agoseris heterophylla</i>	25	1.1	0.4	0.2	3.0				
	<i>Hypochaeris glabra</i>	25	1.0	0.4	0.2	3.0				
	<i>Linanthus</i> spp.	25	0.5	0.2	0.4	1.0				
	<i>Achillea millefolium</i>	25	0.5	0.2	0.2	1.0				
<b>Non-vascular</b>										
	Moss	50	27.4	1.8	0.2	13.0				X
	Lichen	38	19.9	1.0	0.2	4.0				

*Vulpia microstachys* – *Plantago erecta* – *Calycadenia (truncata, multiglandulosa)* Association  
*Lasthenia californica* – *Plantago erecta* – *Vulpia microstachys* Herbaceous Alliance

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## ***Lasthenia glaberrima* Herbaceous Alliance**

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**Common Name:** Smooth goldfields vernal pool bottoms

**NVC Alliance Code:** A4172. *Lasthenia glaberrima* Vernal Pool Alliance

### **Statewide Description**

*Lasthenia glaberrima* and/or *Eleocharis macrostachya* is co-dominant or characteristically present in the herbaceous layer with *Alopecurus saccatus*, *Callitriche marginata*, *Castilleja campestris*, *Centromadia fitchii*, *Crassula aquatica*, *Distichlis spicata*, *Downingia bicornuta*, *Downingia cuspidata*, *Downingia insignis*, *Eryngium* spp., *Glyceria occidentalis*, *Gratiola ebracteata*, *Holocarpha virgata*, *Isoetes howellii*, *Lasthenia fremontii*, *Lilaea scilloides*, *Lupinus bicolor*, *Lythrum hyssopifolia*, *Lythrum portula*, *Myosurus minimus*, *Plagiobothrys stipitatus* var. *micranthus*, *Pleuropogon californicus*, *Pogogyne douglasii*, *Psilocarphus brevissimus* var. *brevissimus*, *Ranunculus bonariensis* var. *trisepalus*, and *Trifolium variegatum*. Other common species include *Hordeum marinum*, *Leontodon saxatilis*, *Lolium perenne*, or *Polypogon monspeliensis*.

Barbour et al. (2003, 2007b) recognized the *Downingia* – *Lasthenia* Class for California vernal pool vegetation on all geomorphic surfaces, landscapes, and soil types in the Central Valley and adjacent foothills. Within that class, Barbour et al. recognized this *Lasthenia glaberrima* Alliance for vegetation of deeper pools bottoms. The alliance has a high constancy and abundance of *Lasthenia glaberrima* and *Eleocharis macrostachya*, which are extremely flood tolerant. Associations in this alliance differ from other freshwater vernal pool alliances in their absence or much lower constancy of species adapted to short inundation periods such as *Blennosperma nanum* var. *nanum*, *Centromadia fitchii*, *Cicendia quadrangularis*, *Downingia cuspidata*, *Lepidium nitidum*, *Limnanthes douglasii* ssp. *rosea*, *Plagiobothrys greenei*, and *Trifolium depauperatum*. Lengthy inundation also leads to a lower degree of invasion by

non-natives. However, stands do have *Downingia bicornuta* and *Eryngium castrense*, which grow across pools of varying degrees of inundation.

The *Lasthenia glaberrima* Alliance occurs on a variety of geomorphic surfaces, landforms, and soil series. Stands occur primarily in freshwater pools but sometimes occur in slightly saline/alkaline pools. Within the alliance are six associations: three that are characteristic of hardpan and volcanic rock pools, and three that are found in claypan pools (Barbour et al. 2007b).

### **Local Vegetation Description**

The Smooth goldfields vernal pool bottoms Alliance forms an intermittent to continuous herbaceous layer. The shrub layer is absent and the tree layer is absent. Dominant herbs include *Pleuropogon californicus*, and characteristic herbs include *Eleocharis macrostachya*, *Hordeum marinum*, and *Mentha pulegium*. Those herbs often present include *Cyperus eragrostis*, *Lasthenia glaberrima*, *Lythrum hyssopifolium*, and *Rumex crispus*, and herbs that are sometimes present include *Cotula coronopifolia*, *Croton setigerus*, *Eleocharis acicularis*, *Epilobium densiflorum*, *Eryngium aristulatum*, *Eryngium armatum*, *Gratiola ebracteata*, *Hordeum brachyantherum*, *Isoetes howellii*, *Leontodon taraxacoides*, *Lilaea scilloides*, *Limnanthes douglasii*, *Lolium perenne*, *Navarretia leucocephala*, *Plagiobothrys bracteatus*, *Polypogon monspeliensis*, *Psilocarphus tenellus*, *Rumex conglomeratus*, and *Xanthium strumarium*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.0	0 – 0	no data	
Herb	65.0	40 – 80	0.4	0 – 1

### **Local Membership Rule**

*Pleuropogon californicus* and/or *Lasthenia glaberrima* are present, sometimes with high cover in the herbaceous layer along with *Limnanthes douglasii*, *Navarretia leucocephala*, *Eryngium aristulatum*, and/or *Isoetes howellii*. If *Eleocharis macrostachya* or *E. palustris* is present and co-dominant, key to this alliance instead of *Eleocharis*. Stands typically occur in vernal pools or vernal influenced marshes.

### **Local Environmental Description**

**Elevation:** Mean 120 m, Range 14 – 265 m

**Aspect:** Flat (4)

**Slope:** Mean 0 degrees, Range 0 – 1 degrees

**Macro Topography:** Upper 1/3 of slope to Ridgetop (1), Bottom (1), Bottom to Lower 1/3 of slope (1), Lower 1/3 of slope (1)

**Large Rock:** 0%

**Fines Cover:** Mean 44.6%, Range 0.2–89%

**Small Rock:** 0%

**Litter Cover:** Mean 44.5%, Range 10– 98%

**Soil Texture (field assessed):** Clay, (class unknown) (1), Medium silt loam (1), Muck (1), Not recorded (1)

**Geology (field or map data):** Sandstone and other sedimentary (2), Sandstone, shale, and gravel deposits (1), Large landslides (1)

**Marin County Watersheds:** Estero San Antonio (1), Novato (1)

**Other Watersheds, San Mateo Co.:** Palo Alto (1); **Sonoma Co.:** Petaluma River (1)

### **Site Impacts**

This alliance has moderate non-native plant cover (average 21.2%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Cotula coronopifolia*, *Hordeum marinum*, *Leontodon taraxacoides*, *Lythrum hyssopifolium*, *Mentha pulegium*, *Polypogon monspeliensis*, *Rumex conglomeratus*, and *Rumex crispus*.

**Associations in Marin County**

*Lasthenia glaberrima* – *Pleuropogon californicus*

**Classification Comments**

Since Marin County has fewer than five surveys of this alliance, data from nearby counties were included.

**References:** Barbour et al. 2003, Barbour et al. 2007b, Klein et al. 2015

**Global Rarity Rank:** G2

**State Rarity Rank:** S2

**Surveys Used for Description**

**Total: N=4; Marin County (n=2):** MARIN231, MARIN304

San Mateo County (n=1): SMAT0243    Sonoma County (n=1): HEAD0344

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Herb	<i>Pleuropogon californicus</i>	75	38.3	28.8	17.0	60.0	X		X	X
	<i>Eleocharis macrostachya</i>	75	10.4	10.1	0.2	38.0	X			X
	<i>Mentha pulegium</i>	75	11.4	9.1	0.2	35.0	X			X
	<i>Hordeum marinum</i>	75	0.3	0.2	0.2	0.2	X			X
	<i>Cyperus eragrostis</i>	50	1.8	0.8	0.2	3.0				X
	<i>Lythrum hyssopifolium</i>	50	0.2	0.1	0.2	0.2				X
	<i>Rumex crispus</i>	50	0.1	0.1	0.2	0.2				X
	<b><i>Lasthenia glaberrima</i></b>	<b>50</b>	<b>0.2</b>	<b>0.1</b>	<b>0.2</b>	<b>0.2</b>				<b>X</b>
	<i>Lolium perenne</i>	25	8.3	6.8	27.0	27.0				
	<i>Navarretia leucocephala</i>	25	11.5	5.0	20.0	20.0				
	<i>Eryngium armatum</i>	25	4.3	4.5	18.0	18.0				
	<i>Isoetes howellii</i>	25	7.5	3.3	13.0	13.0				
	<i>Polypogon monspeliensis</i>	25	0.7	0.8	3.0	3.0				
	<i>Plagiobothrys bracteatus</i>	25	0.7	0.8	3.0	3.0				
	<i>Lilaea scilloides</i>	25	0.7	0.8	3.0	3.0				
	<i>Eleocharis acicularis</i>	25	1.2	0.5	2.0	2.0				
	<i>Limnanthes douglasii</i>	25	0.8	0.5	2.0	2.0				
	<i>Eryngium aristulatum</i>	25	0.6	0.3	1.0	1.0				
	<i>Croton setigerus</i>	25	0.3	0.3	1.0	1.0				
	<i>Epilobium densiflorum</i>	25	0.1	0.1	0.2	0.2				
	<i>Psilocarphus tenellus</i>	25	0.1	0.1	0.2	0.2				
	<i>Leontodon taraxacoides</i>	25	0.1	0.1	0.2	0.2				
	unknown Poaceae	25	0.1	0.1	0.2	0.2				
	<i>Rumex conglomeratus</i>	25	0.1	0.1	0.2	0.2				
	<i>Hordeum brachyantherum</i>	25	0.1	0.1	0.2	0.2				
	<i>Xanthium strumarium</i>	25	0.1	0.1	0.2	0.2				
	<i>Gratiola ebracteata</i>	25	0.1	0.1	0.2	0.2				
	<i>Cotula coronopifolia</i>	25	0.0	0.1	0.2	0.2				

***Lasthenia glaberrima* – *Pleuropogon californicus* Association**

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**Common Name:** Smooth Goldfield Patches

**Alliance:** *Lasthenia glaberrima* Herbaceous Alliance

**Local Vegetation Description**

The Smooth Goldfield Association forms an intermittent to continuous herbaceous layer. The shrub layer is absent and the tree layer is absent. Dominant herbs include *Pleuropogon californicus*. Those herbs often present include *Eleocharis macrostachya*, *Hordeum marinum*, *Mentha pulegium*, and *Rumex crispus*, and herbs that are sometimes present include *Cotula coronopifolia*, *Croton setigerus*, *Cyperus eragrostis*, *Epilobium densiflorum*, *Eryngium armatum*, *Hordeum brachyantherum*, *Lasthenia glaberrima*, *Lilaea scilloides*, *Limnanthes douglasii*, *Lolium perenne*, *Lythrum hyssopifolium*, *Plagiobothrys bracteatus*, *Polypogon monspeliensis*, *Rumex conglomeratus*, and *Xanthium strumarium*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.0	0 – 0	no data	
Herb	73.3	60 – 80	0.5	0 – 1

**Local Environmental Description**

**Elevation:** Mean 71 m, Range 14 – 120 m

**Aspect:** Flat (3)

**Slope:** Mean 0 degrees, Range 0 – 1 degrees

**Macro Topography:** Bottom to Lower 1/3 of slope (1), Lower 1/3 of slope (1), Upper 1/3 of slope to Ridgetop (1)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** Mean 29.7%, Range 0.2 – 88.0%

**Litter Cover:** Mean 56.0%, Range 10.0 – 98%

**Soil Texture (field assessed):** Clay, (class unknown) (1), Medium silt loam (1), Not recorded (1)

**Geology (field or map data):** Sandstone and other sedimentary (2), Sandstone, shale, and gravel deposits (1)

**Marin County Watersheds:** Estero San Antonio (1)

**Other Watersheds, San Mateo Co.:** Palo Alto (1); **Sonoma Co.:** Petaluma River (1)

**Site Impacts**

This association has moderate non-native plant cover (average 27.0%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Cotula coronopifolia*, *Hordeum marinum*, *Lolium perenne*, *Lythrum hyssopifolium*, *Mentha pulegium*, *Polypogon monspeliensis*, *Rumex conglomeratus*, and *Rumex crispus*.

**Classification Comments**

Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** Barbour et al. 2003, Barbour et al. 2007b, Klein et al. 2015

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

Total: N=3; Marin County (n=1): MARIN231

San Mateo County (n=1): SMAT0243

Sonoma County (n=1): HEAD0344

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Herb</b>										
	<b><i>Pleuropogon californicus</i></b>	<b>100</b>	<b>51.1</b>	<b>38.3</b>	<b>17.0</b>	<b>60.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Eleocharis macrostachya</i>	67	12.3	12.7	0.2	38.0				<b>X</b>
	<i>Mentha pulegium</i>	67	14.4	11.7	0.2	35.0				<b>X</b>
	<i>Hordeum marinum</i>	67	0.2	0.1	0.2	0.2				<b>X</b>
	<i>Rumex crispus</i>	67	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Lolium perenne</i>	33	11.0	9.0	27.0	27.0				
	<i>Eryngium armatum</i>	33	5.8	6.0	18.0	18.0				
	<i>Lilaea scilloides</i>	33	1.0	1.0	3.0	3.0				
	<i>Plagiobothrys bracteatus</i>	33	1.0	1.0	3.0	3.0				
	<i>Polypogon monspeliensis</i>	33	1.0	1.0	3.0	3.0				
	<i>Limnanthes douglasii</i>	33	1.1	0.7	2.0	2.0				
	<i>Croton setigerus</i>	33	0.4	0.3	1.0	1.0				
	<i>Cotula coronopifolia</i>	33	0.1	0.1	0.2	0.2				
	<i>Cyperus eragrostis</i>	33	0.1	0.1	0.2	0.2				
	<i>Epilobium densiflorum</i>	33	0.1	0.1	0.2	0.2				
	<i>Hordeum brachyantherum</i>	33	0.1	0.1	0.2	0.2				
	<b><i>Lasthenia glaberrima</i></b>	<b>33</b>	<b>0.1</b>	<b>0.1</b>	<b>0.2</b>	<b>0.2</b>				
	<i>Lythrum hyssopifolium</i>	33	0.1	0.1	0.2	0.2				
	<i>Rumex conglomeratus</i>	33	0.1	0.1	0.2	0.2				
	<i>Xanthium strumarium</i>	33	0.1	0.1	0.2	0.2				



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## ***Lepidium latifolium* – (*Lactuca serriola*) Herbaceous Semi-Natural Alliance**

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**Common Name:** Perennial pepper weed – (prickly lettuce) patches

**NVC Alliance Code:** A3849. *Conyza canadensis* - *Cirsium arvense* - *Lactuca serriola* Ruderal Wet Meadow Alliance

### **Statewide Description**

*Lepidium latifolium* is dominant in the herbaceous layer, though other non-native forbs may also be abundant. Emergent trees and shrubs may be present at low cover.

*Lepidium latifolium* is invading riparian and wetland settings in California. Plants expand rapidly and form extensive, dense patches in both freshwater and brackish water sites in the state. This invasion is magnified in disturbed brackish marshes of the San Francisco Bay estuary, where *L. latifolium* invades first after disturbance along levees and then spreads into diked and tidal wetlands.

### **Local Vegetation Description**

The Perennial pepper weed – (prickly lettuce) patches Alliance forms an open to continuous herbaceous layer. The shrub layer is sparse and the tree layer is absent. *Lepidium latifolium* is dominant in the two stands sampled, and characteristic herbs include *Distichlis spicata*. Those herbs often present include *Brassica nigra*, *Carduus pycnocephalus*, *Cirsium vulgare*, *Conium maculatum*, *Cressa truxillensis*, *Elymus triticoides*, *Juncus arcticus*, *Lactuca serriola*, *Lolium perenne*, *Polypogon monspeliensis*, *Sarcocornia pacifica*, *Sonchus asper*, and *Sonchus oleraceus*. Commonly associated emergent shrubs at sparse cover include *Salix lasiolepis*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.1	0 – 0.2	3.5	2 – 5
Herb	53.5	32 – 75	1.1	0.5 – 2

### **Local Membership Rule**

*Lepidium latifolium* dominates in the herbaceous layer along intermittently and seasonally flooded freshwater and brackish marshes and riparian corridors. In alkaline or saline settings, *Distichlis spicata* is commonly present.

### **Local Environmental Description**

**Elevation:** Mean 5 m, Range 2 – 7 m

**Aspect:** Flat (1), SW (1)

**Slope:** Mean 1 degrees, Range 0 – 1 degrees

**Macro Topography:** Lower 1/3 of slope (2)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** 1.0%

**Litter Cover:** 97%

**Soil Texture (field assessed):** Fine silty clay (1), Unknown (1)

**Geology (field or map data):** Alluvium (1), Sandy alluvium (most alluvial fans and washes) (1)

**Marin County Watersheds:** Novato (1)

**Other Watersheds, Sonoma Co.:** Sonoma Creek (1)

### **Site Impacts**

This alliance has greater cover of exotics than natives, with very high non-native plant cover (average 90.4%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Brassica nigra*, *Carduus pycnocephalus*, *Cirsium vulgare*, *Conium maculatum*, *Lactuca serriola*, *Lepidium latifolium*, *Polypogon monspeliensis*, *Sonchus asper*, and *Sonchus oleraceus*.

### **Associations in Marin County**

*Lepidium latifolium*

### **Classification Comments**

The name of this alliance has been updated from the *Lepidium latifolium* Alliance to more closely align with the analogous NVC alliance. Since Marin County has fewer than five surveys of this alliance, data from nearby counties were included.

**References:** Keeler-Wolf and Vaghti 2000, Klein et al. 2015

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

### **Surveys Used for Description**

**Total: N=2; Marin County (n=1):** MARIN015

Sonoma County (n=1): SONO0424

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Salix lasiolepis</i>	50	50.0	0.1	0.2	0.2				X
<b>Herb</b>										
	<b><i>Lepidium latifolium</i></b>	<b>100</b>	<b>80.4</b>	<b>49.0</b>	<b>21.0</b>	<b>77.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Distichlis spicata</i>	100	1.6	0.6	0.2	1.0	<b>X</b>			<b>X</b>
	<i>Elymus triticoides</i>	50	6.0	2.0	4.0	4.0				<b>X</b>
	<i>Conium maculatum</i>	50	6.0	2.0	4.0	4.0				<b>X</b>
	<i>Carduus pycnocephalus</i>	50	3.0	1.0	2.0	2.0				<b>X</b>
	<i>Juncus arcticus</i>	50	1.5	0.5	1.0	1.0				<b>X</b>
	<i>Brassica nigra</i>	50	0.3	0.1	0.2	0.2				<b>X</b>
	<i>Sonchus oleraceus</i>	50	0.3	0.1	0.2	0.2				<b>X</b>
	<i>Sarcocornia pacifica</i>	50	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Polypogon monspeliensis</i>	50	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Lolium perenne</i>	50	0.3	0.1	0.2	0.2				<b>X</b>
	<b><i>Lactuca serriola</i></b>	<b>50</b>	<b>0.1</b>	<b>0.1</b>	<b>0.2</b>	<b>0.2</b>				<b>X</b>
	<i>Cirsium vulgare</i>	50	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Cressa truxillensis</i>	50	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Sonchus asper</i>	50	0.1	0.1	0.2	0.2				<b>X</b>

***Lepidium latifolium* Semi-natural Association**

**Common Name:** Pepperweed Patches

**Alliance:** *Lepidium latifolium* – (*Lactuca serriola*) Herbaceous Semi-Natural Alliance

**Classification Comments**

The association circumscription is the same as that of the alliance. See above for detailed description. Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

**State Rare:** N



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## ***Leymus cinereus* – *Leymus triticoides* Herbaceous Alliance**

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**Common Name:** Ashy ryegrass – creeping ryegrass turfs

**NVC Alliance Code:** A1329. *Leymus cinereus* - *Leymus triticoides* Alkaline Wet Meadow Alliance

### **Statewide Description**

*Leymus cinereus* and/or *Leymus triticoides* is dominant or co-dominant in the herbaceous layer with *Ambrosia psilostachya*, *Anemopsis californica*, *Aristida purpurea*, *Avena fatua*, *Bromus* spp., *Danthonia unispicata*, *Distichlis spicata*, *Elymus elymoides*, *Hordeum* spp., *Juncus arcticus*, *Lolium perenne*, *Poa secunda* or *Triglochin maritima*. Emergent trees and shrubs may be present at low cover.

Many regional descriptions include the alliance in an alkali meadow category. Stands often occur in a fine mosaic with upland shrublands, including *Artemisia tridentata* and *Sarcobatus vermiculatus* alliances. Soils are influenced by accumulations of coarse to fine volcanic tephra (Young et al. 2007).

The two primary species in this alliance were treated separately in the 2009 book, *A Manual of California Vegetation*, second edition. *Leymus cinereus* and *L. triticoides* may hybridize when they co-occur. *Leymus triticoides* also hybridizes with another large California species, *L. condensatus* in the western Mojave and in the southern Sierra Nevada Foothills. The resulting species complexes are often difficult to identify and may be ecologically overlapping.

### **Local Vegetation Description**

The Ashy ryegrass – creeping ryegrass turfs Alliance forms an intermittent to continuous herbaceous layer. The shrub layer is sparse and the tree layer is absent. *Elymus triticoides* is dominant in the two stands sampled. Those herbs often present include *Geranium dissectum*, and herbs that are sometimes present include *Aira caryophyllea*, *Anagallis arvensis*, *Briza maxima*, *Briza minor*, *Bromus hordeaceus*,

*Carduus pycnocephalus*, *Holcus lanatus*, *Juncus arcticus*, *Juncus patens*, *Juncus phaeocephalus*, *Lolium perenne*, *Picris echioides*, *Raphanus sativus*, *Rumex acetosella*, *Rumex conglomeratus*, *Rumex crispus*, *Rumex* spp., *Sonchus asper*, and *Vulpia bromoides*. Commonly associated emergent shrubs at sparse cover include *Baccharis pilularis*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	1.3	0 – 10	0.8	0.5 – 1
Herb	64.5	33 – 95	0.6	0 – 1

### **Local Membership Rule**

*Leymus triticoides* dominates or co-dominates with *Lolium perenne* or other non-native grasses or forbs. Stands are found on poorly drained floodplains, valley bottoms, and brackish marsh margins.

### **Local Environmental Description**

**Elevation:** Mean 45 m, Range 2 – 221 m

**Aspect:** Flat (4), NE (2), SW (2), NW (1)

**Slope:** Mean 4 degrees, Range 0 – 17 degrees

**Macro Topography:** Lower 1/3 of slope (3), Middle 1/3 of slope (3), Bottom (2), Toeslope (1)

**Large Rock:** 0.0%

**Small Rock:** Mean 0.0%, Range 0.0 – 0.2%

**Fines Cover:** Mean 11.0%, Range 0.0 – 67.0%

**Litter Cover:** Mean 74.2%, Range 0.2 – 97%

**Soil Texture (field assessed):** Fine silty clay (1), Moderately fine silty clay loam (1), Medium silt loam (1), Fine clay (1), Moderately fine clay loam (1)

**Geology (field or map data):** Sandstone (2), Alluvium (2), Sandy alluvium (most alluvial fans and washes) (1), Sandstone and other sedimentary (1), Mixed alluvium (1), Franciscan melange (1), Sandstone, shale, and conglomerate (1)

**Marin County Watersheds:** Estero San Antonio (1), San Rafael (1)

**Other Watersheds, San Mateo Co.:** San Mateo Bayside (1), Tunitas Creek (1); **Sonoma Co.:** Petaluma River (2), Estero Americano (1), Lower Russian River (1), Sonoma Creek (1)

### **Site Impacts**

This alliance has moderate non-native plant cover (average 39.9%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*, *Anagallis arvensis*, *Briza maxima*, *Briza minor*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Geranium dissectum*, *Holcus lanatus*, *Picris echioides*, *Raphanus sativus*, *Rumex acetosella*, *Rumex conglomeratus*, *Rumex crispus*, *Sonchus asper*, and *Vulpia bromoides*.

### **Associations in Marin County**

*Leymus triticoides*

### **Classification Comments**

Since Marin County has fewer than five surveys of this alliance, data from nearby counties were included.

**References:** Buck-Diaz and Evens 2011b, Buck-Diaz et al. 2011, Buck-Diaz et al. 2012, Buck-Diaz et al. 2013, Evens and San 2004, Holstein 2001, Keeler-Wolf and Evens 2006, Keeler-Wolf and Vaghti 2000, Kittel et al. 2012, Klein et al. 2015, NatureServe 2007, Rodriguez et al. 2017, Solomeshch and Barbour 2006, Sproul et al. 2011, VegCAMP 2015a

Global Rarity Rank: G3

State Rarity Rank: S3

**Surveys Used for Description**

Total: N=9; Marin County (n=2): HEAD0040, MARIN229

San Mateo County (n=2): CORT086, SMAT0164

Sonoma County (n=5): SONO0423, SONO0546, SONO0664, SONO0667, SONO0678

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	22	22.2	1.5	3.0	10.2				
<b>Herb</b>										
	<b><i>Elymus triticoides</i></b>	<b>89</b>	<b>46.8</b>	<b>37.0</b>	<b>8.0</b>	<b>93.0</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<i>Geranium dissectum</i>	56	0.2	0.1	0.2	0.2				<b>X</b>
	<i>Lolium perenne</i>	44	21.2	18.4	1.0	80.0				
	<i>Carduus pycnocephalus</i>	44	2.1	2.4	0.2	18.0				
	<i>Juncus patens</i>	44	0.6	0.3	0.2	2.0				
	<i>Picris echioides</i>	33	1.7	1.2	0.2	6.0				
	<i>Sonchus asper</i>	33	0.4	0.5	0.2	4.0				
	<i>Briza maxima</i>	22	6.3	2.3	3.0	18.0				
	<i>Raphanus sativus</i>	22	1.1	1.4	1.0	12.0				
	<i>Holcus lanatus</i>	22	0.8	0.6	0.2	5.0				
	<i>Bromus hordeaceus</i>	22	1.2	0.6	1.0	4.0				
	<i>Anagallis arvensis</i>	22	0.4	0.4	0.2	3.0				
	<i>Rumex conglomeratus</i>	22	0.3	0.3	1.0	2.0				
	<i>Vulpia bromoides</i>	22	0.2	0.1	0.2	1.0				
	<i>Rumex</i> spp.	22	0.2	0.1	0.2	1.0				
	<i>Briza minor</i>	22	0.1	0.1	0.2	1.0				
	<i>Juncus phaeocephalus</i>	22	0.1	0.0	0.2	0.2				
	<i>Juncus arcticus</i>	22	0.0	0.0	0.2	0.2				
	<i>Aira caryophyllea</i>	22	0.0	0.0	0.2	0.2				
	<i>Rumex crispus</i>	22	0.1	0.0	0.2	0.2				
	<i>Rumex acetosella</i>	22	0.1	0.0	0.2	0.2				

## **Leymus triticoides Association**

**Common Name:** Creeping Wildrye Grassland

**Alliance:** *Leymus cinereus* – *Leymus triticoides* Herbaceous Alliance

### **Local Vegetation Description**

The Creeping Wildrye Association forms an intermittent to continuous herbaceous layer. The shrub layer is absent and the tree layer is absent. The dominant and characteristic herb is *Elymus triticoides*. Those herbs often present include *Geranium dissectum*, *Juncus patens*, and *Lolium perenne*. Herbs that are sometimes present include *Briza minor*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Holcus lanatus*, *Juncus arcticus*, *Juncus phaeocephalus*, *Picris echioides*, *Rumex acetosella*, *Rumex conglomeratus*, *Sonchus asper*, and *Vulpia bromoides*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	1.4	0 – 10	0.8	0.5 – 1
Herb	63.7	33 – 95	0.6	0 – 1

### **Local Environmental Description**

**Elevation:** Mean 36 m, Range 2 – 221 m

**Aspect:** Flat (2), SW (1)

**Slope:** Mean 3 degrees, Range 0 – 9 degrees

**Macro Topography:** Lower 1/3 of slope (3), Bottom (2), Middle 1/3 of slope (2), Toeslope (1)

**Large Rock:** 0.0%

**Small Rock:** Mean 0.0%, Range 0.0 – 0.2%

**Fines Cover:** Mean 11.8%, Range 0.0 – 67.0%

**Litter Cover:** Mean 72.9%, Range 0.2 – 97%

**Soil Texture (field assessed):** Fine clay (1), Fine silty clay (1), Medium silt loam (1), Moderately fine clay loam

**Geology (field or map data):** Alluvium (4), Sandstone (2), Sandstone and other sedimentary (2)

**Marin County Watersheds:** Estero San Antonio (1)

**Other Watersheds, San Mateo Co.:** San Mateo Bayside (1), Tunitas Creek (1); **Sonoma Co.:** Petaluma River (2), Estero Americano (1), Lower Russian River (1), Sonoma Creek (1)

### **Site Impacts**

This association has moderate non-native plant cover (average 41.4%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Carduus pycnocephalus*, *Geranium dissectum*, *Lolium perenne*, and *Picris echioides*.

### **Classification Comments**

*Leymus triticoides* and *Elymus triticoides* are synonymous. Since the number of surveys of this association in Marin are low, data from nearby counties were included. Some surveys were previously classified as *Leymus triticoides* – *Lolium perenne* Association in Klein et al. 2015.

**References:** Evens and San 2004, Klein et al. 2015

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

**Total: N=8; Marin County (n=1):** MARIN229

San Mateo County (n=2): CORT086, SMAT0164

Sonoma County (n=5): SONO0423, SONO0546, SONO0664, SONO0667, SONO0678

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Herb</b>										
	<i>Elymus triticoides</i>	100	52.7	41.6	8.0	93.0	X	X		X
	<i>Lolium perenne</i>	50	23.9	20.8	1.0	80.0				X
	<i>Juncus patens</i>	50	0.7	0.3	0.2	2.0				X
	<i>Geranium dissectum</i>	50	0.2	0.1	0.2	0.2				X
	<i>Picris echioides</i>	38	1.9	1.4	0.2	6.0				
	<i>Carduus pycnocephalus</i>	38	0.4	0.4	0.2	3.0				
	<i>Raphanus sativus</i>	25	1.2	1.6	1.0	12.0				
	<i>Holcus lanatus</i>	25	0.9	0.7	0.2	5.0				
	<i>Bromus hordeaceus</i>	25	1.3	0.6	1.0	4.0				
	<i>Sonchus asper</i>	25	0.4	0.5	0.2	4.0				
	<i>Rumex conglomeratus</i>	25	0.4	0.4	1.0	2.0				
	<i>Briza minor</i>	25	0.1	0.2	0.2	1.0				
	<i>Rumex</i> spp.	25	0.3	0.2	0.2	1.0				
	<i>Vulpia bromoides</i>	25	0.2	0.2	0.2	1.0				
	<i>Juncus arcticus</i>	25	0.0	0.1	0.2	0.2				
	<i>Juncus phaeocephalus</i>	25	0.1	0.1	0.2	0.2				
	<i>Rumex acetosella</i>	25	0.1	0.1	0.2	0.2				
	<i>Rumex crispus</i>	25	0.1	0.1	0.2	0.2				



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## **Leymus mollis Herbaceous Alliance**

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**Common Name:** Sea lyme grass patches

**NVC Alliance Code:** A2066. *Poa macrantha* - *Leymus mollis* - *Festuca rubra* Sand Dune Grassland Alliance

### **Statewide Description**

*Leymus mollis* is dominant or characteristically present in the herbaceous layer with *Abronia latifolia*, *Achillea millefolium*, *Ambrosia chamissonis*, *Ammophila arenaria*, *Artemisia pycnocephala*, *Cakile* spp., *Calystegia soldanella*, *Carpobrotus chilensis*, *Lathyrus littoralis*, *Poa douglasii*, and *Poa macrantha*.

Because *Leymus mollis* is an obligate psammophyte, it thrives under conditions of active sand accretion of nearshore dunes and upper beaches (Pickart and Barbour 2007). *Leymus mollis* and *Abronia umbellata* ssp. *breviflora* (a CA rare plant with a rank of 1B.1) grow in the same habitat as the invasive non-native grass *Ammophila arenaria*, which has reduced and replaced these native species over much of their ranges in California. *Leymus mollis* stands fluctuate between being grass- and herb-dominated. They are generally small (< 0.5 ha) and patchy and intermix with stands of the *Abronia latifolia* – *Ambrosia chamissonis* Alliance.

### **Local Vegetation Description**

The Sea lyme grass patches Alliance forms an open to continuous herbaceous layer. The shrub layer is sparse and the tree layer is absent. *Leymus mollis* is dominant or co-dominant, and other characteristic herbs include *Ambrosia chamissonis* and *Cakile maritima*. Those herbs often present include *Abronia latifolia*, *Camissonia cheiranthifolia*, and *Carpobrotus edulis*, and herbs that are sometimes present include *Anagallis arvensis*, *Artemisia pycnocephala*, *Bromus diandrus*, *Castilleja latifolia*, *Distichlis*

*spicata*, *Eriophyllum stoechadifolium*, *Fragaria chiloensis*, *Juncus lescurii*, *Plantago maritima*, *Poa douglasii*, *Polypogon monspeliensis*, *Sedum spathulifolium*, *Sonchus asper*, and *Sonchus oleraceus*. Commonly associated emergent shrubs at sparse cover include *Baccharis pilularis*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	1.6	0.0 – 10.0	0.3	0 – 0.5
Herb	39.3	18 – 70	0.4	0 – 1

### **Local Membership Rule**

*Leymus mollis* dominates or is characteristically present in the herbaceous layer. *Abronia*, *Ambrosia chamissonis*, *Artemisia pycnocephala*, *Cakile*, and other herbaceous species may be present as sub-dominants.

### **Local Environmental Description**

**Elevation:** Mean 9 m, Range 0 – 19 m

**Aspect:** SW (3), Flat (2), NW (2), SE (2), NE (1)

**Slope:** Mean 10 degrees, Range 1 – 41 degrees

**Macro Topography:** Lower 1/3 of slope (2), Bottom to Lower 1/3 of slope (2), Ridge top (1), Middle to Upper 1/3 of slope (1), Lower to Middle 1/3 of slope (1), Upper 1/3 of slope (1), Bottom (1), Middle 1/3 of slope (1)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** Mean 60.1%, Range 0.2 – 99.0%

**Litter Cover:** Mean 11.9%, Range 0.2 – 35%

**Soil Texture (field assessed):** Fine sand (4), Sand, (class unknown) (3)

**Geology (field or map data):** Sand dunes (5), Sandstone and other sedimentary (3), Sandstone (1)

**Marin County Watersheds:** Point Reyes (1)

**Other Watersheds, San Mateo Co.:** Ano Nuevo (7); **Sonoma Co.:** Salmon Creek (1)

### **Site Impacts**

This alliance has low non-native plant cover (average 9.3%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Anagallis arvensis*, *Bromus diandrus*, *Cakile maritima*, *Carpobrotus edulis*, *Polypogon monspeliensis*, *Sonchus asper*, and *Sonchus oleraceus*.

### **Associations in Marin County**

*Leymus mollis* – *Abronia latifolia* – (*Cakile* sp.)

### **Classification Comments**

Since Marin County has fewer than five surveys of this alliance, data from nearby counties were included.

**References:** Johnson 1963, Klein et al. 2015, LaBanca 1993, Parker 1974

**Global Rarity Rank:** G4

**State Rarity Rank:** S2

### **Surveys Used for Description**

**Total: N=10; Marin County (n=2):** MARIN249, MARIN322

San Mateo County (n=7): CORT010, CORT012, CORT169, SMAT0144, SMAT0168, SMATREL0145, SMATREL0170

Sonoma County (n=1): SONO0446

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	30	27.2	1.4	1.0	8.0				
<b>Herb</b>										
	<b><i>Leymus mollis</i></b>	<b>90</b>	<b>43.6</b>	<b>25.1</b>	<b>1.0</b>	<b>55.0</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<i>Cakile maritima</i>	90	2.9	1.4	0.2	10.0	<b>X</b>			<b>X</b>
	<i>Ambrosia chamissonis</i>	80	11.0	6.7	0.2	30.0	<b>X</b>			<b>X</b>
	<i>Carpobrotus edulis</i>	70	4.0	3.3	0.2	11.0				<b>X</b>
	<i>Abronia latifolia</i>	60	8.2	5.0	1.0	20.0				<b>X</b>
	<i>Camissonia cheiranthifolia</i>	50	2.6	1.5	0.2	12.0				<b>X</b>
	<i>Artemisia pycnocephala</i>	40	3.0	2.6	0.2	16.0				
	<i>Distichlis spicata</i>	40	2.3	2.3	0.2	18.0				
	<i>Poa douglasii</i>	30	4.2	2.5	0.2	20.0				
	<i>Bromus diandrus</i>	30	0.6	0.4	0.2	2.0				
	<i>Sonchus asper</i>	30	0.3	0.2	0.2	1.0				
	<i>Sonchus oleraceus</i>	30	0.2	0.1	0.2	0.2				
	<i>Fragaria chiloensis</i>	20	1.6	1.5	5.0	10.0				
	<i>Eriophyllum stoechadifolium</i>	20	0.9	0.8	0.2	8.0				
	<i>Castilleja latifolia</i>	20	0.4	0.4	1.0	3.0				
	<i>Plantago maritima</i>	20	0.4	0.2	0.2	2.0				
	<i>Sedum spathulifolium</i>	20	0.1	0.1	0.2	1.0				
	<i>Juncus lescurii</i>	20	0.0	0.0	0.2	0.2				
	<i>Anagallis arvensis</i>	20	0.1	0.0	0.2	0.2				
	<i>Polypogon monspeliensis</i>	20	0.1	0.0	0.2	0.2				
<b>Non-vascular</b>										
	Moss	20	20.0	0.0	0.2	0.2				

***Leymus mollis* – *Abronia latifolia* – (*Cakile* sp.) Association**

**Common Name:** Native Dunegrass – Coastal Sand-verbena – Sea Rocket Patches

**Alliance:** *Leymus mollis* Herbaceous Alliance

**Classification Comments**

The association circumscription is the same as that of the alliance. See above for detailed description. Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y



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## ***Lolium perenne* Herbaceous Semi-Natural Alliance**

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**Common Name:** Perennial rye grass fields

**NVC Alliance Code:** A3871. *Lolium perenne* Ruderal Grassland Alliance

### **Statewide Description**

*Lolium perenne* is dominant or co-dominant with other non-natives in the herbaceous layer with *Agrostis stolonifera*, *Alopecurus aequalis*, *Asclepias fascicularis*, *Avena fatua*, *Brassica nigra*, *Bromus diandrus*, *Bromus hordeaceus*, *Centaureum muehlenbergii*, *Cirsium vulgare*, *Cryptantha flaccida*, *Euphorbia spathulata*, *Festuca arundinacea*, *Holcus lanatus*, *Hordeum brachyantherum*, *Hordeum marinum*, *Leontodon saxatilis*, *Leymus triticoides*, *Lotus corniculatus*, *Microseris douglasii*, *Nassella pulchra*, *Nasturtium officinale*, *Phalaris aquatica*, *Plantago erecta*, *Poa pratensis*, *Rumex crispus*, and *Trifolium* spp. Emergent trees and shrubs may be present at low cover.

*Lolium perenne* is a widespread and adaptable grass in cismontane California, and the plants grow in a wide range of soil types, except for those excessively drained. Many herbaceous alliances have significant cover of *L. perenne*, including stands of the *Eleocharis macrostachya*, *Juncus arcticus* (var. *balticus*, *mexicanus*), *Leymus triticoides*, *Muhlenbergia rigens*, *Plagiobothrys nothofulvus*, and *Trifolium variegatum* Alliances. While membership rules vary among studies, Sawyer et al. (2009) consider stands to be included in this type if *Lolium perenne* is a strong dominant, either alone or with other non-natives, largely to the exclusion of native plants. Generally, this type occurs in seasonally moist to wet environments that are regularly disturbed through grazing, fire, flooding, or mechanical means.

### **Local Vegetation Description**

The Perennial rye grass fields Alliance forms an intermittent to continuous herbaceous layer. The shrub layer is sparse and the tree layer is sparse. Dominant herbs include *Lolium perenne*. Those herbs often

present include *Bromus hordeaceus* and *Hordeum murinum*, and herbs that are sometimes present include *Avena* spp., *Bromus diandrus*, *Carduus pycnocephalus*, *Conium maculatum*, *Geranium dissectum*, *Hordeum brachyantherum*, *Hordeum marinum*, *Plantago lanceolata*, *Rumex acetosella*, *Rumex pulcher*, *Silybum marianum*, *Trifolium dubium*, *Trifolium subterraneum*, and *Vicia sativa*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0.2	12.5	10 – 15
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	1.4	0 – 15	0.7	0 – 2
Herb	82.5	40 – 100	0.4	0 – 1

### **Local Membership Rule**

*Lolium perenne* dominates or co-dominates with *Avena* spp., *Bromus* spp., *Hordeum marinum*, *H. murinum*, *Medicago*, *Trifolium subterraneum*, *Elymus caput-medusae*, and other non-natives in the herbaceous layer. Native species are typically less than 10% relative cover. These invaded stands are often found on moist or poorly drained sites, on or off serpentine.

### **Local Environmental Description**

**Elevation:** Mean 86 m, Range 2 – 274 m

**Aspect:** SE (4), NW (4), SW (3), Flat (2), NE (2), E (1)

**Slope:** Mean 7 degrees, Range 0 – 16 degrees

**Macro Topography:** Upper 1/3 of slope (6), Lower 1/3 of slope (4), Middle 1/3 of slope (3), Bottom (3), Entire slope (1)

**Large Rock:** Mean 0.5%, Range 0.0 – 5.0%

**Small Rock:** Mean 1.0%, Range 0.0 – 10.0%

**Fines Cover:** Mean 20.3%, Range 1.0 – 70.0%

**Litter Cover:** Mean 71.0%, Range 28.0 – 95%

**Soil Texture (field assessed):** Fine silty clay (3), Not recorded (3), Medium silt (3), Medium to very fine, sandy loam (2), Moderately fine sandy clay loam (2), Moderately fine silty clay loam (1), Medium to very fine, loamy sand (1), Coarse, loamy sand (1), Medium loam (1)

**Geology (field or map data):** Sandstone and other sedimentary (9), Franciscan melange (5), Granitic (4), Sandstone, shale, and conglomerate (2), Alluvium (2), Sandstone (1), Blueschist and semi-schist (1), Ultramafic (type unknown) (1), Large landslides (1)

**Marin County Watersheds:** Point Reyes (12), Walker Creek (4), Novato (3), Petaluma River (3), Bolinas (1), Estero Americano (1), Inverness (1), Lagunitas Creek (1)

### **Site Impacts**

This alliance has greater cover of exotics than natives, with very high non-native plant cover (average 93.9%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Conium maculatum*, *Geranium dissectum*, *Hordeum marinum*, *Hordeum murinum*, *Plantago lanceolata*, *Rumex acetosella*, *Rumex pulcher*, *Silybum marianum*, *Trifolium dubium*, *Trifolium subterraneum*, and *Vicia sativa*.

### **Associations in Marin County**

*Lolium perenne*

*Lolium perenne* – *Hordeum marinum* – *Ranunculus californicus*

*Lolium perenne* – *Lotus corniculatus*

### Classification Comments

None.

**References:** Boul et al. 2021, Buck and Evens 2010, Buck-Diaz et al. 2011, Buck-Diaz et al. 2012, Buck-Diaz et al. 2013, Evens et al. 2004, Keeler-Wolf and Vaghti 2000, Klein et al. 2015, Pickart 2006, Sproul et al. 2011,

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

### Surveys Used for Description

**Total: N=26; Marin County (n=26):** HEAD0071, HEAD0074, HEAD0086, HEAD0134, HEAD0267, HEAD0308, HEAD0314, HEAD0409, MARIN234, MARIN260, MARIN282, MARIN403, MARIN405, MOSD0311, MOSD0320, PGA1438, PGA231, PGA2360, PGA485, PGA499, PGA504, PGA509, PGA530, PGA5419, PORE042, TAMG032M

### Alliance Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Herb	<i>Lolium perenne</i>	100	48.4	48.2	5.0	95.0	X		X	X
	<i>Hordeum murinum</i>	58	10.1	9.8	0.2	62.5				X
	<i>Bromus hordeaceus</i>	50	5.1	3.5	0.2	25.0				X
	<i>Bromus diandrus</i>	46	2.9	3.2	0.2	35.0				
	<i>Carduus pycnocephalus</i>	42	1.1	1.2	0.2	15.0				
	<i>Hordeum marinum</i>	35	3.4	3.3	0.2	38.0				
	<i>Rumex acetosella</i>	35	1.1	1.3	0.2	17.0				
	<i>Silybum marianum</i>	31	0.7	0.7	0.2	10.0				
	<i>Plantago lanceolata</i>	27	1.0	1.1	0.2	10.0				
	<i>Trifolium subterraneum</i>	27	1.3	0.9	0.2	8.0				
	<i>Rumex pulcher</i>	27	0.6	0.4	0.2	10.0				
	<i>Hordeum brachyantherum</i>	27	0.4	0.4	0.2	4.0				
	<i>Avena</i> spp.	27	0.5	0.3	0.2	5.0				
	<i>Trifolium dubium</i>	27	0.1	0.1	0.2	1.0				
	<i>Geranium dissectum</i>	27	0.1	0.1	0.2	1.0				
	<i>Conium maculatum</i>	23	0.5	0.5	0.2	5.0				
	<i>Vicia sativa</i>	23	0.2	0.2	0.2	3.2				

## *Lolium perenne* Semi-natural Association

**Common Name:** Italian Ryegrass Grassland

**Alliance:** *Lolium perenne* Herbaceous Semi-Natural Alliance

### Local Vegetation Description

The Italian Ryegrass Association forms an intermittent to continuous herbaceous layer. The shrub layer is sparse and the tree layer is absent. Dominant herbs include *Lolium perenne*. Those herbs often present include *Hordeum murinum*, and herbs that are sometimes present include *Avena* spp., *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Conium maculatum*, *Danthonia californica*, *Erodium cicutarium*, *Geranium dissectum*, *Holcus lanatus*, *Hypochaeris radicata*, *Plantago lanceolata*, *Rumex acetosella*, *Rumex pulcher*, *Silybum marianum*, *Trifolium dubium*, *Trifolium subterraneum*, and *Vicia sativa*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	1.8	0 – 15	0.3	0 – 0.5
Herb	81.9	40 – 100	0.3	0 – 0.5

### Local Environmental Description

**Elevation:** Mean 98 m, Range 7 – 246 m

**Aspect:** SE (3), NE (2), SW (2), E (1), NW (1)

**Slope:** Mean 8 degrees, Range 3 – 14 degrees

**Macro Topography:** Upper 1/3 of slope (6), Middle 1/3 of slope (2), Bottom (1), Entire slope (1)

**Large Rock:** Mean 0.7%, Range 0.0 – 5.0%

**Small Rock:** Mean 1.5%, Range 0.0 – 10.0%

**Fines Cover:** Mean 24.4%, Range 1.0 – 64.0%

**Litter Cover:** Mean 64.1%, Range 34.0 – 92%

**Soil Texture (field assessed):** Not recorded (3), Medium to very fine, sandy loam (2), Moderately fine sandy clay loam (2), Coarse, loamy sand (1), Moderately fine silty clay loam (1), Medium to very fine, loamy sand (1)

**Geology (field or map data):** Sandstone and other sedimentary (8), Granitic (4), Franciscan melange (3), Ultramafic (type unknown) (1), Sandstone (1)

**Marin County Watersheds:** Point Reyes (11), Walker Creek (4), Inverness (1), Lagunitas Creek (1)

### Site Impacts

This association has significantly greater cover of exotics (average 93.6%) than natives. Non-native species that occur with highest frequency and abundance include *Avena* spp., *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Conium maculatum*, *Erodium cicutarium*, *Geranium dissectum*, *Holcus lanatus*, *Hordeum murinum*, *Hypochaeris radicata*, *Lolium perenne*, *Plantago lanceolata*, *Rumex acetosella*, *Rumex pulcher*, *Silybum marianum*, *Trifolium dubium*, *Trifolium subterraneum*, and *Vicia sativa*.

### Classification Comments

None.

**References:** Buck-Diaz et al. 2011, Buck-Diaz et al. 2012, Buck-Diaz et al. 2013, Keeler-Wolf and Vaghti 2000, Klein et al. 2015, Pickart 2006, Sproul et al. 2011

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

**State Rare:** N

**Surveys Used for Description**

**Total: N=17; Marin County (n=17):** HEAD0071, HEAD0074, HEAD0086, HEAD0267, HEAD0308, HEAD0314, MARIN260, MARIN282, PGA1438, PGA231, PGA2360, PGA485, PGA504, PGA509, PGA5419, PORE042, TAMG032M

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Herb										
	<i>Lolium perenne</i>	100	54.6	53.0	5.0	88.0	X	X		X
	<i>Hordeum murinum</i>	71	12.9	12.3	0.2	62.5				X
	<i>Bromus diandrus</i>	47	1.0	1.1	0.2	12.0				
	<i>Rumex acetosella</i>	41	0.9	0.9	0.2	8.0				
	<i>Silybum marianum</i>	41	0.6	0.5	0.2	3.0				
	<i>Carduus pycnocephalus</i>	41	0.5	0.5	0.2	7.0				
	<i>Bromus hordeaceus</i>	35	4.4	2.6	0.2	25.0				
	<i>Avena</i> spp.	35	0.4	0.2	0.2	2.0				
	<i>Trifolium subterraneum</i>	29	1.9	1.4	0.2	8.0				
	<i>Vicia sativa</i>	29	0.3	0.3	0.2	3.2				
	<i>Rumex pulcher</i>	29	0.1	0.1	0.2	0.2				
	<i>Holcus lanatus</i>	24	3.4	3.4	0.2	35.0				
	<i>Plantago lanceolata</i>	24	1.2	1.2	0.2	10.0				
	<i>Hypochaeris radicata</i>	24	0.9	0.7	0.2	8.0				
	<i>Conium maculatum</i>	24	0.5	0.5	0.2	5.0				
	<i>Trifolium dubium</i>	24	0.1	0.1	0.2	1.0				
	<i>Danthonia californica</i>	24	0.1	0.1	0.2	0.5				
	<i>Erodium cicutarium</i>	24	0.1	0.0	0.2	0.2				
	<i>Geranium dissectum</i>	24	0.1	0.0	0.2	0.2				



## **Lolium perenne – Hordeum marinum – Ranunculus californicus Semi-natural Association**

**Common Name:** Italian Ryegrass – Mediterranean Barley – California Buttercup Grassland

**Alliance:** *Lolium perenne* Herbaceous Semi-Natural Alliance

### **Local Vegetation Description**

The Italian Ryegrass – Mediterranean Barley – California Buttercup Association forms an intermittent to continuous herbaceous layer. The shrub layer is sparse and the tree layer is sparse. Characteristic herbs include *Bromus hordeaceus*, *Carduus pycnocephalus*, *Geranium dissectum*, *Hordeum marinum*, *Lolium perenne*, and *Ranunculus californicus*. Those herbs often present include *Anagallis arvensis*, *Bromus diandrus*, *Hordeum brachyantherum*, *Hordeum murinum*, *Medicago* spp., *Phalaris aquatica*, *Plantago lanceolata*, *Rumex crispus*, *Rumex pulcher*, *Trifolium* spp., *Trifolium dubium*, *Trifolium subterraneum*, *Vicia benghalensis*, and *Vulpia bromoides*. Commonly associated emergent trees at sparse cover include *Quercus agrifolia*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.1	0 – 0.2	12.5	10 – 15
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.1	0.0 – 0.2	1.1	0.5 – 2
Herb	80.8	63 – 95	0.8	0.5 – 1

### **Local Environmental Description**

**Elevation:** Mean 27 m, Range 5 – 74 m

**Aspect:** NW (3), SE (1)

**Slope:** Mean 10 degrees, Range 2 – 16 degrees

**Macro Topography:** Lower 1/3 of slope (3), Middle 1/3 of slope (1)

**Large Rock:** 0.0%

**Small Rock:** Mean 0.1%, Range 0.0 – 0.2%

**Fines Cover:** Mean 20.8%, Range 1.0 – 70.0%

**Litter Cover:** Mean 74.3%, Range 28.0 – 95%

**Soil Texture (field assessed):** Fine silty clay (2), Medium loam (1), Medium silt (1)

**Geology (field or map data):** Blueschist and semi-schist (1), Franciscan melange (1), Sandstone and other sedimentary (1), Sandstone, shale, and conglomerate (1)

**Marin County Watersheds:** Petaluma River (3), Estero Americano (1)

### **Site Impacts**

This association has significantly greater cover of exotics (average 96.1%) than natives. Non-native species that occur with highest frequency and abundance include *Aira caryophyllaea*, *Anagallis arvensis*, *Avena* spp., *Briza maxima*, *Briza minor*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Cerastium glomeratum*, *Cynosurus echinatus*, *Erodium moschatum*, *Geranium dissectum*, *Hordeum marinum*, *Hordeum murinum*, *Hypochaeris radicata*, *Lactuca saligna*, *Leontodon taraxacoides*, *Linum bienne*, *Lolium perenne*, *Lotus angustissimus*, *Medicago* spp., *Phalaris aquatica*, *Picris echioides*, *Plantago lanceolata*, *Ranunculus muricatus*, *Rumex acetosella*, *Rumex crispus*, *Rumex pulcher*, *Trifolium dubium*, *Trifolium subterraneum*, *Vicia benghalensis*, *Vicia sativa*, and *Vulpia bromoides*.

### **Classification Comments**

None.

References: Buck and Evens 2010, Evens et al. 2004

Global Rarity Rank: GNA

State Rarity Rank: SNA

State Rare: N

**Surveys Used for Description**

Total: N=4; Marin County (n=4): HEAD0409, MARIN234, MOSD0311, MOSD0320

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>	<i>Quercus agrifolia</i>	25	25.0	0.1	0.2	0.2				
<b>Shrub</b>	<i>Baccharis pilularis</i>	25	12.5	0.1	0.2	0.2				
	<i>Toxicodendron diversilobum</i>	25	12.5	0.1	0.2	0.2				
<b>Herb</b>	<b><i>Lolium perenne</i></b>	<b>100</b>	<b>24.0</b>	<b>20.8</b>	<b>18.0</b>	<b>25.0</b>	<b>X</b>			<b>X</b>
	<b><i>Hordeum marinum</i></b>	<b>100</b>	<b>12.0</b>	<b>12.8</b>	<b>2.0</b>	<b>38.0</b>	<b>X</b>			<b>X</b>
	<i>Bromus hordeaceus</i>	100	11.3	9.0	3.0	18.0	<b>X</b>			<b>X</b>
	<i>Carduus pycnocephalus</i>	75	2.1	2.1	0.2	5.0	<b>X</b>			<b>X</b>
	<i>Geranium dissectum</i>	75	0.4	0.4	0.2	1.0	<b>X</b>			<b>X</b>
	<b><i>Ranunculus californicus</i></b>	<b>75</b>	<b>0.4</b>	<b>0.4</b>	<b>0.2</b>	<b>1.0</b>	<b>X</b>			<b>X</b>
	<i>Phalaris aquatica</i>	50	11.2	10.0	10.0	30.0				<b>X</b>
	<i>Bromus diandrus</i>	50	5.6	5.0	10.0	10.0				<b>X</b>
	<i>Rumex pulcher</i>	50	3.7	2.6	0.2	10.0				<b>X</b>
	<i>Hordeum murinum</i>	50	2.0	1.8	2.0	5.0				<b>X</b>
	<i>Vicia benghalensis</i>	50	1.5	1.3	0.2	5.0				<b>X</b>
	<i>Vulpia bromoides</i>	50	1.4	1.3	0.2	5.0				<b>X</b>
	<i>Hordeum brachyantherum</i>	50	1.7	1.3	1.0	4.0				<b>X</b>
	<i>Medicago</i> spp.	50	0.7	0.8	0.2	3.0				<b>X</b>
	<i>Trifolium subterraneum</i>	50	0.4	0.3	0.2	1.0				<b>X</b>
	<i>Anagallis arvensis</i>	50	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Plantago lanceolata</i>	50	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Rumex crispus</i>	50	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Trifolium</i> spp.	50	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Trifolium dubium</i>	50	0.1	0.1	0.2	0.2				<b>X</b>
	<i>Lotus angustissimus</i>	25	7.9	9.5	38.0	38.0				
	<i>Briza maxima</i>	25	6.9	6.3	25.0	25.0				
	<i>Hypochaeris radicata</i>	25	1.7	2.0	8.0	8.0				
	<i>Avena</i> spp.	25	1.4	1.3	5.0	5.0				
	<i>Cynosurus echinatus</i>	25	0.6	0.8	3.0	3.0				
	<i>Leontodon taraxacoides</i>	25	0.6	0.8	3.0	3.0				
	<i>Juncus bufonius</i>	25	0.4	0.3	1.0	1.0				
	<i>Juncus occidentalis</i>	25	0.4	0.3	1.0	1.0				

*Lolium perenne* – *Hordeum marinum* – *Ranunculus californicus* Semi-natural Association  
*Lolium perenne* Herbaceous Semi-Natural Alliance

## *Lolium perenne* – *Lotus corniculatus* Semi-natural Association

**Common Name:** Italian Ryegrass – Bird's Foot Trefoil Grassland

**Alliance:** *Lolium perenne* Herbaceous Semi-Natural Alliance

### Local Vegetation Description

The Italian Ryegrass – Bird's Foot Trefoil Association forms an intermittent herbaceous layer. The shrub layer is sparse and the tree layer is absent. Characteristic herbs include *Lolium perenne* and *Lotus corniculatus*. Herbs often present include *Brachypodium distachyon*, *Bromus hordeaceus*, *Hordeum brachyantherum*, *Hordeum marinum*, *Medicago* spp., and *Phalaris aquatica*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	1.8	0.0 – 6.0	no data	
Herb	75.0	45 – 100	0.5	0 – 1

### Local Environmental Description

**Elevation:** Mean 62 m, Range 2 – 170 m

**Aspect:** Flat (2), SW (1)

**Slope:** Mean 0 degrees, Range 0 – 1 degrees

**Macro Topography:** Bottom (3), Lower 1/3 of slope (1)

**Large Rock:** Mean 0.2%, Range 0.0 – 1.0%

**Small Rock:** Mean 0.3%, Range 0.0 – 2.0%

**Fines Cover:** Mean 35.2%, Range 50 – 81%

**Litter Cover:** Mean 55.0%, Range 19 – 92%

**Soil Texture (field assessed):** Fine silty clay (2), Medium silt (2)

**Geology (field or map data):** Sandstone and other sedimentary (3), Alluvium (2), Sandstone, shale, and gravel deposits (1), Large landslides (1)

**Marin County Watersheds:** Novato (3)

**Other Watersheds, San Mateo Co.:** Pescadero Creek (2), San Mateo Coastal (1); **Sonoma Co.:** Sonoma Creek (1)

### Site Impacts

This association has significantly greater cover of exotics (average 92.8%) than natives. Non-native species that occur with highest frequency and abundance include *Anagallis arvensis*, *Anthemis cotula*, *Avena* spp., *Bellardia trixago*, *Brachypodium distachyon*, *Briza minor*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Centaureum tenuiflorum*, *Cirsium vulgare*, *Convolvulus arvensis*, *Gastrium phleoides*, *Geranium dissectum*, *Hordeum marinum*, *Lactuca saligna*, *Linum usitatissimum*, *Lolium perenne*, *Lotus corniculatus*, *Medicago* spp., *Melilotus* spp., *Mentha pulegium*, *Phalaris aquatica*, *Picris echioides*, *Plantago lanceolata*, *Polypogon monspeliensis*, *Rumex acetosella*, *Taraxacum officinale*, *Trifolium angustifolium*, *Trifolium dubium*, *Vicia sativa*, and *Vulpia bromoides*.

### Classification Comments

Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** Keeler-Wolf and Vaghti 2000, Pickart 2006, Boul et al. 2021

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

**State Rare:** N

### Surveys Used for Description

**Total: N=7; Marin County (n=3):** HEAD0134, MARIN403, MARIN405

San Mateo County (n=3): PONU023, TOKA041, TOKA068

Sonoma County (n=1): HEAD0350

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>	<i>Baccharis pilularis</i>	29	26.2	1.0	2.0	5.0				
<b>Herb</b>	<b><i>Lolium perenne</i></b>	<b>100</b>	<b>33.7</b>	<b>37.4</b>	<b>0.2</b>	<b>95.0</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<b><i>Lotus corniculatus</i></b>	<b>100</b>	<b>17.8</b>	<b>21.6</b>	<b>5.7</b>	<b>85.0</b>	<b>X</b>			<b>X</b>
	<i>Hordeum marinum</i>	71	1.6	1.3	0.2	8.0				<b>X</b>
	<i>Brachypodium distachyon</i>	57	3.7	3.7	0.2	11.0				<b>X</b>
	<i>Bromus hordeaceus</i>	57	2.4	2.3	0.2	7.9				<b>X</b>
	<i>Phalaris aquatica</i>	57	1.1	1.1	0.2	6.6				<b>X</b>
	<i>Medicago</i> spp.	57	0.7	0.7	0.2	2.9				<b>X</b>
	<i>Hordeum brachyantherum</i>	57	0.2	0.2	0.2	1.0				<b>X</b>
	<i>Plantago lanceolata</i>	43	4.8	4.7	5.2	15.7				
	<i>Rumex crispus</i>	43	3.4	2.7	0.2	18.0				
	<i>Lactuca serriola</i>	43	1.4	1.7	0.2	7.0				
	<i>Briza minor</i>	43	0.6	0.6	0.9	1.8				
	<i>Anthemis cotula</i>	43	0.6	0.5	0.2	3.0				
	<i>Polypogon monspeliensis</i>	43	0.6	0.5	0.2	3.0				
	<i>Carduus pycnocephalus</i>	43	0.4	0.4	0.2	2.2				
	<i>Anagallis arvensis</i>	43	0.3	0.3	0.2	1.7				
	<i>Sisyrinchium bellum</i>	43	0.1	0.1	0.2	0.4				
	<i>Bellardia trixago</i>	43	0.1	0.1	0.2	0.2				
	<i>Symphotrichum chilense</i>	43	0.1	0.1	0.2	0.2				
	<i>Trifolium dubium</i>	43	0.1	0.1	0.2	0.2				
	<i>Picris echioides</i>	29	7.0	5.5	0.2	38.0				
	<i>Vulpia bromoides</i>	29	4.1	4.1	11.4	17.3				
	<i>Linum usitatissimum</i>	29	2.3	2.3	6.6	9.8				
	<i>Avena</i> spp.	29	0.9	0.9	0.2	6.2				
	<i>Trifolium</i> spp.	29	0.5	0.5	0.2	3.3				
	<i>Mentha pulegium</i>	29	0.6	0.5	0.2	3.0				
	<i>Madia sativa</i>	29	0.4	0.4	1.3	1.3				
	<i>Rumex acetosella</i>	29	0.3	0.3	0.2	1.9				
	<i>Gastrium phleoides</i>	29	0.3	0.3	0.5	1.3				
	<i>Taraxacum officinale</i>	29	0.2	0.2	0.2	1.3				
	<i>Bromus diandrus</i>	29	0.2	0.2	0.4	1.0				
	<i>Vicia</i> spp.	29	0.2	0.2	0.5	0.9				
	<i>Centaurium tenuiflorum</i>	29	0.2	0.2	0.2	0.9				
	<i>Geranium dissectum</i>	29	0.2	0.2	0.2	0.9				
	<i>Trifolium angustifolium</i>	29	0.1	0.1	0.2	0.5				

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## Mesembryanthemum spp. – Carpobrotus spp. Herbaceous Semi-Natural Alliance

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**Common Name:** Ice plant mats

**NVC Alliance Code:** A1620. Mesembryanthemum spp. - Carpobrotus spp. Ruderal Grassland Alliance

### **Statewide Description**

*Carpobrotus chilensis*, *C. edulis*, *Mesembryanthemum*, or other ice plant taxa are dominant in the herbaceous layer. At least eight invasive ice plant taxa grow in California: *Aptenia cordifolia*, *Carpobrotus edulis*, *C. chilensis*, *Conicosia pugioniformis*, *Drosanthemum floribundum*, *Malephora crocea*, *Mesembryanthemum crystallinum*, and *M. nodiflorum*.

*Carpobrotus edulis* is a ground-hugging succulent perennial that forms impenetrable mats covering large areas. This ice plant has been widely planted for soil stabilization and landscaping. The success of *C. edulis* is due particularly to its tolerance of a wide range of soil moisture and nutrient conditions, and to its dispersal by mammals (D'Antonio 1993). This species is often confused with *C. chilensis*, a smaller, less aggressive ice plant with magenta flowers. The two species hybridize, and the hybrids are invasive as well.

*Aptenia cordifolia* grows in disturbed places and on the margins of coastal wetlands (Kitz 2000a).

*Conicosia pugioniformis*, a short-lived succulent, has narrow leaves and does not form clonal mats. It is most abundant in open patches on dunes and in recently disturbed areas (Albert and D'Antonio 2000). The uncommon *Drosanthemum floribundum* is a mat-forming shrub. *Malephora crocea* is a prostrate shrub with linear leaves, common in coastal southern California (DiTomaso and Healy 2007).

*Mesembryanthemum crystallinum* and *M. nodiflorum* invade coastal bluffs and interior alkaline wetlands in southern California (Randall 2000).

### Local Vegetation Description

The Ice plant mats Alliance forms a continuous herbaceous layer. The shrub layer is open and the tree layer is absent. The dominant herb is *Carpobrotus edulis*. Herbs that are sometimes present include *Achillea millefolium*, *Ammophila arenaria*, *Artemisia pycnocephala*, *Bromus diandrus*, and *Grindelia stricta*. Commonly associated emergent shrubs at open cover include *Lupinus arboreus* and *Baccharis pilularis*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	7.6	0 – 14	0.5	0 – 2
Herb	90.9	75 – 99	0.3	0 – 0.5

### Local Membership Rule

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

### Local Environmental Description

**Elevation:** Mean 32 m, Range 5 – 55 m

**Aspect:** no data

**Slope:** no data

**Macro Topography:** no data

**Large Rock:** no data

**Small Rock:** no data

**Fines Cover:** no data

**Litter Cover:** no data

**Soil Texture (field assessed):** no data

**Geology (field or map data):** Sandstone and other sedimentary (5), Sandstone, shale, and conglomerate (1), Marine and nonmarine sand deposits (1)

**Marin County Watersheds:** Point Reyes (5), Bolinas (2)

### Site Impacts

This alliance has greater cover of exotics than natives, non-native plant cover (average 83.3%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Ammophila arenaria*, *Bromus diandrus*, and *Carpobrotus edulis*.

### Associations in Marin County

*Carpobrotus (edulis)*

### Classification Comments

Because these surveys are Accuracy Assessments, environmental attributes were not recorded.

**References:** HDR 2014b, Keeler-Wolf and Evens 2006, Klein et al. 2015, Verdone and Evens 2010

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

### Surveys Used for Description

**Total: N=8; Marin County (n=8):** PGA10645, PGA1470, PGA1471, PGA1473, PGA1482, PGA1734, PGA380A, PGA500

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Lupinus arboreus</i>	75	41.3	3.3	0.2	10.0	X		X	X
	<i>Baccharis pilularis</i>	63	38.8	3.3	0.2	10.0				X
	<i>Rubus ursinus</i>	25	2.0	0.3	0.2	2.0				
<b>Herb</b>										
	<b><i>Carpobrotus edulis</i></b>	<b>100</b>	<b>81.1</b>	<b>75.0</b>	<b>60.0</b>	<b>99.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Ammophila arenaria</i>	25	3.9	3.3	3.0	23.0				
	<i>Grindelia stricta</i>	25	1.9	1.6	3.0	10.0				
	<i>Bromus diandrus</i>	25	1.1	1.3	0.2	10.0				
	<i>Achillea millefolium</i>	25	1.1	1.0	0.2	8.0				
	<i>Artemisia pycnocephala</i>	25	1.2	1.0	3.0	5.0				

***Carpobrotus (edulis)* Semi-natural Association**

**Common Name:** Iceplant Mats

**Alliance:** *Mesembryanthemum* spp. – *Carpobrotus* spp. Herbaceous Semi-Natural Alliance

**Classification Comments**

The association circumscription is the same as that of the alliance. See above for detailed description. Because these surveys are Accuracy Assessments, environmental attributes were not recorded.

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

**State Rare:** N



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## *Mimulus (guttatus)* Herbaceous Alliance

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**Common Name:** Common monkey flower seeps

**NVC Alliance Code:** N/A.

### **Statewide Description**

*Mimulus guttatus* or other native wetland seep and spring plants such as *Cirsium* and *Mimulus* species is dominant or characteristically present in the herbaceous layer with *Bromus diandrus*, *Bromus hordeaceus*, *Carex* spp., *Equisetum arvense*, *Juncus* spp., *Lactuca serriola*, *Lotus purshianus*, *Melilotus indicus*, *Pentagramma triangularis*, *Rumex crispus*, *Sonchus asper*, *Stachys albens*, *Trifolium microcephalum*, *Triteleia hyacinthina*, and *Vulpia microstachys*. Emergent shrubs may be present at low cover, including *Baccharis salicifolia* or *Ceanothus cuneatus*.

The *Mimulus (guttatus)* Alliance often forms stands within the splash zone of small first-order streams, seeps, springs, and hanging gardens. Stands often occur as small patches or in narrow linear strips, occasionally broadening into small hollows. Some stands are found on very steep cascades and waterfalls, or along gentle streams. The floristic composition of stands is variable. This alliance is currently being redefined where lower elevation wet spring and seep stands with *Mimulus guttatus* or other diagnostic forbs are being included in one alliance, while mid to upper elevation seep, wet meadow and riparian stream stands with *M. guttatus*, *M. lewisii*, *M. moschatus*, or *M. pilosus* characteristically present will be defined in other alliances. Stands sometimes occur in mesic upland areas that quickly dry by mid to late spring; they are not usually on flats or in swales, unlike stands of the vernal pool alliances.

### **Local Vegetation Description**

The Common monkey flower seeps Alliance forms an intermittent to open herbaceous layer. The shrub layer is sparse and the tree layer is absent. Dominant herbs include *Mimulus guttatus*. Those herbs often



present include *Juncus bufonius* and *Lolium perenne*, and herbs that are sometimes present include *Angelica hendersonii*, *Cakile maritima*, *Cotula coronopifolia*, *Elymus multisetus*, *Epilobium ciliatum*, *Erigeron glaucus*, *Eriophyllum stoechadifolium*, *Eschscholzia californica*, *Hemizonia congesta*, *Hordeum marinum*, *Juncus occidentalis*, *Juncus phaeocephalus*, *Lactuca saligna*, *Lactuca serriola*, *Lotus humistratus*, *Montia fontana*, *Plantago erecta*, *Plantago maritima*, *Plantago* spp., *Pleuropogon californicus*, *Poa secunda*, *Polypogon monspeliensis*, *Pseudognaphalium stramineum*, *Ranunculus californicus*, *Raphanus sativus*, *Rumex salicifolius*, *Scribneria bolanderi*, *Sonchus asper*, *Trifolium bifidum*, *Trifolium microdon*, and *Trifolium variegatum*. Commonly associated non-vascular plants include Moss.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.3	0 – 1	0.8	0.5 – 1
Herb	61.3	45 – 80	0.3	0 – 0.5

### **Local Membership Rule**

*Mimulus guttatus* or another wetland *Mimulus* species dominates or co-dominates in the herbaceous layer with *Cirsium* and *Juncus* spp. or non-native grasses such as *Lolium perenne* and *Polypogon monspeliensis*. Stands are found in moist or saturated settings along streams, ephemeral cascades, ditches, fens, seeps, and springs often with high cover of moss.

### **Local Environmental Description**

**Elevation:** Mean 164 m, Range 17 – 333 m

**Aspect:** SW (3), NW (1)

**Slope:** Mean 29 degrees, Range 6 – 60 degrees

**Macro Topography:** Middle 1/3 of slope (3), Lower 1/3 of slope (1)

**Large Rock:** Mean 15.5%, Range 0.0 – 62.0%

**Small Rock:** Mean 7.1%, Range 0.0 – 18.0%

**Fines Cover:** Mean 50.3%, Range 8.0 – 97.0%

**Litter Cover:** Mean 25.5%, Range 1.0 – 90%

**Soil Texture (field assessed):** Coarse, loamy sand (1), Medium silt (1)

**Geology (field or map data):** Granitic (generic) (1), Serpentine (1), Ultramafic (type unknown) (1), Franciscan melange (1)

**Marin County Watersheds:** Petaluma River (1)

**Other Watersheds, San Mateo Co.:** Pacifica (1); **Sonoma Co.:** Lower Russian River (1), Middle Russian River (1)

### **Site Impacts**

This alliance has moderate non-native plant cover (average 32.3%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Cakile maritima*, *Cotula coronopifolia*, *Hordeum marinum*, *Lactuca saligna*, *Lactuca serriola*, *Polypogon monspeliensis*, *Raphanus sativus*, and *Sonchus asper*.

### **Associations in Marin County**

*Mimulus guttatus*

### **Classification Comments**

The description for the above association is identical to the alliance description, and is therefore not included. Since Marin County has fewer than five surveys of this alliance, data from nearby counties were included.

**References:** Cooper and Wolf 2006, Evens and San 2004, Klein et al. 2015, VegCAMP 2015a

**Global Rarity Rank:** G4?

**State Rarity Rank:** S3?

**Surveys Used for Description**

**Total: N=4; Marin County (n=1):** MARIN236

San Mateo County (n=1): SMAT0271

Sonoma County (n=2): SONO0347, SONO2204

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Herb	<i>Mimulus guttatus</i>	100	50.4	32.5	15.0	50.0	X	X		X
	<i>Lolium perenne</i>	50	22.6	15.8	18.0	45.0				X
	<i>Juncus bufonius</i>	50	4.3	3.8	0.2	15.0				X
	<i>Polypogon monspeliensis</i>	25	7.9	5.0	20.0	20.0				
	<i>Angelica hendersonii</i>	25	4.0	2.5	10.0	10.0				
	<i>Epilobium ciliatum</i>	25	1.6	1.0	4.0	4.0				
	<i>Erigeron glaucus</i>	25	1.6	1.0	4.0	4.0				
	Forb (herbaceous, not grass nor grasslike)	25	0.9	0.8	3.0	3.0				
	<i>Raphanus sativus</i>	25	0.8	0.5	2.0	2.0				
	<i>Lactuca serriola</i>	25	0.6	0.5	2.0	2.0				
	<i>Lotus humistratus</i>	25	1.0	0.5	2.0	2.0				
	<i>Ranunculus californicus</i>	25	0.4	0.3	1.0	1.0				
	<i>Eriophyllum stoechadifolium</i>	25	0.4	0.3	1.0	1.0				
	<i>Plantago maritima</i>	25	0.4	0.3	1.0	1.0				
	<i>Elymus multisetus</i>	25	0.5	0.3	1.0	1.0				
	<i>Scribneria bolanderi</i>	25	0.5	0.3	1.0	1.0				
	<i>Plantago erecta</i>	25	0.5	0.3	1.0	1.0				
	<i>Juncus occidentalis</i>	25	0.4	0.3	1.0	1.0				
	<i>Eschscholzia californica</i>	25	0.1	0.1	0.2	0.2				
	<i>Trifolium microdon</i>	25	0.1	0.1	0.2	0.2				
	<i>Pseudognaphalium stramineum</i>	25	0.1	0.1	0.2	0.2				
	<i>Juncus phaeocephalus</i>	25	0.1	0.1	0.2	0.2				
	<i>Hordeum marinum</i>	25	0.1	0.1	0.2	0.2				
	<i>Hemizonia congesta</i>	25	0.1	0.1	0.2	0.2				
	<i>Montia fontana</i>	25	0.1	0.1	0.2	0.2				
	<i>Plantago</i> spp.	25	0.1	0.1	0.2	0.2				
	<i>Pleuropogon californicus</i>	25	0.1	0.1	0.2	0.2				
	<i>Poa secunda</i>	25	0.1	0.1	0.2	0.2				

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<i>Lactuca saligna</i>	25	0.1	0.1	0.2	0.2				
	<i>Cotula coronopifolia</i>	25	0.1	0.1	0.2	0.2				
	<i>Cakile maritima</i>	25	0.1	0.1	0.2	0.2				
	<i>Rumex salicifolius</i>	25	0.1	0.1	0.2	0.2				
	<i>Trifolium bifidum</i>	25	0.1	0.1	0.2	0.2				
	<i>Trifolium variegatum</i>	25	0.1	0.1	0.2	0.2				
	<i>Sonchus asper</i>	25	0.1	0.1	0.2	0.2				
<b>Non-vascular</b>										
	Moss	50	37.5	8.8	0.2	35.0				X
	Lichen	25	12.5	0.1	0.2	0.2				

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### ***Mimulus guttatus* Association**

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**Common Name:** Yellow Monkeyflower Seeps

**Alliance:** *Mimulus (guttatus)* Herbaceous Alliance

**Classification Comments**

The association circumscription is the same as that of the alliance. See above for detailed description. Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

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## **Nassella spp. – Melica spp. Herbaceous Alliance**

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**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 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 Co., northward across the Coast Ranges to Sonoma Co. (Bartolome et al. 2007a), and coastal stands tend to have more emergent shrubs, suggesting seral and/or dynamic relationships with woody vegetation types (Tyler et al. 2007). *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).

In southern California, *Nassella lepida* is a common understory herb on dry, fine-textured soils in stands of the *Artemisia californica* and *Salvia leucophylla* Alliances. In some areas, such as the Santa Monica Mountains, small (< 1 ha) glades dominated by this species occur with a diverse mixture of native plants.

*Melica californica* has a broad elevation range from near sea level on the North and Central Coast to over 1500 m elevation in the Coast Ranges, Klamath Mountains, and the Sierra Nevada. Stands are best described from Sonoma and Napa Cos. where they tend to occur on more mesic slopes than stands dominated by *Nassella pulchra*. *M. californica* often forms small stands in openings in woodlands of *Quercus agrifolia*, *douglasii*, *garryana*, *lobata*, and *wislizeni*. It is tolerant of serpentine soils and may grow in relatively deep or shallow soils.

*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.

*Melica imperfecta* and *M. stricta* have not been observed to form stands; both tend to occur in drier, rockier areas and are often components of other alliances.

### **Local Vegetation Description**

The Needle grass - Melic grass grassland Alliance forms a sparse to continuous herbaceous layer. The shrub layer is sparse and the tree layer is sparse. Characteristic herbs include *Nassella pulchra*, *Melica californica*, *Melica torreyana* and *Elymus multisetus*. Those herbs often present include *Avena* spp., *Bromus hordeaceus*, *Chlorogalum pomeridianum*, and *Lolium perenne*, and herbs that are sometimes present include *Achillea millefolium*, *Aira caryophylla*, *Anagallis arvensis*, *Brachypodium distachyon*, *Briza maxima*, *Bromus diandrus*, *Carduus pycnocephalus*, *Cynosurus echinatus*, *Danthonia californica*, *Daucus pusillus*, *Eriogonum nudum*, *Erodium botrys*, *Eschscholzia californica*, *Hemizonia congesta*, *Hypochaeris glabra*, *Lotus wrangelianus*, *Plantago erecta*, *Sanicula bipinnatifida*, *Sisyrinchium bellum*, and *Triteleia laxa*. Commonly associated emergent shrubs at sparse cover include *Baccharis pilularis*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 1	3.5	2 – 5
Hardwood	0.1	0 – 2	12.5	10 – 15
Regenerating or Shrubby Tree	0.0	0 – 0	3.5	2 – 5
Shrub	0.9	0 – 10	1.3	0 – 5
Herb	61.9	1 – 99	0.3	0 – 2

### **Local Membership Rule**

*Melica californica*, *M. torreyana*, and/or *Nassella pulchra* are dominant, co-dominant or characteristic in stands. *Avena*, *Bromus*, *Hemizonia congesta*, *Lolium perenne*, *Plantago erecta*, *P. lanceolata*, and/or *Trifolium* spp. intermix as dominant, co-dominant or characteristic taxa in associations of this alliance. Sometimes *Elymus multisetus* dominates with a similar mix of native and non-native plants as *Nassella pulchra* on serpentine and Franciscan mélange substrates, and is now included in this alliance. If *Danthonia californica* or *Festuca idahoensis* is co-dominant or characteristic with *Nassella pulchra*, then key to the *Festuca idahoensis* – *Danthonia* alliance.

### **Local Environmental Description**

**Elevation:** Mean 196 m, Range 36 – 600 m

**Aspect:** SW (32), SE (29), NE (20), NW (17), E (2), Flat (2), Not recorded (2), S (1)

**Slope:** Mean 17 degrees, Range 0 – 42 degrees

**Macro Topography:** Upper 1/3 of slope (45), Middle 1/3 of slope (32), Lower 1/3 of slope (16), Middle to Upper 1/3 of slope (3), Upper 1/3 of slope to Ridgetop (2), Not recorded (2), Ridge top (2), Lower to Middle 1/3 of slope (1)

**Large Rock:** Mean 7.9%, Range 0.0 – 50.0%

**Small Rock:** Mean 9.8%, Range 0.0 – 70.0%

**Fines Cover:** Mean 12.8%, Range 0.0 – 92.0%

**Litter Cover:** Mean 57.1%, Range 0.0 – 96%

**Soil Texture (field assessed):** Not recorded (18), Moderately fine clay loam (14), Moderately fine sandy clay loam (10), Medium to very fine, sandy loam (8), Moderately coarse, sandy loam (8), Medium silt (7), Moderately fine silty clay loam (7), Fine clay (7), Fine sandy clay (6), Medium loam (5), Unknown (4), Coarse, loamy sand (4), Fine silty clay (2), Medium silt loam (2), Medium to very fine, loamy sand (1)

**Geology (field or map data):** Franciscan melange (58), Blueschist and semi-schist (12), Ultramafic rocks, mostly serpentine (12), Large landslides (11), Serpentine (7), Sandstone and other sedimentary (6), Volcanic and metavolcanic rocks (3), Ultramafic (type unknown) (2), Siltstone (1), Granitic (1), Chert (1), Greenstone (1)

**Marin County Watersheds:** San Rafael (51), Novato (24), Lagunitas Creek (21), Bolinas (10), Walker Creek (8), Petaluma River (2), Inverness (1)

### **Site Impacts**

This alliance has greater cover of exotics than natives, often with moderate to high non-native plant cover (average 50.2%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*, *Anagallis arvensis*, *Brachypodium distachyon*, *Briza maxima*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Cynosurus echinatus*, *Erodium botrys*, and *Hypochaeris glabra*.

### **Associations in Marin County**

*Elymus multisetus* – (*Eschscholzia californica* – *Plantago erecta*)

*Melica californica*

*Melica torreyana*

*Nassella pulchra*

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

*Nassella pulchra* – *Hemizonia congesta*

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

*Nassella pulchra* – *Lolium perenne* – *Plantago erecta* *Serpentine*

### **Classification Comments**

None.

**References:** AECOM 2013, Buck and Evens 2010, Buck-Diaz and Evens 2011b, Buck-Diaz et al. 2011, Buck-Diaz et al. 2012, Buck-Diaz et al. 2013, Buck-Diaz et al. 2019, Evens and Kentner 2006, Evens and San 2004, Fiedler and Leidy 1987, Junak et al. 2007, Keeler-Wolf and Evens 2006, Klein et al. 2007, Klein et al. 2015, Parker 1990b, Rodriguez et al. 2017, Sproul et al. 2011, VegCAMP 2014, Verdone and Evens 2010

**Global Rarity Rank:** G3G4

**State Rarity Rank:** S3S4

### **Surveys Used for Description**

**Total: N=120; Marin County (n=120):** GGNRA281, GGNRA304, HEAD0035, HEAD0039, HEAD0041, HEAD0042, HEAD0043, HEAD0044, HEAD0046, HEAD0067, HEAD0083, HEAD0085, HEAD0127, HEAD0137, HEAD0145, HEAD0148, HEAD0168, HEAD0181, HEAD0230, HEAD0235, HEAD0236, HEAD0237, HEAD0239, HEAD0242, HEAD0263, HEAD0277, HEAD0369, HEAD0370, MARIN220, MARIN244, MARIN257, MARIN285, MARIN301, MMWD0007, MMWD0010, MMWD0018, MMWD0027, MMWD0028, MMWD0030, MMWD0031, MMWD0041, MMWD0046, MMWD0077, MMWD0083, MMWD0090, MMWD0376, MMWD0378, MMWD0603, MMWD0606, MMWD0607, MMWD0610, MMWD0611, MMWD0614, MMWD0615, MMWD0616, MMWD0617, MOSD0075, MOSD0076, MOSD0081, MOSD0156, MOSD0191, MOSD0253, MOSD0256, MOSD0257, MOSD0258, MOSD0263, MOSD0265, MOSD0271, MOSD0272, MOSD0273, MOSD0276, MOSD0288, MOSD0290, MOSD0292, MOSD0295, MOSD0321, MOSD0322, MOSD0323, MOSD0325, MOSD0327, MOSD0329, MOSD0332, MOSD0336, MOSD0337, MOSD0338, MOSD0340, MOSD0341, MOSD0345,

MOSD0346, MOSD0347, MOSD0375, MOSD0377, MOSD0379, MOSD0381, MOSD0382, MOSD0396, MOSD0398, MOSD0399, MTBP005, OSH01, OSH04, PGA1707, PGA46, PGA541, PGA546, PGA552, PGA573, PORE207, RIMO001, RIMO002, RIMO004, RIMO005, RIMO010, TAMG008C, TAMG021M, TAMG024M, TAMG025M, TAMG027M, TAMG029M, TAMG033M

### Alliance Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>	<i>Baccharis pilularis</i>	22	18.2	0.6	0.2	10.0				
<b>Herb</b>	<b><i>Nassella pulchra</i></b>	<b>93</b>	<b>18.0</b>	<b>14.3</b>	<b>0.2</b>	<b>68.0</b>	<b>X</b>			<b>X</b>
	<i>Avena</i> spp.	70	9.0	7.0	0.2	88.0				<b>X</b>
	<i>Lolium perenne</i>	69	13.2	10.0	0.2	68.0				<b>X</b>
	<i>Bromus hordeaceus</i>	52	4.0	2.5	0.2	27.0				<b>X</b>
	<i>Chlorogalum pomeridianum</i>	52	1.8	1.2	0.2	20.0				<b>X</b>
	<i>Eschscholzia californica</i>	48	0.8	0.5	0.2	8.0				
	<i>Achillea millefolium</i>	41	0.8	0.5	0.2	15.0				
	<i>Plantago erecta</i>	40	1.4	0.7	0.2	10.0				
	<i>Sisyrinchium bellum</i>	38	0.5	0.2	0.1	10.0				
	<b><i>Melica californica</i></b>	<b>38</b>	<b>2.6</b>	<b>2.0</b>	<b>0.2</b>	<b>30.0</b>				
	<i>Bromus diandrus</i>	37	2.5	2.2	0.2	57.0				
	<i>Brachypodium distachyon</i>	35	5.5	4.4	0.2	60.0				
	<i>Briza maxima</i>	35	4.2	3.1	0.2	40.0				
	<i>Hemizonia congesta</i>	34	2.4	2.4	0.1	38.0				
	<i>Danthonia californica</i>	33	0.9	0.8	0.2	20.0				
	<i>Carduus pycnocephalus</i>	29	0.6	0.6	0.2	38.0				
	<i>Anagallis arvensis</i>	29	0.4	0.3	0.2	30.0				
	<i>Hypochaeris glabra</i>	28	0.6	0.6	0.1	20.0				
	<i>Aira caryophyllea</i>	28	0.3	0.2	0.2	8.0				
	<i>Lotus wrangelianus</i>	26	0.2	0.2	0.2	8.0				
	<i>Elymus multisetus</i>	25	0.7	0.4	0.2	8.0				
	<i>Daucus pusillus</i>	24	0.2	0.1	0.2	4.0				
	<i>Eriogonum nudum</i>	23	0.6	0.2	0.2	8.0				
	<i>Sanicula bipinnatifida</i>	23	0.1	0.1	0.2	1.0				
	<i>Triteleia laxa</i>	23	0.1	0.1	0.1	3.0				
	<i>Erodium botrys</i>	22	2.2	1.7	0.2	40.0				
	<i>Cynosurus echinatus</i>	20	0.9	1.0	0.2	35.0				



***Elymus multisetus* – (*Eschscholzia californica* – *Plantago erecta*) Association**

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**Common Name:** Big Squirreltail Grass Grassland

**Alliance:** *Nassella* spp. – *Melica* spp. Herbaceous Alliance

**Local Vegetation Description**

The Big Squirreltail Grass Association forms an open to continuous herbaceous layer. The shrub layer is sparse and the tree layer is absent. *Elymus multisetus* is characteristic to co-dominant while those herbs often present include *Avena* spp., *Bromus hordeaceus*, *Chlorogalum pomeridianum*, *Dichelostemma capitatum*, *Eschscholzia californica*, *Lasthenia californica*, *Lolium perenne*, *Lotus humistratus*, *Minuartia douglasii*, and *Plantago erecta*. Herbs that are sometimes present include *Ancistrocarphus filagineus*, *Calandrinia ciliata*, *Croton setigerus*, *Eriogonum luteolum*, *Eriogonum nudum*, *Gilia tricolor*, *Melica californica*, *Nassella pulchra*, *Rumex acetosella*, *Sisyrinchium bellum*, *Trifolium albopurpureum*, *Vulpia bromoides*, and *Vulpia microstachys*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.1	0.0 – 1	0.3	0 – 0.5
Herb	32.5	5 – 80	0.3	0 – 1

**Local Environmental Description**

**Elevation:** Mean 347 m, Range 108 – 760 m

**Aspect:** SW (9), SE (3), NE (2), NW (2)

**Slope:** Mean 17 degrees, Range 4 – 36 degrees

**Macro Topography:** Upper 1/3 of slope (6), Middle 1/3 of slope (4), Middle to Upper 1/3 of slope (2), Ridge top (2)

**Large Rock:** Mean 11.2%, Range 0.0 – 48.0%

**Small Rock:** Mean 32.4%, Range 0.0 – 69.0%

**Fines Cover:** Mean 24.9%, Range 0.2 – 72.0%

**Litter Cover:** Mean 22.8%, Range 0.2 – 93%

**Soil Texture (field assessed):** Moderately fine clay loam (3), Moderately fine sandy clay loam (2), Moderately coarse, sandy loam (1), Not recorded (1), Medium silt loam (1)

**Geology (field or map data):** Serpentine (9), Sandstone and other sedimentary (2), Franciscan melange (2), Sandstone (1), Ultramafic rocks, mostly serpentine (1), Large landslides (1)

**Marin County Watersheds:** Novato (2)

**Other Watersheds, San Mateo Co.:** Pescadero Creek (2), San Mateo Bayside (1); **Sonoma Co.:** Middle Russian River (8), Lower Russian River (3)

**Site Impacts**

This association has moderate non-native plant cover (average 23.5%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Avena* spp., *Bromus hordeaceus*, *Lolium perenne*, *Rumex acetosella*, and *Vulpia bromoides*.



**Classification Comments**

This association was originally placed in the *Elymus (elymoides, multisetus)* Alliance. However, its similarity to serpentinite stands of *Nassella pulchra* suggests that it is better placed in this alliance. Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** Evens and San 2004, Evens et al. 2006, Klein et al. 2015

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

**Total: N=16; Marin County (n=2):** HEAD0046, MARIN285

San Mateo County (n=3): CORT036, CORT070, SMAT0262

Sonoma County (n=11): MILO009, SONO0224, SONO0350, SONO0351, SONO0357, SONO0535, SONO0542, SONO0923, SONO0926, SONO0934, SONO2206

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Herb</b>										
	<i>Elymus multisetus</i>	81	23.9	10.8	2.0	43.0	X			X
	<i>Bromus hordeaceus</i>	69	4.9	3.4	0.2	20.0				X
	<i>Avena</i> spp.	69	3.6	1.8	0.2	12.0				X
	<i>Eschscholzia californica</i>	69	4.0	1.6	0.2	10.0				X
	<i>Plantago erecta</i>	56	2.6	1.6	0.2	13.0				X
	<i>Lotus humistratus</i>	56	2.3	0.4	0.2	2.0				X
	<i>Dichelostemma capitatum</i>	56	0.6	0.2	0.2	1.0				X
	<i>Lolium perenne</i>	50	2.9	3.2	0.2	27.0				X
	<i>Lasthenia californica</i>	50	1.7	1.6	0.2	15.0				X
	<i>Chlorogalum pomeridianum</i>	50	1.6	0.5	0.2	3.0				X
	<i>Minuartia douglasii</i>	50	1.2	0.4	0.2	4.0				X
	<i>Nassella pulchra</i>	44	1.2	1.3	0.2	15.0				
	<i>Vulpia microstachys</i>	44	1.3	0.6	0.2	5.0				
	<i>Sisyrinchium bellum</i>	38	1.0	0.4	0.2	5.0				
	<i>Vulpia bromoides</i>	31	4.3	4.0	0.2	34.0				
	<i>Eriogonum nudum</i>	31	2.4	1.0	0.2	15.0				
	<i>Ancistrocarphus filagineus</i>	31	0.3	0.1	0.2	0.2				
	<i>Rumex acetosella</i>	25	0.5	0.4	0.2	5.0				
	<i>Eriogonum luteolum</i>	25	1.5	0.3	0.2	2.0				
	<i>Gilia tricolor</i>	25	0.8	0.2	0.2	3.0				
	<i>Melica californica</i>	25	0.5	0.1	0.2	1.0				
	<i>Trifolium albopurpureum</i>	25	0.3	0.1	0.2	1.0				
	<i>Calandrinia ciliata</i>	25	0.2	0.1	0.2	0.2				
	<i>Croton setigerus</i>	25	0.2	0.1	0.2	0.2				
<b>Non-vascular</b>										
	Moss	38	34.4	0.6	0.2	5.0				

## ***Melica californica* Association**

**Common Name:** California Melicgrass Grassland

**Alliance:** *Nassella* spp. – *Melica* spp. Herbaceous Alliance

### **Local Vegetation Description**

The California Melicgrass Association forms an open to continuous herbaceous layer. The shrub layer is sparse and the tree layer is sparse. *Avena* spp., *Melica californica*, and *Nassella pulchra* are characteristic to co-dominant herbs while those herbs often present include *Briza maxima*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Chlorogalum pomeridianum*, *Eschscholzia californica*, and *Lolium perenne*. Herbs that are sometimes present include *Achillea millefolium*, *Aira caryophylllea*, *Anagallis arvensis*, *Brachypodium distachyon*, *Bromus carinatus*, *Cynosurus echinatus*, *Elymus glaucus*, *Elymus multisetus*, *Eriogonum nudum*, *Erodium botrys*, *Galium aparine*, *Hypochaeris glabra*, *Lupinus bicolor*, *Plantago erecta*, *Pteridium aquilinum*, *Sanicula bipinnatifida*, and *Sidalcea malviflora*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.1	0 – 2	12.5	10 – 15
Regenerating or Shrubby Tree	0.0	0.0 – 0.5	3.5	2 – 5
Shrub	0.9	0.0 – 7	1.3	0.5 – 2
Herb	66.7	26 – 98	0.3	0 – 1

### **Local Environmental Description**

**Elevation:** Mean 236 m, Range 42 – 531 m

**Aspect:** SW (7), NE (6), NW (6), SE (3), S (1), Flat (1)

**Slope:** Mean 19 degrees, Range 0 – 34 degrees

**Macro Topography:** Upper 1/3 of slope (10), Middle 1/3 of slope (6), Lower 1/3 of slope (5), Ridge top (2), Upper 1/3 of slope to Ridgetop (1)

**Large Rock:** Mean 2.8%, Range 0.0 – 20.0%

**Small Rock:** Mean 3.2%, Range 0.0 – 15.2%

**Fines Cover:** Mean 11.8%, Range 0.0 – 41.0%

**Litter Cover:** Mean 51.4%, Range 0.0 – 95%

**Soil Texture (field assessed):** Medium to very fine, sandy loam (5), Moderately fine clay loam (4), Not recorded (4), Medium loam (3), Moderately coarse, sandy loam (2), Fine clay (2), Moderately fine silty clay loam (2), Medium silt (1), Unknown (1)

**Geology (field or map data):** Franciscan melange (20), Volcanic and metavolcanic rocks (3), Blueschist and semi-schist (2), Ultramafic rocks, mostly serpentine (1), Chert (1), Ultramafic (type unknown) (1), Sandstone and other sedimentary (1)

**Marin County Watersheds:** San Rafael (11), Lagunitas Creek (7), Bolinas (5), Novato (5), Walker Creek (1)

### **Site Impacts**

This association has high non-native plant cover (average 62.1%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Aira caryophylllea*, *Anagallis arvensis*, *Avena* spp., *Brachypodium distachyon*, *Briza maxima*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Cynosurus echinatus*, *Erodium botrys*, *Hypochaeris glabra*, and *Lolium perenne*.

### Classification Comments

None.

**References:** Klein et al. 2015, VegCAMP 2014

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

### Surveys Used for Description

**Total: N=30; Marin County (n=30):** GGNRA281, GGNRA304, HEAD0148, HEAD0168, MARIN220, MARIN301, MMWD0007, MMWD0010, MMWD0018, MMWD0028, MMWD0030, MMWD0031, MMWD0046, MMWD0378, MMWD0607, MMWD0614, MMWD0615, MMWD0617, MOSD0156, MOSD0288, MOSD0329, MOSD0341, MOSD0347, MOSD0375, MOSD0377, MOSD0399, OSH01, PGA546, PGA573, TAMG029M

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	30	20.6	0.5	0.2	5.0				
<b>Herb</b>										
	<b><i>Melica californica</i></b>	<b>100</b>	<b>9.5</b>	<b>7.4</b>	<b>0.2</b>	<b>30.0</b>	<b>X</b>			<b>X</b>
	<i>Nassella pulchra</i>	93	11.2	8.1	0.2	25.0	<b>X</b>			<b>X</b>
	<i>Avena</i> spp.	83	13.5	12.8	0.2	88.0	<b>X</b>			<b>X</b>
	<i>Bromus hordeaceus</i>	67	7.3	4.7	0.2	27.0				<b>X</b>
	<i>Bromus diandrus</i>	63	7.1	6.7	0.2	57.0				<b>X</b>
	<i>Lolium perenne</i>	60	8.5	5.7	0.2	30.0				<b>X</b>
	<i>Briza maxima</i>	57	7.4	6.0	0.2	38.0				<b>X</b>
	<i>Eschscholzia californica</i>	57	0.8	0.7	0.2	7.0				<b>X</b>
	<i>Chlorogalum pomeridianum</i>	53	1.2	1.1	0.2	10.0				<b>X</b>
	<i>Carduus pycnocephalus</i>	53	0.9	0.6	0.2	5.0				<b>X</b>
	<i>Achillea millefolium</i>	40	0.2	0.1	0.2	1.0				
	<i>Brachypodium distachyon</i>	37	6.0	5.0	0.2	47.0				
	<i>Elymus multisetus</i>	33	0.3	0.3	0.2	3.0				
	<i>Sanicula bipinnatifida</i>	33	0.2	0.1	0.2	1.0				
	<i>Anagallis arvensis</i>	30	1.1	1.1	0.2	30.0				
	<i>Erodium botrys</i>	30	1.0	1.0	0.2	25.0				
	<i>Hypochaeris glabra</i>	30	0.9	0.8	0.2	20.0				
	<i>Bromus carinatus</i>	30	0.4	0.3	0.2	3.0				
	<i>Pteridium aquilinum</i>	27	2.0	1.5	0.2	25.0				
	<i>Cynosurus echinatus</i>	27	1.4	1.2	0.2	15.0				
	<i>Elymus glaucus</i>	27	0.8	0.6	0.2	7.0				
	<i>Plantago erecta</i>	27	0.6	0.5	0.2	10.0				
	<i>Aira caryophylla</i>	27	0.3	0.2	0.2	2.0				
	<i>Sidalcea malviflora</i>	27	0.2	0.2	0.2	2.0				
	<i>Galium aparine</i>	27	0.1	0.1	0.2	0.5				
	<i>Eriogonum nudum</i>	23	0.2	0.1	0.2	3.0				
	<i>Lupinus bicolor</i>	23	0.1	0.1	0.2	0.5				

## ***Melica torreyana* Association**

**Common Name:** Torrey's melicgrass Grassland

**Alliance:** *Nassella* spp. – *Melica* spp. Herbaceous Alliance

### **Local Vegetation Description**

The Torrey's melicgrass Association forms a sparse to continuous herbaceous layer. The shrub layer is sparse and the tree layer is sparse to absent. *Melica torreyana* is typically co-dominant or dominant, and other characteristic herbs include *Achillea millefolium*. Those herbs often present include *Chlorogalum pomeridianum*, *Danthonia californica*, *Eschscholzia californica*, *Lolium perenne*, *Nassella pulchra*, *Plantago erecta*, and *Sisyrinchium bellum*, and herbs that are sometimes present include *Avena* spp., *Eriogonum nudum*, *Koeleria macrantha*, *Lasthenia californica*, *Layia platyglossa*, *Lomatium dasycarpum*, *Pentagramma triangularis*, and *Vulpia microstachys*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.1	0 – 1	3.5	2 – 5
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.6	0.0 – 8.0	0.9	0 – 2
Herb	50.5	1 – 95	0.3	0 – 1

### **Local Environmental Description**

**Elevation:** Mean 167 m, Range 63 – 433 m

**Aspect:** SW (7), NW (4), NE (4)

**Slope:** Mean 18 degrees, Range 6 – 40 degrees

**Macro Topography:** Upper 1/3 of slope (8), Middle 1/3 of slope (6)

**Large Rock:** Mean 15.4%, Range 0.2 – 50.0%

**Small Rock:** Mean 24.1%, Range 0.2 – 70.0%

**Fines Cover:** Mean 10.6%, Range 0.2 – 40.0%

**Litter Cover:** Mean 45.6%, Range 0.0 – 91%

**Soil Texture (field assessed):** Coarse, loamy sand (2), Fine silty clay (2), Medium silt (2), Medium to very fine, sandy loam (1), Unknown (1), Not recorded (1), Moderately fine sandy clay loam (1), Moderately fine clay loam (1), Medium to very fine, loamy sand (1), Fine sandy clay (1), Moderately coarse, sandy loam (1)

**Geology (field or map data):** Ultramafic rocks, mostly serpentine (6), Serpentine (4), Franciscan melange (4), Blueschist and semi-schist (1)

**Marin County Watersheds:** San Rafael (13), Lagunitas Creek (2)

### **Site Impacts**

This association has low non-native plant cover (average 17.1%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Avena* spp. and *Lolium perenne*.

### **Classification Comments**

None.

**References:** Buck and Evens 2010, Evens and San 2004

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

**Total: N=15; Marin County (n=15):** HEAD0242, MMWD0041, MMWD0077, MOSD0075, MOSD0295, MOSD0321, MOSD0322, MOSD0323, MOSD0325, MOSD0336, MOSD0337, MOSD0338, MOSD0345, OSH04, RIMO005

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Herb</b>										
	<i>Melica torreyana</i>	100	35.5	12.4	1.0	38.0	X		X	X
	<i>Achillea millefolium</i>	80	1.2	0.4	0.2	2.0	X			X
	<i>Chlorogalum pomeridianum</i>	73	6.5	2.7	0.2	20.0				X
	<i>Nassella pulchra</i>	67	7.3	4.0	0.2	20.0				X
	<i>Plantago erecta</i>	67	3.2	0.8	0.2	3.0				X
	<i>Eschscholzia californica</i>	67	1.6	0.3	0.2	1.0				X
	<i>Lolium perenne</i>	60	9.8	3.7	0.2	23.0				X
	<i>Sisyrinchium bellum</i>	60	2.5	0.8	0.2	10.0				X
	<i>Danthonia californica</i>	53	2.5	1.8	0.2	20.0				X
	<i>Avena</i> spp.	47	3.6	0.7	0.2	3.0				
	<i>Lomatium dasycarpum</i>	47	0.6	0.1	0.2	1.0				
	<i>Layia platyglossa</i>	40	0.9	0.2	0.2	1.0				
	<i>Lasthenia californica</i>	33	4.5	1.9	0.2	20.0				
	<i>Eriogonum nudum</i>	33	0.7	0.1	0.2	0.2				
	<i>Pentagramma triangularis</i>	33	0.2	0.1	0.2	0.2				
	<i>Koeleria macrantha</i>	27	0.5	0.4	0.2	3.0				
	<i>Vulpia microstachys</i>	27	0.6	0.3	0.2	3.0				

## ***Nassella pulchra* Association**

**Common Name:** Purple Needlegrass Grassland

**Alliance:** *Nassella* spp. – *Melica* spp. Herbaceous Alliance

### **Local Vegetation Description**

The Purple Needlegrass Grassland Association forms an intermittent to continuous herbaceous layer. The shrub layer is sparse and the tree layer is absent. *Nassella pulchra* is typically co-dominant or dominant while other characteristic herbs include *Avena* spp., *Cynosurus echinatus*, *Eschscholzia californica*, *Holcus lanatus*, *Lolium perenne*, *Plantago lanceolata*, and *Sisyrinchium bellum*. Those herbs often present include *Achillea millefolium*, *Aira caryophyllea*, *Brachypodium distachyon*, *Erodium botrys*, *Koeleria macrantha*, *Linum bienne*, *Rumex acetosella*, and *Vulpia bromoides*. Commonly associated emergent shrubs at sparse cover include *Baccharis pilularis*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	1.8	0.0 – 6	0.3	0 – 0.5
Herb	65.5	35 – 92	0.3	0 – 0.5

### **Local Environmental Description**

**Elevation:** Mean 180 m, Range 54 – 266 m

**Aspect:** SE (2), Flat (1)

**Slope:** Mean 7 degrees, Range 0 – 14 degrees

**Macro Topography:** Middle 1/3 of slope (2), Upper 1/3 of slope (1)

**Large Rock:** 0.0%

**Small Rock:** Mean 1.1%, Range 0.2 – 2.0%

**Fines Cover:** Mean 17.7%, Range 2.0 – 35.0%

**Litter Cover:** Mean 56%, Range 10.0 – 80%

**Soil Texture (field assessed):** Fine clay (1), Moderately fine sandy clay loam (1), Moderately fine silty clay loam (1)

**Geology (field or map data):** Franciscan melange (3), Sandstone and other sedimentary (1)

**Marin County Watersheds:** Bolinas (1), Lagunitas Creek (1), Walker Creek (1)

**Other Watersheds, Sonoma Co.:** Lower Russian River (1)

### **Site Impacts**

This association has moderate non-native plant cover (average 42.3%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*, *Avena* spp., *Brachypodium distachyon*, *Cynosurus echinatus*, *Erodium botrys*, *Holcus lanatus*, *Linum bienne*, *Lolium perenne*, *Plantago lanceolata*, *Rumex acetosella*, and *Vulpia bromoides*.

### **Classification Comments**

Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** AECOM 2013, Buck-Diaz et al. 2011, Buck-Diaz et al. 2012, Buck-Diaz et al. 2013, Evens and Kentner 2006, Klein et al. 2007, Klein et al. 2015, Rodriguez et al. 2017, Sproul et al. 2011

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

Total: N=4; Marin County (n=3): HEAD0085, MMWD0090, PGA541

Sonoma County (n=1): SONO0408

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	75	75.0	2.3	0.2	6.0	X	X		X
<b>Herb</b>										
	<i>Nassella pulchra</i>	100	42.8	34.5	5.0	68.0	X		X	X
	<i>Sisyrinchium bellum</i>	100	0.3	0.2	0.2	0.2	X			X
	<i>Plantago lanceolata</i>	75	10.5	13.3	0.2	38.0	X			X
	<i>Lolium perenne</i>	75	6.6	3.5	1.0	10.0	X			X
	<i>Avena</i> spp.	75	2.5	2.6	0.2	8.0	X			X
	<i>Cynosurus echinatus</i>	75	1.1	1.1	0.2	3.0	X			X
	<i>Holcus lanatus</i>	75	2.2	0.9	0.2	3.0	X			X
	<i>Eschscholzia californica</i>	75	0.2	0.2	0.2	0.2	X			X
	<i>Erodium botrys</i>	50	6.0	4.5	3.0	15.0				X
	<i>Vulpia bromoides</i>	50	2.3	2.5	2.0	8.0				X
	<i>Achillea millefolium</i>	50	2.1	1.5	3.0	3.0				X
	<i>Brachypodium distachyon</i>	50	2.6	1.5	3.0	3.0				X
	<i>Rumex acetosella</i>	50	1.0	1.0	1.0	3.0				X
	<i>Koeleria macrantha</i>	50	0.5	0.8	0.2	3.0				X
	<i>Linum bienne</i>	50	0.6	0.3	0.2	1.0				X
	<i>Aira caryophylla</i>	50	0.1	0.1	0.2	0.2				X
	<i>Briza maxima</i>	25	2.0	1.8	7.0	7.0				
	<i>Vicia villosa</i>	25	2.7	1.3	5.0	5.0				
	<i>Lupinus bicolor</i>	25	2.2	1.0	4.0	4.0				
	<i>Madia radioides</i>	25	2.2	1.0	4.0	4.0				
	<i>Acaena pinnatifida</i>	25	0.5	0.8	3.0	3.0				
	<i>Agrostis</i> spp.	25	0.5	0.8	3.0	3.0				
	<i>Cirsium quercetorum</i>	25	0.5	0.8	3.0	3.0				
	<i>Danthonia californica</i>	25	0.5	0.8	3.0	3.0				
	<i>Elymus glaucus</i>	25	0.5	0.8	3.0	3.0				
	<i>Hypochaeris glabra</i>	25	1.6	0.8	3.0	3.0				
	<i>Plantago erecta</i>	25	0.9	0.8	3.0	3.0				
	<i>Wyethia angustifolia</i>	25	0.9	0.8	3.0	3.0				
	<i>Chlorogalum pomeridianum</i>	25	0.5	0.3	1.0	1.0				
	<i>Cirsium vulgare</i>	25	0.7	0.3	1.0	1.0				
	<i>Juncus patens</i>	25	0.7	0.3	1.0	1.0				

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

**Common Name:** Purple Needlegrass – Wild Oat – Annual Brome Grassland

**Alliance:** *Nassella* spp. – *Melica* spp. Herbaceous Alliance

### **Local Vegetation Description**

The Purple Needlegrass – Wild Oat – Annual Brome Grassland Association forms an open to continuous herbaceous layer. The shrub layer is sparse and the tree layer is sparse. *Nassella pulchra* is characteristically present to co-dominant with non-native herbs including *Avena* spp. and *Bromus* spp. Those herbs often present include *Brachypodium distachyon*, *Briza maxima*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, and *Erodium botrys*, and herbs that are sometimes present include *Anagallis arvensis*, *Centaurea melitensis*, *Dichelostemma capitatum*, *Eschscholzia californica*, *Hypochaeris glabra*, *Hypochaeris radicata*, *Lolium perenne*, *Sisyrinchium bellum*, *Trifolium* spp. and *Vicia benghalensis*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.2	0 – 1	12.5	10 – 15
Regenerating or Shrubby Tree	0.0	0 – 0.2	no data	
Shrub	1.1	0 – 7	1.6	0.5 – 5
Herb	64.1	7 – 93	0.3	0 – 0.5

### **Local Environmental Description**

**Elevation:** Mean 212 m, Range 36 – 600 m

**Aspect:** SE (8), SW (6), NE (2), E (1)

**Slope:** Mean 19 degrees, Range 3 – 34 degrees

**Macro Topography:** Middle 1/3 of slope (10), Upper 1/3 of slope (3), Lower 1/3 of slope (2), Middle to Upper 1/3 of slope (1)

**Large Rock:** Mean 5.4%, Range 0.0 – 30.0%

**Small Rock:** Mean 5.0%, Range 0.0 – 30.0%

**Fines Cover:** Mean 9.8%, Range 1.0 – 37.0%

**Litter Cover:** Mean 75.9%, Range 21.0 – 93%

**Soil Texture (field assessed):** Fine clay (4), Not recorded (3), Fine sandy clay (2), Moderately fine sandy clay loam (2), Moderately fine clay loam (2), Moderately coarse, sandy loam (2), Moderately fine silty clay loam (1), Medium silt (1)

**Geology (field or map data):** Franciscan melange (9), Large landslides (4), Blueschist and semi-schist (2), Ultramafic (type unknown) (1), Greenstone (1)

**Marin County Watersheds:** Novato (7), San Rafael (7), Lagunitas Creek (2), Bolinas (1), Petaluma River (1)

### **Site Impacts**

This association has greater cover of exotics (average 69.4%) than natives. Non-native species that occur with highest frequency and abundance include *Anagallis arvensis*, *Avena* spp., *Brachypodium distachyon*, *Briza maxima*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Centaurea melitensis*, *Erodium botrys*, *Hypochaeris glabra*, *Hypochaeris radicata*, *Lolium perenne*, and *Vicia benghalensis*.

### **Classification Comments**

*Nassella pulchra* – *Avena* spp. – *Bromus* spp. Association  
*Nassella* spp. – *Melica* spp. Herbaceous Alliance



None.

**References:** Buck and Evens 2010, Evens and Kentner 2006, Junak et al. 2007, Klein et al. 2015, Parker 1990b, Rodriguez et al. 2017

**Global Rarity Rank:** G3

**State Rarity Rank:** S3?

**State Rare:** Y

**Surveys Used for Description**

**Total: N=18; Marin County (n=18):** HEAD0263, MARIN244, MMWD0606, MOSD0081, MOSD0191, MOSD0253, MOSD0265, MOSD0271, MOSD0272, MOSD0273, MOSD0276, MOSD0332, MOSD0379, MOSD0381, MOSD0382, MOSD0398, TAMG008C, TAMG024M

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	28	24.4	0.7	0.2	10.0				
<b>Herb</b>										
	<b><i>Nassella pulchra</i></b>	<b>100</b>	<b>19.2</b>	<b>14.0</b>	<b>0.2</b>	<b>38.0</b>	<b>X</b>			<b>X</b>
	<b><i>Avena</i> spp.</b>	<b>89</b>	<b>14.7</b>	<b>11.0</b>	<b>0.2</b>	<b>40.0</b>	<b>X</b>			<b>X</b>
	<i>Briza maxima</i>	61	10.1	6.6	0.2	40.0				<b>X</b>
	<i>Brachypodium distachyon</i>	56	17.2	12.5	1.0	60.0				<b>X</b>
	<b><i>Bromus diandrus</i></b>	<b>56</b>	<b>3.7</b>	<b>1.8</b>	<b>0.2</b>	<b>13.0</b>				<b>X</b>
	<i>Erodium botrys</i>	50	9.3	6.7	0.2	40.0				<b>X</b>
	<b><i>Bromus hordeaceus</i></b>	<b>50</b>	<b>4.3</b>	<b>2.6</b>	<b>0.2</b>	<b>15.0</b>				<b>X</b>
	<i>Carduus pycnocephalus</i>	50	2.4	2.5	0.2	38.0				<b>X</b>
	<i>Lolium perenne</i>	39	2.3	2.1	0.2	35.0				
	<i>Sisyrinchium bellum</i>	33	0.2	0.1	0.2	1.0				
	<i>Centaurea melitensis</i>	28	0.8	0.6	0.2	7.0				
	<i>Hypochaeris radicata</i>	28	0.2	0.2	0.2	2.0				
	<i>Eschscholzia californica</i>	28	0.3	0.2	0.2	1.0				
	<i>Vicia benghalensis</i>	28	0.2	0.2	0.2	2.0				
	<i>Hypochaeris glabra</i>	22	1.4	1.2	0.2	15.0				
	<i>Trifolium</i> spp.	22	0.5	0.4	0.2	5.0				
	<i>Dichelostemma capitatum</i>	22	0.1	0.1	0.2	1.0				
	<i>Anagallis arvensis</i>	22	0.1	0.1	0.2	0.3				

## ***Nassella pulchra* – *Hemizonia congesta* Association**

**Common Name:** Purple Needlegrass – Hayfield Tarweed Grassland

**Alliance:** *Nassella* spp. – *Melica* spp. Herbaceous Alliance

### **Local Vegetation Description**

The Purple Needlegrass – Hayfield Tarweed Association forms an open to continuous herbaceous layer. The shrub layer is sparse and the tree layer is absent. *Hemizonia congesta* and *Nassella pulchra* are characteristically present to co-dominant with other characteristic herbs including *Bromus hordeaceus*, *Lolium perenne*, and *Lotus wrangelianus*. Those herbs often present include *Aira caryophyllea*, *Anagallis arvensis*, *Avena* spp., *Brachypodium distachyon*, and *Chlorogalum pomeridianum*, and herbs that are sometimes present include *Agoseris grandiflora*, *Astragalus gambelianus*, *Briza maxima*, *Briza minor*, *Brodiaea elegans*, *Bromus carinatus*, *Bromus diandrus*, *Carduus pycnocephalus*, *Castilleja rubicundula* ssp. *lithospermoides*, *Cirsium vulgare*, *Clarkia gracilis*, *Clarkia purpurea*, *Cynosurus echinatus*, *Danthonia californica*, *Daucus pusillus*, *Eschscholzia californica*, *Euphorbia spathulata*, *Gastidium phleoides*, *Geranium dissectum*, *Hordeum marinum*, *Hypochaeris glabra*, *Koeleria macrantha*, *Lactuca saligna*, *Linum bienne*, *Medicago* spp., *Perideridia kelloggii*, *Plantago erecta*, *Plantago lanceolata*, *Silene gallica*, *Sisyrinchium bellum*, *Trifolium bifidum*, *Trifolium dubium*, *Trifolium hirtum*, *Trifolium microcephalum*, *Triteleia laxa*, and *Vulpia bromoides*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	1.0	0.0 – 10	no data	
Herb	65.8	30 – 85	0.5	0 – 2

### **Local Environmental Description**

**Elevation:** Mean 208 m, Range 65 – 459 m

**Aspect:** SE (6), SW (5), NE (2), NW (2), E (1)

**Slope:** Mean 16 degrees, Range 3 – 42 degrees

**Macro Topography:** Upper 1/3 of slope (8), Lower 1/3 of slope (4), Middle 1/3 of slope (3), Not recorded (1)

**Large Rock:** Mean 5.6%, Range 0.0 – 41.0%

**Small Rock:** Mean 5.7%, Range 0.0 – 40.0%

**Fines Cover:** Mean 12.1%, Range 1.0 – 33.0%

**Litter Cover:** Mean 64.3%, Range 2.0 – 96%

**Soil Texture (field assessed):** Not recorded (4), Moderately fine clay loam (3), Moderately fine silty clay loam (1), Moderately fine sandy clay loam (1), Medium to very fine, sandy loam (1), Medium silt loam (1), Fine sandy clay (1), Fine clay (1), Coarse, loamy sand (1), Moderately coarse, sandy loam (1)

**Geology (field or map data):** Franciscan melange (11), Large landslides (5), Blueschist and semi-schist (1), Serpentine (1), Ultramafic rocks, mostly serpentine (1)

**Marin County Watersheds:** Lagunitas Creek (6), Novato (6), Walker Creek (4), San Rafael (3)

### **Site Impacts**

This association has moderate non-native plant cover (average 49.3%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*, *Anagallis*

*arvensis*, *Avena* spp., *Brachypodium distachyon*, *Briza maxima*, *Briza minor*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Cirsium vulgare*, *Cynosurus echinatus*, *Gastridium phleoides*, *Geranium dissectum*, *Hordeum marinum*, *Hypochaeris glabra*, *Lactuca saligna*, *Linum bienne*, *Lolium perenne*, *Medicago* spp., *Plantago lanceolata*, *Silene gallica*, *Trifolium dubium*, *Trifolium hirtum*, and *Vulpia bromoides*.

**Classification Comments**

None.

**References:** Klein et al. 2015

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

**Total: N=19; Marin County (n=19):** HEAD0035, HEAD0067, HEAD0127, HEAD0145, HEAD0181, HEAD0230, HEAD0277, HEAD0369, HEAD0370, MMWD0083, MMWD0376, MMWD0603, MMWD0610, MMWD0611, MTBP005, RIMO010, TAMG025M, TAMG027M, TAMG033M

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Herb										
	<i>Nassella pulchra</i>	100	22.9	21.0	1.0	68.0	X			X
	<i>Hemizonia congesta</i>	100	14.3	14.2	0.2	38.0	X			X
	<i>Bromus hordeaceus</i>	95	2.7	2.6	0.2	8.0	X			X
	<i>Lolium perenne</i>	84	17.7	17.3	0.2	68.0	X			X
	<i>Lotus wrangelianus</i>	84	0.7	0.8	0.2	8.0	X			X
	<i>Avena</i> spp.	68	5.7	5.1	0.2	38.0				X
	<i>Brachypodium distachyon</i>	63	6.6	6.1	0.2	38.0				X
	<i>Aira caryophylla</i>	63	0.6	0.6	0.2	8.0				X
	<i>Anagallis arvensis</i>	53	0.1	0.1	0.2	0.3				X
	<i>Chlorogalum pomeridianum</i>	53	0.1	0.1	0.2	0.3				X
	<i>Danthonia californica</i>	47	1.3	1.0	0.2	7.0				
	<i>Hypochaeris glabra</i>	47	0.3	0.4	0.1	3.0				
	<i>Plantago erecta</i>	47	0.3	0.3	0.2	3.0				
	<i>Sisyrinchium bellum</i>	47	0.4	0.2	0.1	3.0				
	<i>Brodiaea elegans</i>	42	0.1	0.1	0.1	0.3				
	<i>Trifolium bifidum</i>	37	0.1	0.1	0.2	0.3				
	<i>Triteleia laxa</i>	37	0.1	0.1	0.2	0.3				
	<i>Briza minor</i>	37	0.1	0.1	0.2	0.3				
	<i>Briza maxima</i>	32	2.6	2.2	0.2	35.0				
	<i>Cynosurus echinatus</i>	32	1.3	1.8	0.2	18.0				
	<i>Plantago lanceolata</i>	32	1.6	1.4	0.3	8.0				
	<i>Bromus diandrus</i>	32	0.4	0.4	0.2	4.0				
	<i>Carduus pycnocephalus</i>	26	0.4	0.5	0.2	8.0				
	<i>Vulpia bromoides</i>	26	0.4	0.5	0.2	3.0				
	<i>Hordeum marinum</i>	26	0.3	0.3	0.2	3.0				
	<i>Trifolium dubium</i>	26	0.2	0.2	0.2	3.0				

*Nassella pulchra* – *Hemizonia congesta* Association  
*Nassella* spp. – *Melica* spp. Herbaceous Alliance

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<i>Daucus pusillus</i>	26	0.1	0.1	0.2	1.0				
	<i>Linum bienne</i>	26	0.1	0.1	0.2	1.0				
	<i>Castilleja rubicundula</i> ssp. <i>lithospermoides</i>	26	0.1	0.1	0.2	0.3				
	<i>Silene gallica</i>	26	0.1	0.1	0.2	0.3				
	<i>Koeleria macrantha</i>	26	0.1	0.1	0.2	0.3				
	<i>Bromus carinatus</i>	21	0.9	0.9	0.2	15.0				
	<i>Lactuca saligna</i>	21	1.4	0.9	0.1	16.0				
	<i>Trifolium hirtum</i>	21	0.6	0.4	0.2	5.0				
	<i>Gastridium phleoides</i>	21	0.3	0.3	0.1	3.0				
	<i>Agoseris grandiflora</i>	21	0.3	0.2	0.2	3.0				
	<i>Geranium dissectum</i>	21	0.1	0.2	0.2	3.0				
	<i>Clarkia gracilis</i>	21	0.1	0.1	0.3	0.8				
	<i>Eschscholzia californica</i>	21	0.1	0.1	0.2	1.0				
	<i>Perideridia kelloggii</i>	21	0.1	0.1	0.2	0.5				
	<i>Clarkia purpurea</i>	21	0.1	0.1	0.2	0.3				
	<i>Trifolium microcephalum</i>	21	0.1	0.1	0.2	0.3				
	<i>Euphorbia spathulata</i>	21	0.1	0.1	0.2	0.3				
	<i>Astragalus gambelianus</i>	21	0.1	0.0	0.2	0.3				
	<i>Cirsium vulgare</i>	21	0.0	0.0	0.2	0.3				
	<i>Medicago</i> spp.	21	0.0	0.0	0.2	0.2				

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

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**Common Name:** Italian Ryegrass – Purple Needlegrass Grassland

**Alliance:** *Nassella* spp. – *Melica* spp. Herbaceous Alliance

**Local Vegetation Description**

The Italian Ryegrass – Purple Needlegrass Association forms an intermittent to continuous herbaceous layer. The shrub layer is sparse and the tree layer is absent. *Nassella pulchra* is characteristically present to co-dominant with *Lolium perenne* and various other native and non-native herbs including *Lotus* and *Trifolium* spp. Those herbs often present include *Avena* spp., *Bromus hordeaceus*, *Chlorogalum pomeridianum*, and *Sisyrinchium bellum*, and herbs that are sometimes present include *Achillea millefolium*, *Anagallis arvensis*, *Bromus carinatus*, *Cirsium vulgare*, *Cynosurus echinatus*, *Danthonia californica*, *Elymus glaucus*, *Eschscholzia californica*, *Euphorbia spathulata*, *Geranium dissectum*, *Hemizonia congesta*, *Hypochaeris glabra*, *Lotus wrangelianus*, *Plantago erecta*, *Ranunculus californicus*, *Trifolium bifidum*, *Trifolium microdon*, *Triteleia laxa*, *Vicia benghalensis*, and *Vicia sativa*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	1.7	0.0 – 10	1.5	1 – 2
Herb	75.2	35 – 99	0.3	0 – 0.5

**Local Environmental Description**

**Elevation:** Mean 141 m, Range 49 – 306 m

**Aspect:** SE (4), NW (1), SW (1), NE (1)

**Slope:** Mean 12 degrees, Range 5 – 23 degrees

**Macro Topography:** Upper 1/3 of slope (3), Lower 1/3 of slope (2), Middle to Upper 1/3 of slope (1), Middle 1/3 of slope (1)

**Large Rock:** Mean 3.5%, Range 0.0 – 20.0%

**Small Rock:** Mean 5.0%, Range 0.0 – 30.0%

**Fines Cover:** Mean 19.3%, Range 1.0 – 50.0%

**Litter Cover:** Mean 67.4%, Range 20.0 – 93%

**Soil Texture (field assessed):** Not recorded (2), Coarse, loamy sand (1), Unknown (1), Fine sandy clay (1), Moderately fine sandy clay loam (1), Medium silt (1)

**Geology (field or map data):** Blueschist and semi-schist (3), Franciscan melange (2), Large landslides (1), Ultramafic rocks, mostly serpentine (1)

**Marin County Watersheds:** San Rafael (3), Novato (2), Petaluma River (1), Walker Creek (1)

**Site Impacts**

This association has greater cover of exotics (average 59.9%) than natives. Non-native species that occur with highest frequency and abundance include *Anagallis arvensis*, *Avena* spp., *Bromus hordeaceus*, *Cirsium vulgare*, *Cynosurus echinatus*, *Geranium dissectum*, *Hypochaeris glabra*, *Lolium perenne*, *Vicia benghalensis*, and *Vicia sativa*.

**Classification Comments**

None.

**References:** Buck and Evens 2010, Evens and Kentner 2006, Fiedler and Leidy 1987, Rodriguez et al. 2017

**Global Rarity Rank:** G3

**State Rarity Rank:** S3?

**State Rare:** Y

**Surveys Used for Description**

**Total: N=8; Marin County (n=8):** HEAD0039, MARIN257, MOSD0256, MOSD0258, MOSD0263, MOSD0290, MOSD0292, TAMG021M

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>	<i>Baccharis pilularis</i>	29	28.6	1.5	0.3	10.0				
<b>Herb</b>	<b><i>Lolium perenne</i></b>	<b>100</b>	<b>49.9</b>	<b>36.6</b>	<b>18.0</b>	<b>68.0</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<b><i>Nassella pulchra</i></b>	<b>100</b>	<b>26.4</b>	<b>23.7</b>	<b>1.0</b>	<b>68.0</b>	<b>X</b>			<b>X</b>
	<i>Avena</i> spp.	57	3.2	1.3	0.2	7.0				<b>X</b>
	<i>Bromus hordeaceus</i>	57	1.1	0.6	0.2	2.0				<b>X</b>
	<i>Chlorogalum pomeridianum</i>	57	0.9	0.5	0.2	2.0				<b>X</b>
	<i>Sisyrinchium bellum</i>	57	0.2	0.1	0.2	0.3				<b>X</b>
	<i>Danthonia californica</i>	43	1.1	1.2	0.2	5.0				
	<i>Vicia benghalensis</i>	43	1.3	0.6	0.2	2.0				
	<i>Elymus glaucus</i>	43	0.9	0.5	0.2	2.0				
	<i>Achillea millefolium</i>	43	0.1	0.1	0.2	0.3				
	<i>Anagallis arvensis</i>	43	0.1	0.1	0.2	0.3				
	<i>Lotus</i> spp.	43	0.2	0.1	0.2	0.2				
	<i>Ranunculus californicus</i>	29	1.4	0.6	0.2	4.0				
	<i>Bromus carinatus</i>	29	0.5	0.5	0.2	3.0				
	<i>Cynosurus echinatus</i>	29	0.2	0.2	0.2	1.0				
	<i>Hemizonia congesta</i>	29	0.1	0.1	0.2	0.5				
	<i>Euphorbia spathulata</i>	29	0.1	0.1	0.2	0.3				
	<i>Lotus wrangelianus</i>	29	0.1	0.1	0.2	0.3				
	<i>Plantago erecta</i>	29	0.1	0.1	0.2	0.3				
	<b><i>Trifolium bifidum</i></b>	<b>29</b>	<b>0.1</b>	<b>0.1</b>	<b>0.2</b>	<b>0.3</b>				
	<b><i>Trifolium microdon</i></b>	<b>29</b>	<b>0.1</b>	<b>0.1</b>	<b>0.2</b>	<b>0.3</b>				
	<i>Vicia sativa</i>	29	0.1	0.1	0.2	0.3				
	<i>Cirsium vulgare</i>	29	0.1	0.1	0.2	0.2				
	<i>Eschscholzia californica</i>	29	0.1	0.1	0.2	0.2				
	<i>Geranium dissectum</i>	29	0.1	0.1	0.2	0.2				
	<i>Hypochaeris glabra</i>	29	0.1	0.1	0.2	0.2				
	<i>Triteleia laxa</i>	29	0.1	0.1	0.2	0.2				

***Nassella pulchra* – *Lolium perenne* – *Plantago erecta* Serpentine Association**

**Common Name:** Purple Needlegrass – Italian Ryegrass – California Plantain Serpentine Grassland

**Alliance:** *Nassella* spp. – *Melica* spp. Herbaceous Alliance

**Local Vegetation Description**

The Purple Needlegrass – Italian Ryegrass – California Plantain Serpentine Association forms a sparse to continuous herbaceous layer. The shrub layer is sparse and the tree layer is usually absent. *Nassella pulchra* is characteristically present to co-dominant with *Lolium perenne*, *Chlorogalum pomeridianum*, and *Plantago erecta*. Those herbs often present include *Achillea millefolium*, *Avena* spp., *Danthonia californica*, *Elymus multisetus*, *Eriogonum nudum*, *Eschscholzia californica*, *Lactuca saligna*, *Lomatium dasycarpum*, and herbs that are sometimes present include *Brachypodium distachyon*, *Bromus hordeaceus*, *Calystegia purpurata*, *Daucus pusillus*, *Hemizonia congesta*, *Hesperervax sparsiflora*, *Hesperolinon congestum*, *Koeleria macrantha*, *Lasthenia californica*, *Layia platyglossa*, *Melica californica*, *Melica torreyana*, *Microseris douglasii*, *Nassella lepida*, *Ranunculus californicus*, *Sanicula bipinnatifida*, *Silene gallica*, *Sisyrinchium bellum*, *Triteleia laxa*, and *Vulpia microstachys*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0.2	12.5	10 – 15
Regenerating or Shrubby Tree	0.0	0.0 – 0.2	3.5	2 – 5
Shrub	0.1	0.0 – 1	1.1	0.5 – 2
Herb	50.6	1 – 95	0.4	0 – 1

**Local Environmental Description**

**Elevation:** Mean 161 m, Range 67 – 328 m

**Aspect:** SE (6), SW (5), NE (4), NW (3), Not recorded (1)

**Slope:** Mean 17 degrees, Range 6 – 34 degrees

**Macro Topography:** Upper 1/3 of slope (11), Middle 1/3 of slope (3), Lower 1/3 of slope (2), Lower to Middle 1/3 of slope (1), Not recorded (1), Upper 1/3 of slope to Ridgetop (1)

**Large Rock:** Mean 14.8%, Range 0.0 – 45.0%

**Small Rock:** Mean 15.1%, Range 0.0 – 53.0%

**Fines Cover:** Mean 12.2%, Range 0.0 – 92.0%

**Litter Cover:** Mean 51.8%, Range 0.2 – 85%

**Soil Texture (field assessed):** Moderately fine sandy clay loam (4), Moderately fine clay loam (3), Not recorded (3), Medium silt (2), Moderately fine silty clay loam (2), Unknown (1), Medium loam (1), Fine sandy clay (1), Medium to very fine, sandy loam (1), Moderately coarse, sandy loam (1)

**Geology (field or map data):** Franciscan melange (9), Ultramafic rocks, mostly serpentine (3), Serpentine (2), Blueschist and semi-schist (2), Sandstone and other sedimentary (1)

**Marin County Watersheds:** San Rafael (13), Lagunitas Creek (3), Novato (2)

**Site Impacts**

This association has moderate non-native plant cover (average 32.4%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Avena* spp., *Brachypodium distachyon*, *Bromus hordeaceus*, *Lactuca saligna*, *Lolium perenne*, and *Silene gallica*.

**Classification Comments**

None.

References: Klein et al. 2015

Global Rarity Rank: GNR

State Rarity Rank: SNR

State Rare: Y

**Surveys Used for Description**

**Total: N=21; Marin County (n=21):** HEAD0041, HEAD0042, HEAD0043, HEAD0044, HEAD0137, HEAD0235, HEAD0236, HEAD0237, HEAD0239, MMWD0027, MMWD0616, MOSD0076, MOSD0257, MOSD0327, MOSD0340, MOSD0346, MOSD0396, PGA552, RIMO001, RIMO002, RIMO004

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Herb	<i>Nassella pulchra</i>	95	29.0	20.8	2.0	68.0	X			X
	<i>Lolium perenne</i>	90	18.7	14.7	0.2	68.0	X			X
	<i>Chlorogalum pomeridianum</i>	75	2.4	2.1	0.2	8.0	X			X
	<i>Plantago erecta</i>	70	3.5	1.6	0.2	8.0				X
	<i>Eschscholzia californica</i>	65	2.1	1.3	0.2	8.0				X
	<i>Achillea millefolium</i>	65	1.9	1.2	0.2	8.0				X
	<i>Eriogonum nudum</i>	65	2.7	0.9	0.2	8.0				X
	<i>Avena</i> spp.	55	6.2	2.6	0.2	20.0				X
	<i>Elymus multisetus</i>	55	1.8	1.0	0.2	4.0				X
	<i>Danthonia californica</i>	50	0.8	0.8	0.2	3.0				X
	<i>Lomatium dasycarpum</i>	50	0.7	0.2	0.2	2.0				X
	<i>Lactuca saligna</i>	50	0.1	0.1	0.1	0.2				X
	<i>Layia platyglossa</i>	45	1.6	1.0	0.2	8.0				
	<i>Daucus pusillus</i>	45	0.6	0.5	0.2	4.0				
	<i>Hemizonia congesta</i>	45	0.4	0.4	0.2	3.0				
	<i>Triteleia laxa</i>	45	0.2	0.2	0.1	3.0				
	<i>Sanicula bipinnatifida</i>	45	0.3	0.1	0.2	1.0				
	<i>Vulpia microstachys</i>	40	0.6	0.3	0.2	3.0				
	<i>Calystegia purpurata</i>	40	0.3	0.2	0.2	3.0				
	<i>Hesperovax sparsiflora</i>	40	0.5	0.2	0.2	3.0				
	<i>Sisyrinchium bellum</i>	40	0.3	0.1	0.2	1.0				
	<i>Bromus hordeaceus</i>	35	3.7	2.2	0.2	20.0				
	<i>Melica torreyana</i>	30	4.1	0.7	0.2	8.0				
	<i>Melica californica</i>	30	0.9	0.7	0.2	3.0				
	<i>Brachypodium distachyon</i>	30	0.5	0.5	0.2	6.0				
	<i>Microseris douglasii</i>	25	1.3	0.7	0.2	10.0				
	<i>Koeleria macrantha</i>	25	1.0	0.7	0.2	10.0				
	<i>Nassella lepida</i>	25	0.6	0.6	0.2	3.0				
	<i>Hesperolinon congestum</i>	25	0.5	0.1	0.2	2.0				
	<i>Ranunculus californicus</i>	25	0.1	0.1	0.2	0.3				
	<i>Silene gallica</i>	25	0.1	0.1	0.2	0.3				
	<i>Lasthenia californica</i>	25	0.1	0.0	0.1	0.2				



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## ***Nuphar lutea* Aquatic Herbaceous Provisional Alliance**

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**Common Name:** Yellow pond-lily mats

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

### **Statewide Description**

*Nuphar lutea* ssp. *polysepala* is an aquatic perennial species that spreads across the water surface. Spongy rhizomes anchor into muddy bottoms of water bodies and give rise to long, stout stems. *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* stands are monospecific or, less commonly, mixed with other floating-leaved hydrophytes.

Other wetland aquatic plants that may be similar to this include *Lemna* spp., *Potamogeton* spp., *Spirodela* spp., *Wolffia* spp. and/or *Wolffiella* spp., which 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*.

Stands of floating-leaved hydrophytes tend to have established, perennial-rooted species, which wax and wane over the seasons and from year to year.

### **Local Vegetation Description**

The Yellow pond-lily mats Alliance forms an open to continuous herbaceous layer. The shrub layer is sparse and the tree layer is sparse. The dominant herb is *Nuphar lutea* ssp. *polysepala*. Those herbs often present include *Lemna* spp. and *Polygonum punctatum*, and herbs that are sometimes present include *Alisma lanceolatum*, *Athyrium filix-femina*, *Azolla filiculoides*, *Carex barbarae*, *Carex obtusa*,

*Eleocharis macrostachya*, *Erechtites glomeratus*, *Hippuris vulgaris*, *Oenanthe sarmentosa*, *Potamogeton natans*, *Ranunculus repens*, *Scirpus microcarpus*, *Solanum* spp., *Typha latifolia*, and *Typha* spp. Commonly associated emergent trees at sparse cover include *Alnus rubra*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.1	0 – 0.2	3.5	2 – 5
Regenerating or Shrubby Tree	0.0	0 – 0	3.5	2 – 5
Shrub	0.1	0 – 0.2	0.8	0.5 – 1
Herb	61.8	29 – 98	0.7	0 – 2

### **Local Membership Rule**

*Nuphar lutea* dominates on the water surface. Algae and a variety of hydrophytes may intermix, including *Alisma*, *Carex*, *Hippuris vulgaris*, *Lemna*, *Polygonum*, and *Oenanthe*.

### **Local Environmental Description**

**Elevation:** Mean 85 m, Range 4 – 215 m

**Aspect:** Flat (4)

**Slope:** 0 degrees

**Macro Topography:** Bottom (4)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** Mean 20.8%, Range 0.0 – 73%

**Litter Cover:** Mean 2.6%, Range 0.0 – 10%

**Soil Texture (field assessed):** Muck (3)

**Geology (field or map data):** Franciscan melange (2), Mixed alluvium (1), Sandstone, shale, and conglomerate (1)

**Marin County Watersheds:** Lagunitas Creek (1), Walker Creek (1)

**Other Watersheds, Sonoma Co.:** Gualala River (1), Lower Russian River (1)

### **Site Impacts**

This alliance has very low non-native plant cover (average 0.6%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Alisma lanceolatum*, *Erechtites glomeratus*, and *Ranunculus repens*.

### **Associations in Marin County**

*Nuphar lutea* ssp. *polysepala*

### **Classification Comments**

Since Marin County has fewer than five surveys of this alliance, data from nearby counties are included. We await more analyses of freshwater aquatic stands before combining or modifying this provisional alliance.

**References:** Buck-Diaz et al. 2019, Klein et al. 2015

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

### **Surveys Used for Description**

**Total: N=4; Marin County (n=2):** MARIN101, MARIN123

Sonoma County (n=2): SONO0098, SONO0397

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Tree</b>										
	<i>Alnus rubra</i>	25	25.0	0.1	0.2	0.2				
<b>Shrub</b>										
	<i>Rhododendron occidentale</i>	25	12.5	0.1	0.2	0.2				
	<i>Morella californica</i>	25	12.5	0.1	0.2	0.2				
<b>Herb</b>										
	<b><i>Nuphar lutea ssp. polysepala</i></b>	<b>100</b>	<b>69.8</b>	<b>51.5</b>	<b>28.0</b>	<b>98.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Lemna</i> spp.	50	10.3	8.8	10.0	25.0				X
	<i>Polygonum punctatum</i>	50	2.4	2.6	0.2	10.0				X
	<i>Azolla filiculoides</i>	25	4.9	7.5	30.0	30.0				
	<i>Hippuris vulgaris</i>	25	4.0	4.3	17.0	17.0				
	Forb (herbaceous, not grass nor grasslike)	25	3.5	3.8	15.0	15.0				
	<i>Solanum</i> spp.	25	2.3	2.5	10.0	10.0				
	<i>Oenanthe sarmentosa</i>	25	0.5	0.5	2.0	2.0				
	<i>Alisma lanceolatum</i>	25	0.2	0.3	1.0	1.0				
	<i>Potamogeton natans</i>	25	0.8	0.3	1.0	1.0				
	<i>Carex barbarae</i>	25	0.2	0.3	1.0	1.0				
	<i>Ranunculus repens</i>	25	0.2	0.3	1.0	1.0				
	<i>Erechtites glomeratus</i>	25	0.2	0.1	0.2	0.2				
	<i>Typha</i> spp.	25	0.0	0.1	0.2	0.2				
	<i>Carex obnupta</i>	25	0.2	0.1	0.2	0.2				
	<i>Scirpus microcarpus</i>	25	0.1	0.1	0.2	0.2				
	<i>Athyrium filix-femina</i>	25	0.2	0.1	0.2	0.2				
	<i>Eleocharis macrostachya</i>	25	0.0	0.1	0.2	0.2				

***Nuphar lutea ssp. polysepala* Provisional Association**

**Common Name:** Yellow pond-lily Mats

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

**Classification Comments**

The association circumscription is the same as that of the alliance. See above for detailed description. This association is considered provisional since it is under-sampled in its expected range. Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y



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## ***Phalaris aquatica* – *Phalaris arundinacea* Herbaceous Semi-Natural Alliance**

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**Common Name:** Harding grass – Reed Canary grass swards

**NVC Alliance Code:** A3846. *Phalaris arundinacea* Western Ruderal Marsh Alliance

### **Statewide Description**

*Phalaris aquatica* or *Phalaris arundinacea* is dominant in the herbaceous layer. Scattered emergent shrubs may be present at low cover, including *Baccharis pilularis*, *Baccharis salicifolia*, *Ceanothus cuneatus* or *Salix* spp.

Stands of *Phalaris aquatica* have invaded many inland settings, especially grasslands with past disturbance (such as clearing) or from nearby intentional plantings. *P. aquatica* forms dense patches that prevent the germination of other species (Silveira 2000). Native species richness drops because of a thick surface litter and thatch build-up. In wetlands, land managers plant *Phalaris aquatica* for waterfowl food (Silveira 2000). Other *Phalaris* species are less invasive, but locally found in wildlands: *P. arundinacea*, *P. brachystachys*, *P. canariensis*, *P. caroliniana*, *P. minor*, and *P. paradoxa*. See DiTomaso and Healy (2007) for details.

Although *P. arundinacea* is considered to be native to California, it tends to form stands in cultivated and disturbed settings as some biotypes are of non-native origin (from Europe). Stands of *Phalaris arundinacea* are established in irrigated pastures, wet meadows, pond and lake margins, intermittent drainages and other riparian areas, where *P. arundinacea* often has displaced the local flora upon being cultivated and/or escaped (Buck-Diaz et al. 2012). Because of this invasive behavior, associations of this species have been placed in this expanded alliance.

This alliance was cited as *Phalaris aquatica* Herbaceous Semi-Natural Alliance in the 2009 book, A Manual of California Vegetation, second edition, and has been expanded to include ruderal stands of *P. arundinacea*.

### Local Vegetation Description

The Harding grass – Reed Canary grass swards Alliance forms a continuous herbaceous layer. The shrub layer is open and the tree layer is sparse. The dominant herb is *Phalaris aquatica*. Herbs that are sometimes present include *Aira caryophylla*, *Avena* spp., *Briza minor*, *Festuca arundinacea*, *Juncus effusus*, *Juncus patens*, *Plantago lanceolata*, and *Sonchus asper*. Commonly associated emergent shrubs at open cover include *Baccharis pilularis*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.1	0 – 1	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	3.5	2 – 5
Shrub	5.1	0 – 15	0.7	0 – 2
Herb	90.8	66 – 99	0.8	0.5 – 1

### Local Membership Rule

*Phalaris aquatica* dominates in naturalized or planted stands. Other non-native herbs, such as *Avena barbata* and *Hypochaeris glabra* may be present with low cover.

### Local Environmental Description

**Elevation:** Mean 44 m, Range 3 – 168 m

**Aspect:** SW (1), SE (1), NE (1), NW (1)

**Slope:** Mean 6 degrees, Range 2 – 12 degrees

**Macro Topography:** Bottom (2), Lower 1/3 of slope (2)

**Large Rock:** Mean 0.1%, Range 0.0 – 0.2%

**Small Rock:** Mean 0.3%, Range 0.0 – 1.0%

**Fines Cover:** Mean 3.7%, Range 0.2 – 10.0%

**Litter Cover:** Mean 68.8%, Range 0.2 – 97%

**Soil Texture (field assessed):** Fine silty clay (2), Clay, (class unknown) (1), Moderately fine clay loam (1)

**Geology (field or map data):** Sandstone and other sedimentary (7), Volcanic flow rocks (1), Franciscan melange (1), Chert (1), Sandstone, shale, and conglomerate (1)

**Marin County Watersheds:** Point Reyes (6), Bolinas (2), Petaluma River (2), Walker Creek (1)

### Site Impacts

This alliance has greater cover of exotics than natives, with high non-native plant cover (average 90.6%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Aira caryophylla*, *Briza minor*, *Festuca arundinacea*, *Phalaris aquatica*, *Plantago lanceolata*, and *Sonchus asper*.

### Associations in Marin County

*Phalaris aquatica*

*Phalaris aquatica* – *Avena barbata*

### Classification Comments

None.

**References:** AECOM 2013, Buck and Evens 2010, Buck-Diaz et al. 2012, Evens and San 2004, Keeler-Wolf and Vaghti 2000, Klein et al. 2015

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

**Surveys Used for Description**

**Total: N=11; Marin County (n=11):** GGNRA307, MMWD0374, MOSD0310, MOSD0313, PGA583, PGA5862, PGA5875, PGA5940, PGA5961, PGA6004, PGA6032

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	73	61.2	4.4	0.2	15.0				X
	<i>Rubus ursinus</i>	36	16.1	1.1	0.2	5.0				
<b>Herb</b>										
	<b><i>Phalaris aquatica</i></b>	<b>100</b>	<b>81.3</b>	<b>72.1</b>	<b>30.0</b>	<b>98.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Festuca arundinacea</i>	36	2.5	2.2	0.2	20.0				
	<i>Juncus patens</i>	36	0.5	0.5	1.0	2.0				
	<i>Plantago lanceolata</i>	36	0.3	0.2	0.2	1.0				
	<i>Avena</i> spp.	27	1.0	0.7	0.2	7.0				
	<i>Juncus effusus</i>	27	0.6	0.6	0.2	5.0				
	<i>Aira caryophyllea</i>	27	0.2	0.2	0.2	1.0				
	<i>Sonchus asper</i>	27	0.1	0.1	0.2	0.2				
	<i>Briza minor</i>	27	0.1	0.1	0.2	0.2				

***Phalaris aquatica* Provisional Semi-natural Association**

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**Common Name:** Harding grass Grassland

**Alliance:** *Phalaris aquatica* – *Phalaris arundinacea* Herbaceous Semi-Natural Alliance

**Local Vegetation Description**

The Harding grass Association forms a continuous herbaceous layer. The shrub layer is open and the tree layer is sparse. Dominant herbs include *Phalaris aquatica*. Those herbs that are sometimes present include *Aira caryophyllea*, *Festuca arundinacea*, *Juncus effusus*, *Juncus patens*, and *Plantago lanceolata*. Commonly associated emergent shrubs at sparse cover include *Baccharis pilularis*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.1	0 – 1	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.2	0.0 – 1.0	3.5	2 – 5
Shrub	5.7	0.0 – 15	0.7	0 – 2
Herb	93.6	85 – 99	0.8	0.5 – 1

**Local Environmental Description**

**Elevation:** Mean 38 m, Range 3 – 168 m

**Aspect:** NE (1), SE (1), SW (1)

**Slope:** Mean 4 degrees, Range 2 – 5 degrees

**Macro Topography:** Bottom (2), Lower 1/3 of slope (1)

**Large Rock:** 0.0%

**Small Rock:** Mean 0.1%, Range 0.0 – 0.2%

**Fines Cover:** Mean 0.6%, Range 0.2 – 1.0%

**Litter Cover:** Mean 63.4%, Range 0.2 – 97%

**Soil Texture (field assessed):** Fine silty clay (2), Clay, (class unknown) (1)

**Geology (field or map data):** Sandstone and other sedimentary (7), Sandstone, shale, and conglomerate (1), Volcanic flow rocks (1), Chert (1)

**Marin County Watersheds:** Point Reyes (6), Bolinas (2), Petaluma River (2)

**Site Impacts**

This association has greater cover of exotics (average 89.8%) than natives. Non-native species that occur with highest frequency and abundance include *Aira caryophyllea*, *Festuca arundinacea*, *Phalaris aquatica*, and *Plantago lanceolata*.

**Classification Comments**

This association is considered provisional since it is under-sampled in its expected range.

**References:** AECOM 2013, Buck and Evens 2010, Buck-Diaz et al. 2012, Keeler-Wolf and Vaghti 2000, Klein et al. 2015

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

**State Rare:** N

**Surveys Used for Description**

**Total: N=10; Marin County (n=10):** GGNRA307, MOSD0310, MOSD0313, PGA583, PGA5862, PGA5875, PGA5940, PGA5961, PGA6004, PGA6032

### **Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

<b>Layer</b>	<b>Taxon</b>	<b>Con</b>	<b>Rel</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>	<b>Ch</b>	<b>D</b>	<b>cD</b>	<b>Oft</b>
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	70	57.3	4.8	1.0	15.0				X
	<i>Rubus ursinus</i>	40	17.7	1.2	0.2	5.0				
<b>Herb</b>										
	<b><i>Phalaris aquatica</i></b>	<b>100</b>	<b>85.2</b>	<b>76.3</b>	<b>60.0</b>	<b>98.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Festuca arundinacea</i>	40	2.8	2.4	0.2	20.0				
	<i>Juncus patens</i>	40	0.5	0.5	1.0	2.0				
	<i>Juncus effusus</i>	30	0.6	0.6	0.2	5.0				
	<i>Aira caryophyllea</i>	30	0.3	0.2	0.2	1.0				
	<i>Plantago lanceolata</i>	30	0.2	0.1	0.2	1.0				



## *Phalaris aquatica* – *Avena barbata* Provisional Semi-natural Association

**Common Name:** Harding grass – Slender oat Grassland

**Alliance:** *Phalaris aquatica* – *Phalaris arundinacea* Herbaceous Semi-Natural Alliance

### Local Vegetation Description

The Harding grass – Slender oat Association forms a continuous herbaceous layer in the single survey available. The shrub layer is sparse and the tree layer is absent. *Briza maxima* and *Phalaris aquatica* are co-dominant in the one stand sampled, and characteristic herbs include *Avena* spp., *Brachypodium distachyon*, *Briza minor*, *Calochortus luteus*, *Carduus pycnocephalus*, *Chlorogalum pomeridianum*, *Cynosurus echinatus*, *Erodium cicutarium*, *Geranium dissectum*, *Logfia gallica*, *Lupinus* spp., *Microsteris gracilis*, *Plantago lanceolata*, *Rumex crispus*, *Sonchus asper*, and *Vicia villosa*. Commonly associated emergent shrubs at sparse cover include *Baccharis pilularis*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	NA	no data	
Hardwood	0.0	NA	no data	
Regenerating or Shrubby Tree	0.0	NA	no data	
Shrub	0.2	NA	no data	
Herb	66.0	NA	0.8	0.5 – 1

### Local Environmental Description

**Elevation:** 107 m

**Aspect:** NW (1)

**Slope:** 12 degrees

**Macro Topography:** Lower 1/3 of slope (1)

**Large Rock:** 0.2%

**Small Rock:** 1.0%

**Fines Cover:** 10.0%

**Litter Cover:** 85%

**Soil Texture (field assessed):** Moderately fine clay loam (1)

**Geology (field or map data):** Franciscan melange (1)

**Marin County Watersheds:** Walker Creek (1)

### Site Impacts

This association has greater cover of exotics (average 98.3%) than natives. Non-native species that occur with highest frequency and abundance include *Avena* spp., *Brachypodium distachyon*, *Briza maxima*, *Briza minor*, *Carduus pycnocephalus*, *Cynosurus echinatus*, *Erodium cicutarium*, *Geranium dissectum*, *Logfia gallica*, *Phalaris aquatica*, *Plantago lanceolata*, *Rumex crispus*, *Sonchus asper*, and *Vicia villosa*.

### Classification Comments

This association is considered provisional since it is under-sampled in its expected range.

**References:** Evens and San 2004

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

**State Rare:** N

### Surveys Used for Description

**Total: N=1; Marin County (n=1):** MMWD0374

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	100	100.0	0.2	0.2	0.2	X	X		X
<b>Herb</b>										
	<b><i>Phalaris aquatica</i></b>	<b>100</b>	<b>42.6</b>	<b>30.0</b>	<b>30.0</b>	<b>30.0</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<i>Briza maxima</i>	100	34.1	24.0	24.0	24.0	X		X	X
	<b><i>Avena spp.</i></b>	<b>100</b>	<b>9.9</b>	<b>7.0</b>	<b>7.0</b>	<b>7.0</b>	<b>X</b>			<b>X</b>
	<i>Brachypodium distachyon</i>	100	5.7	4.0	4.0	4.0	X			X
	<i>Cynosurus echinatus</i>	100	1.4	1.0	1.0	1.0	X			X
	<i>Plantago lanceolata</i>	100	1.4	1.0	1.0	1.0	X			X
	<i>Rumex crispus</i>	100	1.4	1.0	1.0	1.0	X			X
	<i>Briza minor</i>	100	0.3	0.2	0.2	0.2	X			X
	<i>Calochortus luteus</i>	100	0.3	0.2	0.2	0.2	X			X
	<i>Carduus pycnocephalus</i>	100	0.3	0.2	0.2	0.2	X			X
	<i>Chlorogalum pomeridianum</i>	100	0.3	0.2	0.2	0.2	X			X
	<i>Erodium cicutarium</i>	100	0.3	0.2	0.2	0.2	X			X
	<i>Geranium dissectum</i>	100	0.3	0.2	0.2	0.2	X			X
	<i>Logfia gallica</i>	100	0.3	0.2	0.2	0.2	X			X
	<i>Lupinus spp.</i>	100	0.3	0.2	0.2	0.2	X			X
	<i>Microsteris gracilis</i>	100	0.3	0.2	0.2	0.2	X			X
	<i>Sonchus asper</i>	100	0.3	0.2	0.2	0.2	X			X
	<i>Vicia villosa</i>	100	0.3	0.2	0.2	0.2	X			X

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

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**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 *Symphotrichum ascendens*.

**Local Vegetation Description**

The Kentucky Bluegrass – Redtop – Creeping Bentgrass Meadows Alliance forms a continuous herbaceous layer. The shrub layer is open and the tree layer is absent. Dominant herbs include *Festuca arundinacea*. Those herbs often present include *Cirsium vulgare*, *Holcus lanatus*, *Juncus patens*, *Plantago lanceolata*, and *Vicia sativa*, and herbs that are sometimes present include *Anagallis arvensis*, *Galium aparine*, *Geranium dissectum*, *Phalaris aquatica*, *Rumex acetosella*, and *Sonchus oleraceus*. Commonly associated emergent shrubs at sparse cover include *Baccharis pilularis*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	2.3	0 – 8	1.3	0.5 – 2
Herb	87.8	72 – 99	0.7	0 – 2

### **Local Membership Rule**

*Agrostis gigantea*, *A. stolonifera*, and/or *Festuca arundinacea* dominate or co-dominate in the herbaceous layer. The stands encountered for this project were dominated by *F. arundinacea*, though stands dominated by *Agrostis* may be present in Marin County.

### **Local Environmental Description**

**Elevation:** Mean 149 m, Range 10 – 628 m

**Aspect:** SW (1), NW (1), SE (1)

**Slope:** Mean 2 degrees, Range 0 – 5 degrees

**Macro Topography:** Bottom (2), Lower to Middle 1/3 of slope (1)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** Mean 2.5%, Range 2.0 – 3.0%

**Litter Cover:** Mean 34.7%, Range 1.0 – 95%

**Soil Texture (field assessed):** Medium to very fine, sandy loam (1), Moderately fine clay loam (1), Not recorded (1)

**Geology (field or map data):** Sandstone and other sedimentary (3), Franciscan melange (2)

**Marin County Watersheds:** Bolinas (3), Lagunitas Creek (1), Point Reyes (1)

### **Site Impacts**

This alliance has greater cover of exotics than natives, with high non-native plant cover (average 92.3%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Anagallis arvensis*, *Cirsium vulgare*, *Festuca arundinacea*, *Geranium dissectum*, *Holcus lanatus*, *Phalaris aquatica*, *Plantago lanceolata*, *Rumex acetosella*, *Sonchus oleraceus*, and *Vicia sativa*.

### **Associations in Marin County**

*Festuca arundinacea*

### **Classification Comments**

None.

**References:** Klein et al. 2015

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

### **Surveys Used for Description**

**Total: N=6; Marin County (n=6):** GGNRA308, MARIN246, MMWD0057, PGA563, PGA6072, TEVA011b

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	50	50.0	1.7	1.0	8.0				X
<b>Herb</b>										
	<i>Festuca arundinacea</i>	100	76.8	67.2	35.0	98.0	X	X		X
	<i>Plantago lanceolata</i>	67	0.3	0.3	0.2	1.0				X
	<i>Cirsium vulgare</i>	67	0.2	0.1	0.2	0.2				X
	<i>Holcus lanatus</i>	50	5.7	4.8	4.0	20.0				X
	<i>Vicia sativa</i>	50	0.3	0.2	0.2	1.0				X
	<i>Juncus patens</i>	50	0.3	0.2	0.2	1.0				X
	<i>Phalaris aquatica</i>	33	7.6	6.8	1.0	40.0				
	<i>Galium aparine</i>	33	0.2	0.2	0.2	1.0				
	<i>Geranium dissectum</i>	33	0.2	0.2	0.2	1.0				
	<i>Sonchus oleraceus</i>	33	0.1	0.1	0.2	0.2				
	<i>Anagallis arvensis</i>	33	0.1	0.1	0.2	0.2				
	<i>Rumex acetosella</i>	33	0.1	0.1	0.2	0.2				

***Festuca arundinacea* Provisional Semi-natural Association**

**Common Name:** Tall Fescue Grassland

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

**Classification Comments**

The association circumscription is the same as that of the alliance. See above for detailed description. This association is considered provisional since it is under-sampled in its expected range.

**Global Rarity Rank:** GNA

**State Rarity Rank:** SNA

**State Rare:** N



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## ***Polygonum lapathifolium* – *Xanthium strumarium* Herbaceous Alliance**

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**Common Name:** Smartweed – cocklebur patches

**NVC Alliance Code:** N/A.

### **Statewide Description**

*Polygonum lapathifolium*, *Alisma* spp., *Xanthium strumarium*, and/or other knotweed species are dominant or co-dominant in the herbaceous layer with *Cuscuta pentagona*, *Echinochloa* spp., *Eleocharis macrostachya*, *Euthamia occidentalis*, *Helianthus annuus*, *Phyla nodiflora*, and *Polygonum* spp.

This alliance was cited as *Persicaria lapathifolia* - *Xanthium strumarium* Provisional Herbaceous Alliance in the 2009 book, *A Manual of California Vegetation, second edition*. The main diagnostic species in this alliance are considered native to California and North America, but all (including *Helianthus annuus*) are globally widespread due to their weedy nature. This is an example of an annual ruderal alliance with native diagnostic species.

### **Local Vegetation Description**

The Smartweed – cocklebur patches Alliance forms an open to continuous herbaceous layer. The shrub layer is absent and the tree layer is absent. Those herbs often present and co-dominant to dominant include *Xanthium strumarium*, and herbs that are sometimes present include *Alisma lanceolatum*, *Atriplex prostrata*, *Cuscuta pentagona*, *Cyperus eragrostis*, *Eleocharis macrostachya*, *Lolium perenne*, *Polygonum amphibium*, *Polygonum argyrocoleon*, and *Polypogon monspeliensis*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.0	0 – 0	no data	
Herb	68.0	7 – 90	0.9	0 – 2

### **Local Membership Rule**

*Persicaria* (= *Polygonum*) spp., *Alisma* spp., and/or *Xanthium strumarium* co-dominate or dominate in marshes and regularly disturbed vernal wet ponds, fields, and stream terraces.

### **Local Environmental Description**

**Elevation:** Mean 55 m, Range 4 – 241 m

**Aspect:** Flat (3), NE (3), SW (2), NW (1)

**Slope:** Mean 1 degrees, Range 0 – 3 degrees

**Macro Topography:** Bottom (4), Lower 1/3 of slope (4), Upper 1/3 of slope (1)

**Large Rock:** Mean 1.1%, Range 0.0 – 10.0%

**Small Rock:** Mean 1.7%, Range 0.0 – 15.0%

**Fines Cover:** Mean 44.7%, Range 0.0 – 96.0%

**Litter Cover:** Mean 39.6%, Range 0.2 – 96%

**Soil Texture (field assessed):** Fine silty clay (2), Medium silt loam (2), Medium to very fine, loamy sand (2), Muck (1), Not recorded (1)

**Geology (field or map data):** Franciscan melange (5), Alluvium (3), Large landslides (1)

**Marin County Watersheds:** Novato (6), Lagunitas Creek (3)

### **Site Impacts**

This alliance has moderate non-native plant cover (average 30.6%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Alisma lanceolatum*, *Atriplex prostrata*, *Polygonum argyrocoleon*, and *Polypogon monspeliensis*.

### **Associations in Marin County**

*Alisma (triviale)*

*Polygonum (amphibium, lapathifolium)*

*Xanthium strumarium*

### **Classification Comments**

None.

**References:** Buck-Diaz et al. 2011, Buck-Diaz et al. 2012, Buck-Diaz et al. 2013

**Global Rarity Rank:** G5

**State Rarity Rank:** S4

### **Surveys Used for Description**

**Total: N=9; Marin County (n=9):** MARIN059, MARIN074, MARIN105, MARIN107, MARIN110, MARIN114, MARIN408, MARIN409, MTBP002

### Alliance Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Herb</b>										
	<i>Xanthium strumarium</i>	67	27.6	23.6	3.0	90.0				X
	<i>Alisma lanceolatum</i>	44	19.3	7.2	0.2	40.0				
	<i>Cuscuta pentagona</i>	44	3.0	2.7	0.2	24.0				
	<i>Polygonum amphibium</i>	33	17.5	15.0	5.0	90.0				
	<i>Eleocharis macrostachya</i>	33	5.5	4.3	0.2	38.0				
	<i>Lolium perenne</i>	33	4.9	3.9	0.2	35.0				
	<i>Cyperus eragrostis</i>	22	8.9	4.0	1.0	35.0				
	<i>Polygonum argyrocoleon</i>	22	0.6	0.4	0.2	3.0				
	<i>Polypogon monspeliensis</i>	22	0.1	0.0	0.2	0.2				
	<i>Atriplex prostrata</i>	22	0.1	0.0	0.2	0.2				
<b>Non-vascular</b>										
	Algae	22	22.2	5.2	0.2	47.0				



## *Alisma (triviale)* Provisional Association

**Common Name:** Northern Water Plantain Mats

**Alliance:** *Polygonum lapathifolium* – *Xanthium strumarium* Herbaceous Alliance

### Local Vegetation Description

The Northern Water Plantain Association forms an open to continuous herbaceous layer. The shrub layer is absent and the tree layer is absent. *Alisma lanceolatum* or *Alisma triviale* is dominant or co-dominant in the herbaceous layer. Those herbs often present include *Eleocharis macrostachya* and *Typha latifolia*, and herbs that are sometimes present include *Beckmannia syzigachne*, *Bromus hordeaceus*, *Carex densa*, *Conium maculatum*, *Convolvulus arvensis*, *Cuscuta pentagona*, *Cyperus eragrostis*, *Eleocharis acicularis*, *Equisetum* spp., *Galium aparine*, *Juncus phaeocephalus*, *Lepidium latifolium*, *Lolium perenne*, *Malvella leprosa*, *Mentha pulegium*, *Oenanthe sarmentosa*, *Polygonum amphibium*, *Polygonum argyrocoleon*, *Polygonum punctatum*, *Polypogon monspeliensis*, *Raphanus sativus*, *Rumex conglomeratus*, *Rumex crispus*, *Sagittaria brevirostra*, *Schoenoplectus pungens*, *Stachys chamissonis*, *Trifolium* spp., and *Xanthium strumarium*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.0	0.0 – 0	no data	
Herb	59.3	7 – 90	0.9	0.5 – 2

### Local Environmental Description

**Elevation:** Mean 25 m, Range 10 – 56 m

**Aspect:** Flat (1), Variable (1), NE (1), SW (1)

**Slope:** Mean 1 degrees, Range 0 – 1 degrees

**Macro Topography:** Lower 1/3 of slope (2), Bottom (2)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** Mean 41.0%, Range 0.0 – 96.0%

**Litter Cover:** Mean 32.3%, Range 0.2 – 92%

**Soil Texture (field assessed):** Medium sand (1), Medium silt loam (1), Muck (1), Fine silty clay (1)

**Geology (field or map data):** Franciscan melange (2), Alluvium (1), Silty alluvium (1)

**Marin County Watersheds:** Lagunitas Creek (2), Novato (1)

**Other Watersheds, Sonoma Co.:** Middle Russian River (1)

### Site Impacts

This association has greater cover of exotics (average 73.3%) than natives. Non-native species that occur with highest frequency and abundance include *Alisma lanceolatum*, *Bromus hordeaceus*, *Conium maculatum*, *Convolvulus arvensis*, *Lepidium latifolium*, *Lolium perenne*, *Mentha pulegium*, *Polygonum argyrocoleon*, *Polypogon monspeliensis*, *Raphanus sativus*, *Rumex conglomeratus*, and *Rumex crispus*.

### Classification Comments

This association is considered provisional since it is under-sampled in its expected range. It is newly described here. Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** none

Global Rarity Rank: GNR

State Rarity Rank: SNR

State Rare: Y

**Surveys Used for Description**

Total: N=4; Marin County (n=3): MARIN059, MARIN074, MARIN110

Sonoma County (n=1): SONO0232

**Association Stand Table**

\*Taxon listed more than once, Con = Constasy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Herb										
	<i>Alisma lanceolatum</i>	100	60.1	31.3	7.0	60.0	X	X		X
	<i>Typha latifolia</i>	50	0.3	0.3	0.2	1.0				X
	<i>Eleocharis macrostachya</i>	50	0.8	0.1	0.2	0.2				X
	<i>Alisma triviale</i>	25	10.1	6.3	25.0	25.0				
	<i>Rumex conglomeratus</i>	25	6.2	5.0	20.0	20.0				
	<i>Juncus phaeocephalus</i>	25	4.2	3.8	15.0	15.0				
	<i>Lepidium latifolium</i>	25	2.8	2.5	10.0	10.0				
	<i>Polygonum punctatum</i>	25	3.1	2.5	10.0	10.0				
	<i>Mentha pulegium</i>	25	2.2	1.8	7.0	7.0				
	<i>Xanthium strumarium</i>	25	2.8	1.8	7.0	7.0				
	<i>Polygonum amphibium</i>	25	2.0	1.3	5.0	5.0				
	<i>Eleocharis acicularis</i>	25	1.2	0.8	3.0	3.0				
	<i>Polygonum argyrocoleon</i>	25	1.2	0.8	3.0	3.0				
	<i>Beckmannia syzigachne</i>	25	0.3	0.3	1.0	1.0				
	<i>Conium maculatum</i>	25	0.3	0.3	1.0	1.0				
	<i>Cyperus eragrostis</i>	25	0.3	0.3	1.0	1.0				
	<i>Oenanthe sarmentosa</i>	25	0.3	0.3	1.0	1.0				
	<i>Rumex crispus</i>	25	0.3	0.3	1.0	1.0				
	<i>Bromus hordeaceus</i>	25	0.1	0.1	0.2	0.2				
	<i>Carex densa</i>	25	0.1	0.1	0.2	0.2				
	<i>Convolvulus arvensis</i>	25	0.1	0.1	0.2	0.2				
	<i>Cuscuta pentagona</i>	25	0.1	0.1	0.2	0.2				
	<i>Equisetum</i> spp.	25	0.1	0.1	0.2	0.2				
	<i>Galium aparine</i>	25	0.1	0.1	0.2	0.2				
	<i>Lolium perenne</i>	25	0.1	0.1	0.2	0.2				
	<i>Malvella leprosa</i>	25	0.1	0.1	0.2	0.2				
	<i>Polypogon monspeliensis</i>	25	0.1	0.1	0.2	0.2				
	<i>Raphanus sativus</i>	25	0.1	0.1	0.2	0.2				
	<i>Sagittaria brevirostra</i>	25	0.1	0.1	0.2	0.2				
	<i>Schoenoplectus pungens</i>	25	0.7	0.1	0.2	0.2				
	<i>Stachys chamissonis</i>	25	0.1	0.1	0.2	0.2				
	<i>Trifolium</i> spp.	25	0.1	0.1	0.2	0.2				

## **Polygonum (amphibium, lapathifolium) Association**

**Common Name:** Knotweed Mats

**Alliance:** *Polygonum lapathifolium* – *Xanthium strumarium* Herbaceous Alliance

### **Local Vegetation Description**

The Knotweed Association forms an open to continuous herbaceous layer. The shrub layer is sparse and the tree layer is absent. *Polygonum amphibium* is dominant or co-dominant in the herbaceous layer. Those herbs that are sometimes present include *Agrostis avenacea*, *Alisma lanceolatum*, *Cardamine oligosperma*, *Carex obnupta*, *Centaurium muehlenbergii*, *Cyperus eragrostis*, *Eleocharis macrostachya*, *Euthamia occidentalis*, *Helenium puberulum*, *Hirschfeldia incana*, *Holcus lanatus*, *Juncus effusus*, *Ludwigia* spp., *Myriophyllum aquaticum*, *Polygonum argyrocoleon*, *Polypogon monspeliensis*, *Pseudognaphalium luteoalbum*, *Schoenoplectus acutus*, *Typha angustifolia*, *Typha latifolia*, and *Xanthium strumarium*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.1	0.0 – 0.2	0.8	0.5 – 1
Herb	73.8	30 – 95	0.8	0 – 2

### **Local Environmental Description**

**Elevation:** Mean 79 m, Range 52 – 110 m

**Aspect:** Flat (2), NE (1), NW (1)

**Slope:** Mean 1 degrees, Range 0 – 3 degrees

**Macro Topography:** Bottom (3), Lower 1/3 of slope (1)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** Mean 20.3%, Range 0.0 – 58.0%

**Litter Cover:** Mean 52.5%, Range 0.0 – 85%

**Soil Texture (field assessed):** Not recorded (2), Fine silty clay (1), Muck (1)

**Geology (field or map data):** Franciscan melange (2), Mixed alluvium (1)

**Marin County Watersheds:** Lagunitas Creek (1), Novato (1)

**Other Watersheds, San Mateo Co.:** Palo Alto (1), San Mateo Bayside (1)

### **Site Impacts**

This association has low non-native plant cover (average 1.2%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Agrostis avenacea*, *Alisma lanceolatum*, *Hirschfeldia incana*, *Holcus lanatus*, *Myriophyllum aquaticum*, *Polygonum argyrocoleon*, *Polypogon monspeliensis*, and *Pseudognaphalium luteoalbum*.

### **Classification Comments**

Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** Buck-Diaz et al. 2012

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** N

**Surveys Used for Description**

Total: N=4; Marin County (n=2): MARIN105, MARIN114

San Mateo County (n=2): SMAT0207, SMAT0241

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Rubus ursinus</i>	25	12.5	0.1	0.2	0.2				
	<i>Toxicodendron diversilobum</i>	25	12.5	0.1	0.2	0.2				
<b>Herb</b>										
	<b><i>Polygonum amphibium</i></b>	<b>100</b>	<b>84.9</b>	<b>62.5</b>	<b>30.0</b>	<b>90.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Eleocharis macrostachya</i>	25	11.7	9.5	38.0	38.0				
	<i>Xanthium strumarium</i>	25	0.9	0.8	3.0	3.0				
	<i>Carex obnupta</i>	25	0.5	0.5	2.0	2.0				
	<i>Agrostis avenacea</i>	25	0.3	0.3	1.0	1.0				
	<i>Holcus lanatus</i>	25	0.3	0.3	1.0	1.0				
	<i>Polypogon monspeliensis</i>	25	0.3	0.3	1.0	1.0				
	<i>Typha latifolia</i>	25	0.3	0.3	1.0	1.0				
	<i>Alisma lanceolatum</i>	25	0.1	0.1	0.2	0.2				
	<i>Cardamine oligosperma</i>	25	0.1	0.1	0.2	0.2				
	<i>Centaurium muehlenbergii</i>	25	0.1	0.1	0.2	0.2				
	<i>Cyperus eragrostis</i>	25	0.1	0.1	0.2	0.2				
	<i>Euthamia occidentalis</i>	25	0.1	0.1	0.2	0.2				
	<i>Helenium puberulum</i>	25	0.1	0.1	0.2	0.2				
	<i>Hirschfeldia incana</i>	25	0.1	0.1	0.2	0.2				
	<i>Juncus effusus</i>	25	0.1	0.1	0.2	0.2				
	<i>Ludwigia</i> spp.	25	0.2	0.1	0.2	0.2				
	<i>Myriophyllum aquaticum</i>	25	0.2	0.1	0.2	0.2				
	<b><i>Polygonum argyrocoleon</i></b>	<b>25</b>	<b>0.1</b>	<b>0.1</b>	<b>0.2</b>	<b>0.2</b>				
	<i>Pseudognaphalium luteoalbum</i>	25	0.1	0.1	0.2	0.2				
	<i>Schoenoplectus acutus</i>	25	0.1	0.1	0.2	0.2				
	<i>Typha angustifolia</i>	25	0.1	0.1	0.2	0.2				

## ***Xanthium strumarium* Association**

**Common Name:** Rough Cocklebur Stands

**Alliance:** *Polygonum lapathifolium* – *Xanthium strumarium* Herbaceous Alliance

### **Local Vegetation Description**

The Rough Cocklebur Association forms an intermittent to continuous herbaceous layer. The shrub layer is absent and the tree layer is absent. *Xanthium strumarium* is dominant or co-dominant in the herbaceous layer. Those herbs often to characteristically present include *Atriplex prostrata*, *Cuscuta pentagona*, and *Lolium perenne*. Herbs sometimes present include *Agrostis* spp., *Carduus pycnocephalus*, *Cyperus eragrostis*, *Distichlis spicata*, *Frankenia salina*, *Juncus effusus*, *Pleuropogon californicus*, *Polypogon monspeliensis*, *Rumex* spp., *Silybum marianum*, and *Solanum americanum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.0	0 – 0	no data	
Herb	73.8	45 – 90	0.6	0 – 1

### **Local Environmental Description**

**Elevation:** Mean 76 m, Range 4 – 241 m

**Aspect:** Flat (2), NE (1), SW (1)

**Slope:** Mean 2 degrees, Range 0 – 6 degrees

**Macro Topography:** Bottom (2), Lower 1/3 of slope (1), Upper 1/3 of slope (1)

**Large Rock:** Mean 2.5%, Range 0.0 – 10.0%

**Small Rock:** Mean 3.8%, Range 0.0 – 15.0%

**Fines Cover:** Mean 43.0%, Range 1.0 – 96.0%

**Litter Cover:** Mean 48.5%, Range 2.0 – 96%

**Soil Texture (field assessed):** Medium to very fine, loamy sand (2), Medium silt loam (1)

**Geology (field or map data):** Alluvium (2), Large landslides (1), Franciscan melange (1)

**Marin County Watersheds:** Novato (4)

### **Site Impacts**

This association has low non-native plant cover (average 11.4%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Atriplex prostrata*, *Carduus pycnocephalus*, *Lolium perenne*, *Polypogon monspeliensis*, *Rumex crispus*, and *Silybum marianum*.

### **Classification Comments**

None.

**References:** Buck-Diaz et al. 2011, Buck-Diaz et al. 2012, Buck-Diaz et al. 2013

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** N

### **Surveys Used for Description**

**Total: N=4; Marin County (n=4):** MARIN107, MTBP002, MARIN408, MARIN409

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Herb</b>										
	<i>Xanthium strumarium</i>	100	58.4	50.5	5.0	90.0	X	X		X
	<i>Lolium perenne</i>	75	11.0	8.9	0.2	35.0	X			X
	<i>Cuscuta pentagona</i>	75	6.6	6.1	0.2	24.0	X			X
	<i>Atriplex prostrata</i>	50	0.1	0.1	0.2	0.2				X
	<i>Cyperus eragrostis</i>	25	19.7	8.8	35.0	35.0				
	<i>Distichlis spicata</i>	25	1.6	1.5	6.0	6.0				
	<i>Juncus effusus</i>	25	1.7	0.8	3.0	3.0				
	<i>Agrostis</i> spp.	25	0.1	0.1	0.2	0.2				
	<i>Bidens frondosa</i>	25	0.1	0.1	0.2	0.2				
	<i>Carduus pycnocephalus</i>	25	0.1	0.1	0.2	0.2				
	<i>Pleuropogon californicus</i>	25	0.1	0.1	0.2	0.2				
	<i>Polypogon monspeliensis</i>	25	0.1	0.1	0.2	0.2				
	<i>Rumex crispus</i>	25	0.1	0.1	0.2	0.2				
	<i>Rumex</i> spp.	25	0.1	0.1	0.2	0.2				
	<i>Silybum marianum</i>	25	0.1	0.1	0.2	0.2				
	<i>Solanum americanum</i>	25	0.1	0.1	0.2	0.2				
	<i>Frankenia salina</i>	25	0.0	0.0	0.1	0.1				
<b>Non-vascular</b>										
	Algae	50	50.0	11.8	0.2	47.0				X

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## ***Sarcocornia pacifica* (*Salicornia depressa*) Herbaceous Alliance**

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**Common Name:** Pickleweed mats

**NVC Alliance Code:** A3902. *Sarcocornia pacifica* - *Spartina foliosa* - *Glaux maritima* Salt Marsh Alliance

### **Statewide Description**

*Salicornia depressa* or *Sarcocornia pacifica* is dominant, co-dominant, or characteristic in the subshrub and herbaceous layers with algae and *Atriplex patula*, *Atriplex prostrata*, *Batis maritima*, *Bolboschoenus maritimus*, *Cotula coronopifolia*, *Crypsis schoenoides*, *Cuscuta salina*, *Distichlis spicata*, *Echinochloa crus-galli*, *Frankenia salina*, *Grindelia stricta*, *Jaumea carnosa*, *Juncus* spp., *Lepidium latifolium*, *Limonium californicum*, *Monanthochloe littoralis*, *Persicaria lapathifolia*, *Sesuvium verrucosum*, *Spartina foliosa*, *Suaeda esteroa*, *Suaeda taxifolia*, *Triglochin maritima*, and *Xanthium strumarium*.

In northern California, *Sarcocornia pacifica* co-dominates with *Cuscuta salina* in the high marsh zone, slightly above the zones dominated by the non-native grass *Spartina densiflora*. In central California, *Sarcocornia pacifica* dominates in high- and mid-marsh zones above the zones dominated by the native grass *Spartina foliosa*. In southern California, Zedler et al. (1999) stated that elevation profiles and vegetation patterns do not have discrete zonation, but they recognize three habitats: high marsh, marsh plain, and cordgrass habitat. In the high marsh, *Sarcocornia pacifica* is associated with *Arthrocnemum subterminale* and *Cuscuta salina*; the marsh plain is dominated by *Batis maritima*, *Distichlis spicata*, *Monanthochloe littoralis*, and *Sarcocornia pacifica*. General descriptions are found in Grewell et al. (2007).

### Local Vegetation Description

The Pickleweed mats Alliance forms an open to continuous herbaceous layer. The shrub layer is sparse and the tree layer is sparse. *Sarcocornia pacifica* or *Triglochin maritima* is dominant to co-dominant in the herbaceous layer, and characteristic herbs include *Distichlis spicata*. Those herbs often present include *Jaumea carnosa*, and herbs that are sometimes present include *Frankenia salina*, *Limonium californicum*, and *Spartina foliosa*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.0	0 – 0	no data	
Herb	79.5	20 – 100	0.3	0 – 1

### Local Membership Rule

*Sarcocornia pacifica* or *Triglochin maritima* dominates or co-dominates with *Distichlis spicata*, *Frankenia salina*, *Jaumea carnosa*, *Triglochin concinna*, and/or *Lepidium latifolium*. Stands found in coastal salt marshes, alkali flats, and wetland mudflats. Sometimes, *Jaumea carnosa* or *Frankenia* is dominant with *S. pacifica* subdominant.

### Local Environmental Description

**Elevation:** Mean 6 m, Range 0 – 12 m

**Aspect:** Flat (17), SW (4), NE (3), SE (2)

**Slope:** Mean 0 degrees, Range 0 – 2 degrees

**Macro Topography:** Bottom (8), Edge of basin/wetland (8), Bottom to Lower 1/3 of slope (3), Other (2), Lower 1/3 of slope (1)

**Large Rock:** 0.0%

**Small Rock:** Mean 0.0%, Range 0.0 – 0.2%

**Fines Cover:** Mean 33.9%, Range 0.0 – 96.0%

**Litter Cover:** Mean 18.9%, Range 0.0 – 88%

**Soil Texture (field assessed):** Medium silt (8), Muck (6), Fine silty clay (3), Medium to very fine, sandy loam (2), Moderately fine silty clay loam (2)

**Geology (field or map data):** Sandstone and other sedimentary (19), Alluvium (16), Franciscan melange (3), Mixed alluvium (3), Sand dunes (2), Granitic (1), Sandstone, shale, and conglomerate (1)

**Marin County Watersheds:** Point Reyes (17), Walker Creek (11), Drakes Estero (9), Tomales Bay (9), Lagunitas Creek (6), Novato (5), Bolinas (3), Inverness (2), Petaluma River (2), San Rafael (2)

### Site Impacts

This alliance has low non-native plant cover (average 2.9%) relative to native cover.

### Associations in Marin County

*Sarcocornia pacifica* – *Cotula coronopifolia*

*Sarcocornia pacifica* – *Jaumea carnosa* – *Distichlis spicata*

*Sarcocornia pacifica* Tidal

*Triglochin maritima*

### Classification Comments

Note that an association of *Triglochin maritima* is included in this alliance. It was mapped in Marin County, but no survey data of that association was available for the descriptions.



**References:** Atwater et al. 1979, Buck and Evens 2010, Buck-Diaz et al. 2012, Duke et al. 1999, Eicher 1987, Hickson and Keeler-Wolf 2007, Keeler-Wolf and Evens 2006, Keeler-Wolf and Vaghti 2000, Klein et al. 2015, Newton 1989, Peinado et al. 1994, Sproul et al. 2011

**Global Rarity Rank:** G4

**State Rarity Rank:** S3

**Surveys Used for Description**

**Total: N=74; Marin County (n=74):** MARIN012, MARIN013, MARIN025, MARIN030, MARIN042, MARIN103, MARIN147, MARIN400, MARIN401, MARIN402, MARIN404, MARINSP11, MOSD0308, NCSALT02, NCSALT04, PGA1096, PGA1111, PGA1115, PGA1374, PGA147, PGA168, PGA20, PGA2101, PGA2125, PGA2137, PGA241A, PGA248, PGA249, PGA256, PGA262, PGA288, PGA293, PGA298, PGA300, PGA301, PGA3258, PGA3282, PGA3302, PGA3574, PGA3587, PGA3593, PGA361, PGA3654, PGA3674, PGA3946, PGA4057, PGA412, PGA4132, PGA4153, PGA4351, PGA4493, PGA4494, PGA4728, PGA5947, PGA8356, PGA8492, PGA8694, PGA8728, PORE005, PORE006, PORE022, PORE040, PORE041, PORE080, PORE086, PORE108, SFANM02, SFANM03, SFANM04, SFANM06, SFANM07, SFANM10, SFANM11, SFANM12

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Herb	<i>Sarcocornia pacifica</i>	100	56.2	50.2	12.0	95.0	X	X		X
	<i>Distichlis spicata</i>	80	20.9	22.8	0.2	93.3	X			X
	<i>Jaumea carnosa</i>	65	6.5	7.0	0.2	60.0				X
	<i>Limonium californicum</i>	31	1.0	1.2	0.2	20.0				
	<i>Frankenia salina</i>	30	1.5	1.5	0.2	20.0				
	<i>Spartina foliosa</i>	22	3.7	2.7	0.2	65.0				

## ***Sarcocornia pacifica* – *Cotula coronopifolia* Association**

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**Common Name:** Pacific Glasswort – Brass Buttons Patches

**Alliance:** *Sarcocornia pacifica* (*Salicornia depressa*) Herbaceous Alliance

### **Local Vegetation Description**

The Pacific Glasswort – Brass Buttons Association forms a continuous herbaceous layer in the single survey available. The shrub layer is absent and the tree layer is absent. *Cotula coronopifolia* and *Sarcocornia pacifica* are co-dominant in the one stand sampled in Marin County, and other herbs include *Distichlis spicata*, *Frankenia salina*, *Isolepis cernua*, *Triglochin concinna*, and *Triglochin maritima*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	NA	no data	
Hardwood	0.0	NA	no data	
Regenerating or Shrubby Tree	0.0	NA	no data	
Shrub	0.0	NA	no data	
Herb	95.6	NA	no data	

### **Local Environmental Description**

**Elevation:** 7 m

**Aspect:** SW (1)

**Slope:** 0 degrees

**Macro Topography:** Edge of basin/wetland (1)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** no data

**Litter Cover:** 3%

**Soil Texture (field assessed):** Fine silty clay (1)

**Geology (field or map data):** Mixed alluvium (1)

**Marin County Watersheds:** Walker Creek (1)

### **Site Impacts**

This association has moderate non-native plant cover (average 36.6%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Cotula coronopifolia*.

### **Classification Comments**

None.

**References:** Buck-Diaz et al. 2012, Hickson and Keeler-Wolf 2007, Keeler-Wolf and Vaghti 2000

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

### **Surveys Used for Description**

**Total: N=1; Marin County (n=1):** PORE080

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Herb</b>										
	<b><i>Sarcocornia pacifica</i></b>	<b>100</b>	<b>57.5</b>	<b>55.0</b>	<b>55.0</b>	<b>55.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<b><i>Cotula coronopifolia</i></b>	<b>100</b>	<b>36.6</b>	<b>35.0</b>	<b>35.0</b>	<b>35.0</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<i>Triglochin concinna</i>	100	4.2	4.0	4.0	4.0	<b>X</b>			<b>X</b>
	<i>Triglochin maritima</i>	100	1.0	1.0	1.0	1.0	<b>X</b>			<b>X</b>
	<i>Distichlis spicata</i>	100	0.2	0.2	0.2	0.2	<b>X</b>			<b>X</b>
	<i>Frankenia salina</i>	100	0.2	0.2	0.2	0.2	<b>X</b>			<b>X</b>
	<i>Isolepis cernua</i>	100	0.2	0.2	0.2	0.2	<b>X</b>			<b>X</b>

***Sarcocornia pacifica* – *Jaumea carnosa* – *Distichlis spicata* Association**

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**Common Name:** Pacific Glasswort – Saltgrass – Marsh Jaumea Tidal Salt Marsh

**Alliance:** *Sarcocornia pacifica* (*Salicornia depressa*) Herbaceous Alliance

**Local Vegetation Description**

The Pacific Glasswort – Saltgrass – Marsh Jaumea Tidal Salt Marsh Association forms an open to continuous herbaceous layer. The shrub layer is sparse and the tree layer is absent. *Sarcocornia pacifica* is dominant to co-dominant with *Distichlis spicata*, *Jaumea carnosa*, and/or various herbs. Those herbs that are sometimes present include *Frankenia salina*, *Limonium californicum*, and *Triglochin concinna*. Sometimes, *Jaumea carnosa* is dominant with *S. pacifica* subdominant and keyed here.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.0	0 – 0	no data	
Herb	83.1	20 – 100	0.3	0 – 1

**Local Environmental Description**

**Elevation:** Mean 6 m, Range 0 – 12 m

**Aspect:** Flat (8), SW (3), NE (2), NW (1), SE (1)

**Slope:** Mean 0 degrees, Range 0 – 2 degrees

**Macro Topography:** Edge of basin/wetland (6), Bottom (3), Other (2), Lower 1/3 of slope (1), Bottom to Lower 1/3 of slope (1)

**Large Rock:** 0.0%

**Small Rock:** Mean 0.0%, Range 0.0 – 0.2%

**Fines Cover:** Mean 22.4%, Range 0.0 – 96.0%

**Litter Cover:** Mean 12.1%, Range 0.0 – 88%

**Soil Texture (field assessed):** Medium silt (3), Muck (3), Fine silty clay (2), Medium to very fine, sandy loam (2), Moderately fine silty clay loam (2)

**Geology (field or map data):** Sandstone and other sedimentary (16), Alluvium (11), Sand dunes (2), Franciscan melange (2), Granitic (1), Sandstone, shale, and conglomerate (1), Mixed alluvium (1)

**Marin County Watersheds:** Point Reyes (13), Walker Creek (9), Drakes Estero (7), Lagunitas Creek (6), Tomales Bay (5), Bolinas (2), Inverness (2), Petaluma River (2), Novato (1)

**Site Impacts**

This association has low non-native plant cover (average 2.0%) relative to native cover.

**Classification Comments**

None.

**References:** Buck and Evens 2010, Eicher 1987, Keeler-Wolf and Evens 2006, Klein et al. 2015, Newton 1989

**Global Rarity Rank:** G3

**State Rarity Rank:** S3

**State Rare:** Y

**Surveys Used for Description**

**Total: N=52; Marin County (n=52):** MARIN025, MARIN030, MARIN103, MARIN147, MARINSP11, MOSD0308, NCSALT02, NCSALT04, PGA1096, PGA1111, PGA1115, PGA1374, PGA168, PGA2101, PGA2125, PGA2137, PGA249, PGA288, PGA293, PGA298, PGA300, PGA301, PGA3258, PGA3282, PGA3302, PGA3654, PGA3674, PGA3946, PGA4057, PGA412, PGA4132, PGA4153, PGA4351, PGA4493, PGA4494, PGA4728, PGA5947, PGA8356, PGA8492, PGA8694, PGA8728, PORE006, PORE022, PORE040, PORE041, PORE086, PORE108, SFANM06, SFANM07, SFANM10, SFANM11, SFANM12

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Herb	<i>Sarcocornia pacifica</i>	100	48.8	48.5	12.0	88.9	X		X	X
	<i>Distichlis spicata</i>	98	29.5	32.3	3.0	93.3	X			X
	<i>Jaumea carnosa</i>	81	9.1	9.9	0.2	60.0	X			X
	<i>Frankenia salina</i>	37	2.0	2.0	0.2	20.0				
	<i>Limonium californicum</i>	37	1.3	1.6	0.2	20.0				
	<i>Triglochin concinna</i>	23	2.1	3.1	0.2	39.0				

## **Sarcocornia pacifica Tidal Association**

**Common Name:** Pacific Glasswort Tidal Marsh

**Alliance:** *Sarcocornia pacifica* (*Salicornia depressa*) Herbaceous Alliance

### **Local Vegetation Description**

The Pacific Glasswort Tidal Association forms a sparse to continuous herbaceous layer. The shrub layer is absent and the tree layer is absent. The dominant herb is *Sarcocornia pacifica*. Those herbs often present include *Spartina foliosa*, and herbs that are sometimes present include *Distichlis spicata*, *Jaumea carnosa*, and *Limonium californicum*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.0	0 – 0	no data	
Herb	70.2	20 – 95	0.3	0 – 0.5

### **Local Environmental Description**

**Elevation:** Mean 5 m, Range 0 – 9 m

**Aspect:** Flat (5), NE (1), SE (1)

**Slope:** Mean 0 degrees, Range 0 – 1 degrees

**Macro Topography:** Bottom to Lower 1/3 of slope (2), Edge of basin/wetland (1), Bottom (1)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** Mean 50.3%, Range 0.7 – 93.0%

**Litter Cover:** Mean 6.3%, Range 3.0 – 12%

**Soil Texture (field assessed):** Muck (3), Medium silt (1)

**Geology (field or map data):** Sandstone and other sedimentary (3), Alluvium (1), Franciscan melange (1), Mixed alluvium (1)

**Marin County Watersheds:** Point Reyes (4), Tomales Bay (4), Drakes Estero (2), San Rafael (2), Bolinas (1), Walker Creek (1)

### **Site Impacts**

This association has low non-native plant cover (average 3.5%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Spartina patens*.

### **Classification Comments**

None.

**References:** Atwater et al. 1979, Duke et al. 1999, Keeler-Wolf and Vaghti 2000, Klein et al. 2015, Peinado et al. 1994, Sproul et al. 2011

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

### **Surveys Used for Description**

**Total: N=17; Marin County (n=17):** MARIN012, MARIN013, MARIN042, PGA147, PGA20, PGA241A, PGA248, PGA256, PGA262, PGA3574, PGA3587, PGA3593, PGA361, PORE005, SFANM02, SFANM03, SFANM04

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Herb	<i>Sarcocornia pacifica</i>	100	76.1	52.3	20.0	95.0	X	X		X
	<i>Spartina foliosa</i>	53	14.8	10.4	0.2	65.0				X
	<i>Jaumea carnosa</i>	35	0.3	0.2	0.2	3.0				
	<i>Distichlis spicata</i>	29	0.6	0.4	0.2	4.0				
	<i>Limonium californicum</i>	24	0.3	0.3	0.2	3.0				

**Triglochin maritima Provisional Association**

**Common Name:** Seaside arrowgrassTidal Marsh

**Alliance:** *Sarcocornia pacifica* (*Salicornia depressa*) Herbaceous Alliance

**Local Vegetation Description**

The *Triglochin maritima* Association was not adequately sampled in Marin County, but field verification and fine-scale mapping validate its existence in tidal marshes. Stands in this association are dominated by *Triglochin maritima* (> 50% relative cover). This association also occurs in tidal marshes further north in Oregon and Washington, denoted as *Triglochin maritima* - (*Salicornia depressa*) Association.

**References:** NatureServe 2021

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

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## ***Schoenoplectus (acutus, californicus)* Herbaceous Alliance**

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**Common Name:** Hardstem and California bulrush marshes

**NVC Alliance Code:** A3895. *Schoenoplectus americanus* - *Schoenoplectus acutus* - *Schoenoplectus californicus* Marsh Alliance

### **Statewide Description**

*Schoenoplectus acutus* and/or *S. californicus* is dominant or co-dominant in the herbaceous layer with *Apocynum cannabinum*, *Azolla filiculoides*, *Bolboschoenus maritimus*, *Calystegia sepium*, *Eichhornia crassipes*, *Euthamia occidentalis*, *Hibiscus lasiocarpus*, *Hoita macrostachya*, *Hydrocotyle ranunculoides*, *Leersia oryzoides*, *Ludwigia peploides*, *Lycopus americanus*, *Persicaria punctata*, *Phragmites australis*, *Sparganium eurycarpum*, *Triglochin* spp., *Typha* spp., and *Urtica dioica*. Emergent trees and shrubs may be present at low cover, including trees: *Alnus rhombifolia*, *Populus fremontii*, or *Salix gooddingii*, and shrubs: *Cephalanthus occidentalis*, *Rubus armeniacus*, *Salix exigua*, or *Salix lasiolepis*.

The alliance is a widespread, freshwater to slightly brackish marsh type, typical of marshes throughout much of North America (NatureServe 2007a). Although *Schoenoplectus acutus* and *S. californicus* commonly occur in the same area, *S. acutus* is less tolerant of brackish conditions than is *S. californicus*, and associations dominated by *S. acutus* are not found regularly on the edges of large stretches of open water (Grewell et al. 2007). *S. californicus* tends to dominate on the outer, more-exposed edges of marshes adjacent to open water. However, both species also can co-dominate in stands.



### **Local Vegetation Description**

The Hardstem and California bulrush marshes Alliance forms an intermittent to continuous herbaceous layer. The shrub layer is open and the tree layer is sparse. Dominant herbs include *Schoenoplectus californicus*. Herbs that are sometimes present include *Atriplex prostrata*, *Distichlis spicata*, *Hydrocotyle ranunculoides*, *Juncus effusus*, *Potentilla anserina*, and *Schoenoplectus acutus*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.2	0 – 2	3.5	2 – 5
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	3.6	0 – 28	1.3	0.5 – 2
Herb	85.6	60 – 98	3.0	0 – 5

### **Local Membership Rule**

*Schoenoplectus acutus* or *Schoenoplectus californicus* dominates or co-dominates with other herbs including *Typha* spp. Occurs in both freshwater and tidal marshes, along ponds and lagoons.

### **Local Environmental Description**

**Elevation:** Mean 36 m, Range 3 – 215 m

**Aspect:** Flat (1), NW (1), SE (1)

**Slope:** 0 degrees

**Macro Topography:** Edge of basin/wetland (4)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** no data

**Litter Cover:** Mean 47.5%, Range 10.0 – 95%

**Soil Texture (field assessed):** Coarse, loamy sand (1), Medium silt loam (1), Moderately coarse, sandy loam (1), Moderately fine clay loam (1)

**Geology (field or map data):** Sandstone and other sedimentary (4), Sandstone (1), Mixed alluvium (1), Shale (1), Franciscan melange (1), Alluvium (1), Large landslides (1)

**Marin County Watersheds:** Bolinas (4), Point Reyes (4), Lagunitas Creek (2), Walker Creek (1)

### **Site Impacts**

This alliance has low non-native plant cover (average 3.6%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Atriplex prostrata*.

### **Associations in Marin County**

*Schoenoplectus acutus*

*Schoenoplectus californicus*

### **Classification Comments**

None.

**References:** AECOM 2013, Buck-Diaz et al. 2012, Hickson and Keeler-Wolf 2007, Keeler-Wolf and Vaghti 2000, Klein and Evens 2005, Klein et al. 2015, Reyes et al. 2020a, Sproul et al. 2011, VegCAMP 2015a

**Global Rarity Rank:** GNR

**State Rarity Rank:** S3S4

### Surveys Used for Description

**Total: N=13; Marin County (n=13):** PGA286, PGA318, PGA3368, PGA430, PGA439, PGA7497, PGA8375, PGA8931, PGA8976, PORE046, PORE116, PORE125, PORE127

### Alliance Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Herb	<b><i>Schoenoplectus californicus</i></b>	<b>77</b>	<b>45.0</b>	<b>40.8</b>	<b>30.0</b>	<b>95.0</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<i>Juncus effusus</i>	31	4.6	3.8	0.2	35.0				
	<i>Potentilla anserina</i>	31	3.4	3.5	3.0	20.0				
	<b><i>Schoenoplectus acutus</i></b>	<b>23</b>	<b>11.5</b>	<b>11.6</b>	<b>45.0</b>	<b>58.0</b>				
	<i>Distichlis spicata</i>	23	3.6	3.5	4.0	25.0				
	<i>Hydrocotyle ranunculoides</i>	23	0.8	0.6	0.2	7.0				
	<i>Atriplex prostrata</i>	23	0.4	0.5	0.2	3.0				

## ***Schoenoplectus acutus* Association**

**Common Name:** Common Tule Marsh

**Alliance:** *Schoenoplectus (acutus, californicus)* Herbaceous Alliance

### **Local Vegetation Description**

The Common Tule Association forms an open to continuous herbaceous layer. The shrub layer is sparse and the tree layer is sparse. The dominant herb is *Schoenoplectus acutus*. Those herbs that are sometimes present include *Atriplex prostrata*, *Distichlis spicata*, *Juncus effusus*, *Polygonum punctatum*, *Rumex crispus*, and *Typha latifolia*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.2	0 – 2	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.3	0 – 3	0.8	0.5 – 1
Herb	66.1	14 – 100	2.8	0 – 5

### **Local Environmental Description**

**Elevation:** Mean 82 m, Range 0 – 486 m

**Aspect:** Flat (6)

**Slope:** Mean 0 degrees, Range 0 – 0 degrees

**Macro Topography:** Bottom (6)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** Mean 3.2%, Range 0.0 – 10.0%

**Litter Cover:** Mean 52.7%, Range 0.0 – 93%

**Soil Texture (field assessed):** Muck (2)

**Geology (field or map data):** Mixed alluvium (4), Sandstone and other sedimentary (2), Franciscan melange (1), Alluvium (1), Volcanic flow rocks (1)

**Marin County Watersheds:** Bolinas (2), Walker Creek (1)

**Other Watersheds, San Mateo Co.:** San Mateo Bayside (3); **Sonoma Co.:** Middle Russian River (2), Petaluma River (1), Sonoma Creek (1)

### **Site Impacts**

This association has low non-native plant cover (average 2.2%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Atriplex prostrata* and *Rumex crispus*.

### **Classification Comments**

Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** AECOM 2013, Buck-Diaz et al. 2012, Hickson and Keeler-Wolf 2007, Klein and Evens 2005, Klein et al. 2015, Reyes et al. 2020a, Sproul et al. 2011, VegCAMP 2015a

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

### **Surveys Used for Description**

**Total: N=10; Marin County (n=3):** PGA3368, PGA8375, PGA8931

San Mateo County (n=3): PWFWM03, SMAT0208, SMAT0209

Sonoma County (n=4): SONO0233, SONO0321, SONO0374, SONO0648

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Herb</b>										
	<b><i>Schoenoplectus acutus</i></b>	<b>90</b>	<b>61.0</b>	<b>41.4</b>	<b>10.0</b>	<b>90.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Typha latifolia</i>	40	1.6	0.6	0.2	3.0				
	<i>Distichlis spicata</i>	30	4.7	4.6	4.0	25.0				
	<i>Atriplex prostrata</i>	30	0.5	0.6	0.2	3.0				
	<i>Juncus effusus</i>	30	0.6	0.6	0.2	4.0				
	<i>Polygonum punctatum</i>	30	0.2	0.1	0.2	0.2				
	<i>Rumex crispus</i>	30	0.1	0.1	0.2	0.2				

## Schoenoplectus californicus Association

**Common Name:** California Bulrush Marsh

**Alliance:** *Schoenoplectus (acutus, californicus)* Herbaceous Alliance

### Local Vegetation Description

The California Bulrush Association forms an intermittent to continuous herbaceous layer. The shrub layer is open and the tree layer is absent. The dominant herb is *Schoenoplectus californicus*. Those herbs that are sometimes present include *Hydrocotyle ranunculoides*, *Juncus effusus*, and *Potentilla anserina*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	3.5	2 – 5
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	5.3	0 – 28	1.3	0.5 – 2
Herb	83.2	60 – 96	3.5	2 – 5

### Local Environmental Description

**Elevation:** Mean 45 m, Range 3 – 215 m

**Aspect:** Flat (1), NW (1), SE (1)

**Slope:** Mean 0 degrees, Range 0 – 0 degrees

**Macro Topography:** Edge of basin/wetland (4)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** no data

**Litter Cover:** Mean 47.5%, Range 10 – 95%

**Soil Texture (field assessed):** Medium silt loam (1), Moderately coarse, sandy loam (1), Coarse, loamy sand (1), Moderately fine clay loam (1)

**Geology (field or map data):** Sandstone and other sedimentary (2), Franciscan melange (1), Shale (1), Sandstone (1), Mixed alluvium (1), Alluvium (1), Large landslides (1)

**Marin County Watersheds:** Point Reyes (4), Bolinas (2), Lagunitas Creek (2)

### Site Impacts

This association has low non-native plant cover (average 4.1%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Holcus lanatus* and *Delairea odorata*.

### Classification Comments

None.

**References:** Buck-Diaz et al. 2012, Keeler-Wolf and Vaghti 2000, Klein et al. 2015, Sproul et al. 2011

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

### Surveys Used for Description

**Total: N=10; Marin County (n=10):** PGA286, PGA318, PGA430, PGA439, PGA7497, PGA8976, PORE046, PORE116, PORE125, PORE127

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Herb	<i>Schoenoplectus californicus</i>	100	58.5	53.0	30.0	95.0	X	X		X
	<i>Juncus effusus</i>	30	5.6	4.5	0.2	35.0				
	<i>Potentilla anserina</i>	30	3.8	3.8	3.0	20.0				
	<i>Hydrocotyle ranunculoides</i>	30	1.1	0.7	0.2	7.0				

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## ***Sedum spathulifolium* Herbaceous Provisional Alliance**

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**Common Name:** Coast Range stonecrop draperies

**NVC Alliance Code:** A3784. *Sedum spathulifolium* Sparse Rock Vegetation Alliance

### **Statewide Description**

*Sedum spathulifolium* is dominant in the herbaceous layer with *Bromus rubens*, *Clarkia* spp., *Dichelostemma capitatum*, *Dudleya lanceolata*, *Erigeron petrophilus*, *Galium aparine*, *Melica torreyana*, *Pentagramma triangularis*, and *Polypodium californicum*. Emergent tree bonsai or shrubs may be present at low cover, including the shrubs *Galium porrigens* or *Heteromeles arbutifolia*.

Stands are typically small (< 0.5 ha), with the largest sampled so far at Pinnacles National Monument (NatureServe 2007b). In the future, we need information on species composition of nonvascular plants as well. They may be the diagnostic species if vegetation occurs on these rocky environments. Rock climbing and informal trails have impacted some stands negatively.

### **Local Vegetation Description**

The Coast Range stonecrop draperies Alliance forms an open to continuous herbaceous layer. The shrub layer is open and the tree layer is absent. Dominant herbs include *Polypodium californicum* and *Sedum spathulifolium*. Those herbs often present include *Aira praecox*, *Dudleya farinosa*, and *Hypochaeris radicata*, and herbs that are sometimes present include *Bromus diandrus*, *Eriophyllum stoechadifolium*, *Plantago lanceolata*, *Poa secunda*, *Rumex acetosella*, and *Vulpia bromoides*. Commonly associated emergent shrubs at sparse cover include *Baccharis pilularis*. Commonly associated non-vascular plants include Lichen and Moss.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	2.0	0 – 10	0.6	0 – 2
Herb	43.2	5 – 90	0.3	0 – 0.5

### **Local Membership Rule**

*Sedum spathulifolium* and/or *Polypodium* spp. dominate or co-dominate in small stands on steep north-facing rock outcrops and vertical cliff faces. Moss and lichen species often have high cover.

### **Local Environmental Description**

**Elevation:** Mean 225 m, Range 39 – 462 m

**Aspect:** NW (4), NE (2)

**Slope:** Mean 55 degrees, Range 31 – 70 degrees

**Macro Topography:** Upper 1/3 of slope (4), Middle to Upper 1/3 of slope (1), Upper 1/3 of slope to Ridgetop (1)

**Large Rock:** Mean 70.6%, Range 12.0 – 99.0%

**Small Rock:** Mean 7.6%, Range 0.0 – 45.0%

**Fines Cover:** Mean 18.4%, Range 0.2 – 87.0%

**Litter Cover:** Mean 2.6%, Range 0.2 – 10%

**Soil Texture (field assessed):** Not recorded (5), Unknown (1)

**Geology (field or map data):** Sandstone (3), Granitic (generic) (1), Metamorphic (type unknown) (1), Ultramafic (type unknown) (1)

**Marin County Watersheds:** Walker Creek (2), Estero San Antonio (1), Point Reyes (1)

**Other Watersheds, San Mateo Co.:** Pacifica (1), San Mateo Bayside (1)

### **Site Impacts**

This alliance has low non-native plant cover (average 12.9%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Aira praecox*, *Bromus diandrus*, *Hypochaeris radicata*, *Plantago lanceolata*, *Rumex acetosella*, and *Vulpia bromoides*.

### **Associations in Marin County**

*Sedum spathulifolium* – *Polypodium californicum* / Lichen – Moss

### **Classification Comments**

Since Marin County has fewer than five surveys of this alliance, data from nearby counties were included.

**References:** Sawyer et al. 2009

**Global Rarity Rank:** G4?

**State Rarity Rank:** S4?

### **Surveys Used for Description**

**Total: N=6; Marin County (n=4):** MARIN261, MARIN269, MARIN297, MARIN306

San Mateo County (n=2): SMAT0057, SMAT0158



**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	50	10.6	0.6	0.2	3.0				X
	<i>Rubus ursinus</i>	33	14.3	0.2	0.2	1.0				
	<i>Diplacus aurantiacus</i>	33	2.7	0.1	0.2	0.2				
<b>Herb</b>										
	<i>Polypodium californicum</i>	83	31.1	20.4	0.2	90.0	X		X	X
	<b><i>Sedum spathulifolium</i></b>	<b>83</b>	<b>41.1</b>	<b>9.7</b>	<b>0.2</b>	<b>40.0</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<i>Dudleya farinosa</i>	67	0.9	0.1	0.2	0.2				X
	<i>Aira praecox</i>	50	1.2	0.6	0.2	3.0				X
	<i>Hypochaeris radicata</i>	50	1.0	0.1	0.2	0.2				X
	<i>Vulpia bromoides</i>	33	3.2	0.7	1.0	3.0				
	<i>Eriophyllum stoechadifolium</i>	33	1.9	0.4	0.2	2.0				
	<i>Rumex acetosella</i>	33	0.5	0.2	0.2	1.0				
	<i>Poa secunda</i>	33	0.8	0.1	0.2	0.2				
	<i>Bromus diandrus</i>	33	0.8	0.1	0.2	0.2				
	<i>Plantago lanceolata</i>	33	0.3	0.1	0.2	0.2				
<b>Non-vascular</b>										
	Lichen	100	66.2	28.7	1.0	75.4	X	X		X
	Moss	83	33.8	12.5	0.2	38.0	X		X	X

***Sedum spathulifolium* – *Polypodium californicum* / Lichen – Moss Provisional Association**

**Common Name:** Broadleaf Stonecrop – California Polypody / Lichen – Moss Outcrops

**Alliance:** *Sedum spathulifolium* Herbaceous Provisional Alliance

**Classification Comments**

The association circumscription is the same as that of the alliance. See above for detailed description. This association is considered provisional since it is under-sampled in its expected range. Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

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## *Selaginella (bigelovii, wallacei)* Herbaceous Alliance

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**Common Name:** Bushy spikemoss mats

**NVC Alliance Code:** A3785. *Selaginella bigelovii* Rock Alliance

### **Statewide Description**

*Selaginella bigelovii* or *Selaginella wallacei* is dominant or conspicuous as rhizomatous mats in the herbaceous layer with *Aira caryophyllea*, *Avena barbata*, *Bromus diandrus*, *Bromus rubens*, *Corethrogyne filaginifolia*, *Logfia filaginoides*, *Melica imperfecta*, *Mirabilis laevis* var. *crassifolia*, *Plantago erecta*, and *Vulpia microstachys*. Emergent shrubs may be present at low cover, including *Adenostoma fasciculatum*, *Artemisia californica*, *Ceanothus crassifolius*, *Diplacus aurantiacus*, *Eriogonum fasciculatum*, *Eriogonum wrightii*, or *Hesperoyucca whipplei*.

The alliance is characteristic of outcrops in much of cismontane California. It typically occurs on gently to moderately sloping slabs of rock and, over time, may form thick mats of intertwined roots and rhizomes. The alliance is widespread in southern California, including the Channel Islands and Baja California. Surveys come from inland San Diego County north to San Benito County. In the northern Sierra Nevada foothills, Klein et al. (2007) placed stands with high cover of *Selaginella hansenii* in the *Lasthenia californica* – *Plantago erecta* – *Vulpia microstachys* Alliance. The relationships between *Selaginella*-dominated and annual herb-dominated vegetation can be better understood with further sampling in the southern foothills and other parts of California. The *Selaginella (tortipila, rupestris)* Alliance exists in the southeastern United States (NatureServe 2007a).

### **Local Vegetation Description**

The Bushy spikemoss mats Alliance forms an open herbaceous layer. The shrub layer is sparse and the tree layer is sparse. The dominant herb in the two stands sampled is *Selaginella wallacei*, and

characteristic herbs include *Avena* spp., *Bromus hordeaceus*, *Chlorogalum pomeridianum*, *Elymus multisetus*, *Eschscholzia californica*, *Gilia clivorum*, *Hypochaeris glabra*, *Hypochaeris radicata*, *Melica californica*, *Polypodium californicum*, *Silene gallica*, and *Vulpia myuros*. Those herbs often present include *Brachypodium distachyon*, *Briza maxima*, *Bromus diandrus*, *Bromus madritensis*, *Cheilanthes covillei*, *Crassula connata*, *Dichelostemma capitatum*, *Dichelostemma congestum*, *Dudleya cymosa*, *Dudleya* spp., *Epilobium canum*, *Erigeron petrophilus* var. *petrophilus*, *Eriogonum nudum*, *Erodium botrys*, *Erodium cicutarium*, *Logfia gallica*, *Lotus micranthus*, *Nassella pulchra*, *Pentagramma triangularis*, *Phacelia distans*, *Phacelia imbricata*, *Poa secunda*, *Rumex acetosella*, *Spergula arvensis*, *Streptanthus glandulosus*, *Thysanocarpus curvipes*, *Trifolium ciliolatum*, and *Trifolium microcephalum*. Commonly associated regenerating or shrubby trees at sparse cover include *Quercus agrifolia*. Commonly associated emergent shrubs at sparse cover include *Lupinus albifrons*, *Diplacus aurantiacus*, *Artemisia californica*, and *Keckiella corymbosa*. Commonly associated non-vascular plants include Lichen, Moss, *Umbilicaria phaea*, *Xanthoparmelia* spp., and Cryptogamic crust.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.1	0 – 0.2	0.3	0 – 0.5
Shrub	1.1	0.2 – 2	0.3	0 – 0.5
Herb	14.0	14 – 14	0.5	0 – 1

### **Local Membership Rule**

*Selaginella wallacei* dominates or characterizes small stands on rock outcrops, cliff faces, or skeletal soils over gently to steeply sloping, impervious substrates. Moss and lichen species often intermix.

### **Local Environmental Description**

**Elevation:** Mean 481 m, Range 421 – 541 m

**Aspect:** SE (1), SW (1)

**Slope:** Mean 54 degrees, Range 50 – 58 degrees

**Macro Topography:** Ridge top (1), Upper 1/3 of slope (1)

**Large Rock:** Mean 80.5%, Range 75.0 – 86.0%

**Small Rock:** Mean 10.5%, Range 3.0 – 18.0%

**Fines Cover:** Mean 6.5%, Range 6.0 – 7.0%

**Litter Cover:** Mean 2.0%, Range 1.0 – 3%

**Soil Texture (field assessed):** Not recorded (2)

**Geology (field or map data):** Ultramafic (type unknown) (2)

**Marin County Watersheds:** Novato (1), San Rafael (1)

### **Site Impacts**

This alliance has moderate non-native plant cover (average 26.0%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Brachypodium distachyon*, *Briza maxima*, *Bromus diandrus*, *Bromus hordeaceus*, *Bromus madritensis*, *Erodium botrys*, *Erodium cicutarium*, *Hypochaeris glabra*, *Hypochaeris radicata*, *Logfia gallica*, *Rumex acetosella*, *Silene gallica*, *Spergula arvensis*, and *Vulpia myuros*.

### **Associations in Marin County**

*Selaginella wallacei* / Lichen – Moss

### **Classification Comments**

None.

References: Klein et al. 2015

Global Rarity Rank: G4

State Rarity Rank: S3

**Surveys Used for Description**

Total: N=2; Marin County (n=2): MARIN218, MARIN227

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Regenerating or Shrubby Trees</b>										
	<i>Quercus agrifolia</i>	50	50.0	0.1	0.2	0.2				X
<b>Shrub</b>										
	<i>Lupinus albifrons</i>	100	40.6	0.6	0.2	1.0	X		X	X
	<i>Diplacus aurantiacus</i>	100	28.1	0.2	0.2	0.2	X			X
	<i>Keckiella corymbosa</i>	50	15.6	0.5	1.0	1.0				X
	<i>Artemisia californica</i>	50	15.6	0.5	1.0	1.0				X
<b>Herb</b>										
	<b><i>Selaginella wallacei</i></b>	<b>100</b>	<b>47.7</b>	<b>8.0</b>	<b>7.0</b>	<b>9.0</b>	<b>X</b>		<b>X</b>	<b>X</b>
	<i>Vulpia myuros</i>	100	1.2	0.2	0.2	0.2	X			X
	<i>Melica californica</i>	100	1.2	0.2	0.2	0.2	X			X
	<i>Elymus multisetus</i>	100	1.2	0.2	0.2	0.2	X			X
	<i>Gilia clivorum</i>	100	1.2	0.2	0.2	0.2	X			X
	<i>Silene gallica</i>	100	1.2	0.2	0.2	0.2	X			X
	<i>Hypochaeris radicata</i>	100	1.2	0.2	0.2	0.2	X			X
	<i>Eschscholzia californica</i>	100	1.2	0.2	0.2	0.2	X			X
	<i>Hypochaeris glabra</i>	100	1.2	0.2	0.2	0.2	X			X
	<i>Polypodium californicum</i>	100	1.2	0.2	0.2	0.2	X			X
	<i>Bromus hordeaceus</i>	100	1.2	0.2	0.2	0.2	X			X
	<i>Chlorogalum pomeridianum</i>	100	1.2	0.2	0.2	0.2	X			X
	<i>Avena</i> spp.	100	1.2	0.2	0.2	0.2	X			X
	<i>Briza maxima</i>	50	11.0	2.0	4.0	4.0				X
	<i>Bromus diandrus</i>	50	5.5	1.0	2.0	2.0				X
	<i>Erigeron petrophilus</i> var. <i>petrophilus</i>	50	6.3	1.0	2.0	2.0				X
	<i>Erodium botrys</i>	50	0.5	0.1	0.2	0.2				X
	<i>Bromus madritensis</i>	50	0.6	0.1	0.2	0.2				X
	<i>Cheilanthes covillei</i>	50	0.5	0.1	0.2	0.2				X
	<i>Poa secunda</i>	50	0.6	0.1	0.2	0.2				X
	<i>Dichelostemma congestum</i>	50	0.5	0.1	0.2	0.2				X
	<i>Dudleya cymosa</i>	50	0.6	0.1	0.2	0.2				X
	<i>Epilobium canum</i>	50	0.6	0.1	0.2	0.2				X
	<i>Erodium cicutarium</i>	50	0.6	0.1	0.2	0.2				X
	<i>Eriogonum nudum</i>	50	0.6	0.1	0.2	0.2				X
	<i>Logfia gallica</i>	50	0.5	0.1	0.2	0.2				X
	<i>Crassula connata</i>	50	0.6	0.1	0.2	0.2				X

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<i>Brachypodium distachyon</i>	50	0.6	0.1	0.2	0.2				X
	<i>Dudleya</i> spp.	50	0.5	0.1	0.2	0.2				X
	<i>Lotus micranthus</i>	50	0.5	0.1	0.2	0.2				X
	<i>Dichelostemma capitatum</i>	50	0.6	0.1	0.2	0.2				X
	<i>Streptanthus glandulosus</i>	50	0.6	0.1	0.2	0.2				X
	<i>Trifolium microcephalum</i>	50	0.5	0.1	0.2	0.2				X
	<i>Trifolium ciliolatum</i>	50	0.5	0.1	0.2	0.2				X
	<i>Thysanocarpus curvipes</i>	50	0.5	0.1	0.2	0.2				X
	<i>Rumex acetosella</i>	50	0.5	0.1	0.2	0.2				X
	<i>Phacelia imbricata</i>	50	0.6	0.1	0.2	0.2				X
	<i>Spergula arvensis</i>	50	0.5	0.1	0.2	0.2				X
	<i>Phacelia distans</i>	50	0.6	0.1	0.2	0.2				X
	<i>Nassella pulchra</i>	50	0.5	0.1	0.2	0.2				X
	<i>Pentagramma triangularis</i>	50	0.5	0.1	0.2	0.2				X
<b>Non-vascular</b>										
	<b>Lichen</b>	<b>100</b>	<b>69.5</b>	<b>41.5</b>	<b>33.0</b>	<b>50.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Xanthoparmelia</i> spp.	100	14.1	8.5	6.0	11.0	X			X
	<i>Umbilicaria phaea</i>	100	9.7	5.5	4.0	7.0	X			X
	<b>Moss</b>	<b>100</b>	<b>3.9</b>	<b>2.1</b>	<b>0.2</b>	<b>4.0</b>	<b>X</b>			<b>X</b>
	Cryptogamic crust	50	2.8	1.5	3.0	3.0				X

### ***Selaginella wallacei* / Lichen – Moss Provisional Association**

**Common Name:** Wallace's Spikemoss / Lichen – Moss Outcrops

**Alliance:** *Selaginella (bigelovii, wallacei)* Herbaceous Alliance

#### **Classification Comments**

The association circumscription is the same as that of the alliance. See above for detailed description. This association is considered provisional since it is under-sampled in its expected range.

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y



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## ***Sparganium (angustifolium)* Herbaceous Alliance**

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**Common Name:** Mats of bur-reed leaves

**NVC Alliance Code:** A3893. *Hippuris vulgaris* - *Ruppia* spp. - *Sparganium* spp. Aquatic Vegetation Alliance

### **Statewide Description**

*Sparganium angustifolium* or another *Sparganium* species is dominant on the water surface with *Brasenia schreberi*, *Callitriche* spp., *Carex utriculata*, *Carex vesicaria*, *Nuphar lutea*, *Potamogeton* spp., *Stuckenia* spp., *Typha* spp. and *Utricularia macrorhiza*.

*Sparganium eurycarpum* grows along the coast and inland in California, but not in salt marshes. *S. natans* grows in cool, quiet, slightly acidic to somewhat basic waters of bays, pools, ditches, and fens (Kaul 2000). The vegetational relationships among the bur-reeds need clarification.

*Sparganium angustifolium* is common in California's mountain lakes, regularly forming stands in the middle of small ponds and near lake shorelines. The habitat setting is similar to that of *Nuphar lutea*, but *S. angustifolium* typically occupies shallower water that may fluctuate more widely during the growing season.

### **Local Vegetation Description**

The Mats of bur-reed leaves Alliance forms a continuous herbaceous layer. The shrub layer is sparse and the tree layer is absent. *Sparganium eurycarpum* is dominant in the herbaceous layer. Those herbs often present include *Oenanthe sarmentosa*, and herbs that are sometimes present include *Agrostis pallens*, *Alisma triviale*, *Carex obnupta*, *Conium maculatum*, *Eleocharis macrostachya*, *Epilobium ciliatum*, *Erechtites minimus*, *Galium triflorum*, *Juncus arcticus*, *Juncus effusus*, *Juncus lescurii*, *Juncus*

*phaeocephalus*, *Lemna* spp., *Lythrum hyssopifolium*, *Polygonum amphibium*, *Polygonum punctatum*, *Potentilla anserina*, *Rumex acetosella*, *Rumex conglomeratus*, *Rumex crispus*, and *Schoenoplectus acutus*. Commonly associated emergent shrubs at sparse cover include *Rubus ursinus*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.2	0.0 – 1.0	1.5	1 – 2
Herb	79.8	70 – 90	2.3	1 – 5

### **Local Membership Rule**

*Sparganium eurycarpum* is dominant in wetlands with other forbs including *Agrostis pallens*, *Oenanthe sarmentosa*, and *Rumex conglomeratus*.

### **Local Environmental Description**

**Elevation:** Mean 39 m, Range 5 – 69 m

**Aspect:** Flat (3), NW (2)

**Slope:** Mean 1 degrees, Range 0 – 3 degrees

**Macro Topography:** Bottom to Lower 1/3 of slope (2), Lower 1/3 of slope (2), Bottom (1)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** Mean 29.8%, Range 0.0 – 92.0%

**Litter Cover:** Mean 15.6%, Range 0.0 – 63%

**Soil Texture (field assessed):** Muck (2), Not recorded (2), Medium silt (1)

**Geology (field or map data):** Mixed alluvium (1), Sandstone and other sedimentary (1), Alluvium (1), Volcanic and metavolcanic rocks (1), Franciscan melange (1)

**Marin County Watersheds:** Walker Creek (2), Lagunitas Creek (1), Point Reyes (1)

### **Site Impacts**

This alliance has low non-native plant cover (average 2.0%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Conium maculatum*, *Erechtites minimus*, *Lythrum hyssopifolium*, *Rumex acetosella*, *Rumex conglomeratus*, and *Rumex crispus*.

### **Associations in Marin County**

*Sparganium eurycarpum*

### **Classification Comments**

Since Marin County has fewer than five surveys of this alliance, data from nearby counties were included.

**References:** Sawyer et al. 2009

**Global Rarity Rank:** G4

**State Rarity Rank:** S3?

### **Surveys Used for Description**

**Total: N=5; Marin County (n=4):** MARIN073, MARIN078, MARIN259, MARIN296

San Mateo County (n=1): SMAT0213

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Rubus ursinus</i>	20	20.0	0.2	1.0	1.0				
<b>Herb</b>										
	<b><i>Sparganium eurycarpum</i></b>	<b>100</b>	<b>77.2</b>	<b>65.0</b>	<b>55.0</b>	<b>75.0</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<i>Oenanthe sarmentosa</i>	60	8.9	10.4	0.2	50.0				<b>X</b>
	<i>Rumex conglomeratus</i>	40	1.6	1.2	0.2	6.0				
	<i>Polygonum punctatum</i>	40	0.6	0.4	0.2	2.0				
	<i>Juncus effusus</i>	40	0.3	0.2	0.2	1.0				
	<i>Polygonum amphibium</i>	20	4.7	4.0	20.0	20.0				
	<i>Agrostis pallens</i>	20	4.6	3.6	18.0	18.0				
	<i>Juncus lescurii</i>	20	0.8	0.6	3.0	3.0				
	<i>Juncus arcticus</i>	20	0.2	0.2	1.0	1.0				
	<i>Galium triflorum</i>	20	0.3	0.2	1.0	1.0				
	<i>Conium maculatum</i>	20	0.2	0.2	1.0	1.0				
	<i>Rumex crispus</i>	20	0.0	0.0	0.2	0.2				
	<i>Juncus phaeocephalus</i>	20	0.0	0.0	0.2	0.2				
	<i>Lythrum hyssopifolium</i>	20	0.0	0.0	0.2	0.2				
	<i>Erechtites minimus</i>	20	0.1	0.0	0.2	0.2				
	<i>Lemna</i> spp.	20	0.1	0.0	0.2	0.2				
	<i>Potentilla anserina</i>	20	0.0	0.0	0.2	0.2				
	<i>Rumex acetosella</i>	20	0.0	0.0	0.2	0.2				
	<i>Epilobium ciliatum</i>	20	0.1	0.0	0.2	0.2				
	<i>Eleocharis macrostachya</i>	20	0.0	0.0	0.2	0.2				
	<i>Carex obnupta</i>	20	0.1	0.0	0.2	0.2				
	<i>Alisma triviale</i>	20	0.0	0.0	0.2	0.2				
	<i>Schoenoplectus acutus</i>	20	0.1	0.0	0.2	0.2				

***Sparganium eurycarpum* Provisional Association**

**Common Name:** Broadfruit Bur-reed Aquatic Vegetation

**Alliance:** *Sparganium (angustifolium)* Herbaceous Alliance

**Classification Comments**

The association circumscription is the same as that of the alliance. See above for detailed description. This association is considered provisional since it is under-sampled in its expected range. Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y



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## ***Spartina foliosa* Herbaceous Alliance**

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**Common Name:** California cordgrass marsh

**NVC Alliance Code:** A3902. *Sarcocornia pacifica* - *Spartina foliosa* - *Glaux maritima* Salt Marsh Alliance

### **Statewide Description**

*Spartina foliosa* is dominant in the herbaceous layer with algae and *Batis maritima*, *Sarcocornia pacifica*, and *Schoenoplectus californicus*.

The alliance often dominates lower-marsh settings in central and southern California; stands of *Sarcocornia pacifica* or *Salicornia depressa* typically occupy the landward edges of the alliance in mid- to high-marsh settings. For an overview of the state's coastal salt marshes, see Grewell et al. (2007) and MacDonald (1977); for regional descriptions of San Francisco and San Pablo bays, see Josselyn (1983) and Spicher and Josselyn (1985); and for southern California estuaries see J. Zedler (1982) and Zedler et al. (1999).

*Spartina alterniflora*, a highly invasive species, was introduced into San Francisco Bay in the 1970s (Callaway and Josselyn 1992). Early workers assumed that the subsequently invading grass was *Spartina alterniflora* but later work found that the plants invading new sites were hybrids with *S. foliosa* (Ainouche et al. 2004, Ayres et al. 2007). In contrast to the native *Spartina foliosa*, the hybrids grow in upper salt marshes and in deeper water, changing marsh species composition by invading mud flats. These hybrids may eventually eliminate *S. foliosa* (Ayres et al. 2007).

### **Local Vegetation Description**

The California cordgrass marsh Alliance forms an open to intermittent herbaceous layer. The shrub layer is absent and the tree layer is absent. *Spartina foliosa* is dominant in the herbaceous layer often as monocultures. Herbs that are sometimes present include *Sarcocornia pacifica*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.0	0 – 0	no data	
Herb	37.2	20 – 60	0.6	0 – 1

**Local Membership Rule**

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

**Local Environmental Description**

**Elevation:** Mean 5 m, Range 3 – 6 m

**Aspect:** Flat (1), NW (1), SE (1), SW (1)

**Slope:** Mean 0 degrees, Range 0 – 1 degrees

**Macro Topography:** Edge of basin/wetland (2), Bottom (1), Bottom to Lower 1/3 of slope (1)

**Large Rock:** Mean 0.1%, Range 0.0 – 0.2%

**Small Rock:** Mean 0.1%, Range 0.0 – 0.2%

**Fines Cover:** Mean 86.0%, Range 79.0 – 93.0%

**Litter Cover:** Mean 5.1%, Range 0.0 – 20%

**Soil Texture (field assessed):** Medium silt (2), Muck (2)

**Geology (field or map data):** Franciscan melange (2), Silty alluvium (2)

**Marin County Watersheds:** Drakes Estero (1), Inverness (1), Novato (1), San Rafael (1), Tomales Bay (1)

**Site Impacts**

This alliance has very low non-native plant cover (average 0.0%) relative to native cover.

**Associations in Marin County**

*Spartina foliosa*

**Classification Comments**

None.

**References:** AECOM 2013, Atwater et al. 1979, Keeler-Wolf and Vaghti 2000, Keeler-Wolf et al. 2003a, Klein et al. 2015, Peinado et al. 1994, Sproul et al. 2011

**Global Rarity Rank:** G3

**State Rarity Rank:** S3

**Surveys Used for Description**

**Total: N=5; Marin County (n=5):** MARIN011, MARIN022, PGA241, PORE160, PORE191

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Herb	<i>Spartina foliosa</i>	100	98.2	36.6	20.0	57.0	X	X		X
	<i>Sarcocornia pacifica</i>	40	1.8	1.0	0.2	5.0				
Non-vascular										
	Algae	20	20.0	5.0	25.0	25.0				

## ***Spartina foliosa* Association**

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**Common Name:** California Cordgrass Salt Marsh

**Alliance:** *Spartina foliosa* Herbaceous Alliance

### **Classification Comments**

The association circumscription is the same as that of the alliance. See above for detailed description.

**References:** AECOM 2013, Atwater et al. 1979, Keeler-Wolf and Vaghti 2000, Keeler-Wolf et al. 2003a, Klein et al. 2015, Peinado et al. 1994, Sproul et al. 2011

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

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## ***Trifolium variegatum* Herbaceous Alliance**

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**Common Name:** White-tip clover swales

**NVC Alliance Code:** A4175. *Trifolium variegatum* Vernal Pool Alliance

### **Statewide Description**

*Trifolium variegatum* is dominant or characteristically present in the herbaceous layer with *Aira caryophylllea*, *Avena barbata*, *Briza minor*, *Bromus diandrus*, *Bromus hordeaceus*, *Castilleja attenuata*, *Deschampsia danthonioides*, *Erodium botrys*, *Erodium cicutarium*, *Hedypnois cretica*, *Hesperervax caulescens*, *Hypochaeris glabra*, *Juncus bufonius*, *Leontodon saxatilis*, *Lolium perenne*, *Microseris elegans*, *Mimulus guttatus*, *Montia fontana*, *Soliva sessilis*, *Trifolium gracilentum*, *Trifolium microcephalum*, *Triphysaria eriantha*, and *Vulpia bromoides*.

Stands form in swales, seeps, moist grassy flats, and intermittent stream channels as a conspicuous mix of native and non-native plants (Klein et al. 2007). Barbour et al. (2005, 2007b) noted that *T. variegatum* occurred within a group of vernal pool vegetation types of short inundation periods distinguished by species such as *Blennosperma nanum*, *Cicendia quadrangularis*, *Lasthenia californica*, *Trifolium variegatum*, and *Triphysaria eriantha*. Their research focused on vernal pools, but stands of *Trifolium variegatum* are also in seasonally moist or saturated upland settings. The relationships between this and other alliances need investigation because this alliance extends beyond vernal pools to these other settings.

We have defined this alliance by using *T. variegatum* as the native indicator species that occurs regularly but varies in dominance both spatially and temporally. In some years or in certain locations, non-native annuals surpass its abundance and cover. In-depth studies (Bartolome et al. 2007a, Buck 2006, Stromberg et al. 2007) describe the value of identifying persistent native species, even at low cover, as a

means to understanding restoration potentials and the natural ranges and ecological variability of these vegetation types.

Pitt and Heady (1978) identified a negative relationship between *Trifolium* cover and annual grass cover. More recently, D'Antonio et al. (2007) discussed seasonal variation and ecological interactions between native and non-native herbs, and Corbin et al. (2007) discussed negative interactions among native *Trifolium* and non-native *Erodium* and annual grasses. Climatic variation in some years favors the dominance of *Erodium* and *Trifolium* species; in some years *Avena* species or *Bromus hordeaceus* dominate. Annual grasses tend to be favored in years when rain starts early, temperatures are relatively warm during germination, and rainfall is regular throughout the wet season. Conversely, *Erodium* and *Trifolium* species appear to be favored during years with a late rain onset or an extended winter or spring drought.

### **Local Vegetation Description**

The White-tip clover swales Alliance forms an intermittent to continuous herbaceous layer. The shrub layer is absent and the tree layer is absent. *Trifolium variegatum* is characteristically present to co-dominant. Those herbs often present include *Bromus hordeaceus*, *Hemizonia congesta*, *Hordeum marinum*, *Juncus bufonius*, *Lolium perenne*, and *Mimulus guttatus*, and herbs that are sometimes present include *Anagallis arvensis*, *Astragalus gambelianus*, *Avena* spp., *Briza minor*, *Bromus diandrus*, *Cardamine oligosperma*, *Carduus pycnocephalus*, *Cerastium glomeratum*, *Chlorogalum pomeridianum*, *Cynosurus echinatus*, *Cyperus eragrostis*, *Dichelostemma capitatum*, *Eleocharis macrostachya*, *Eschscholzia californica*, *Geranium dissectum*, *Glyceria* spp., *Hypochaeris glabra*, *Juncus phaeocephalus*, *Juncus xiphioides*, *Lactuca saligna*, *Leontodon taraxacoides*, *Lilaea scilloides*, *Lotus humistratus*, *Lotus micranthus*, *Lotus unifoliolatus* var. *unifoliolatus*, *Lythrum hyssopifolium*, *Mentha pulegium*, *Montia fontana*, *Nassella pulchra*, *Parentucellia viscosa*, *Picris echioides*, *Plagiobothrys nothofulvus*, *Pleuropogon californicus*, *Ranunculus californicus*, *Ranunculus muricatus*, *Rumex pulcher*, *Sherardia arvensis*, *Trifolium fucatum*, and *Vulpia microstachys*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.0	0 – 0	no data	
Herb	65.0	55 – 80	0.3	0 – 0.5

### **Local Membership Rule**

*Trifolium variegatum* dominates or co-dominates in the herbaceous layer with a variety of other native and non-native herbs such as *Bromus* spp., *Juncus bufonius*, *Lolium perenne*, *Lotus* spp., *Plagiobothrys* spp., *Trifolium fucatum*, and others. Stands occur in vernal wet, shallow swales.

### **Local Environmental Description**

**Elevation:** Mean 214 m, Range 73 – 489 m

**Aspect:** SW (1), NW (1), SE (1)

**Slope:** Mean 7 degrees, Range 2 – 14 degrees

**Macro Topography:** Lower 1/3 of slope (2), Middle 1/3 of slope (1)

**Large Rock:** Mean 2.0%, Range 0.0 – 6.0%

**Small Rock:** Mean 1.1%, Range 0.0 – 3.0%

**Fines Cover:** Mean 20.7%, Range 8.0 – 34.0%

**Litter Cover:** Mean 30.7%, Range 0.2 – 90%

**Soil Texture (field assessed):** Coarse, loamy sand (1), Medium silt (1), Muck (1)

**Geology (field or map data):** Franciscan melange (2), Silty alluvium (1)

**Marin County Watersheds:** Lagunitas Creek (1), Novato (1), Petaluma River (1)



## Site Impacts

This alliance has moderate non-native plant cover (average 43.6%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Anagallis arvensis*, *Briza minor*, *Bromus diandrus*, *Bromus hordeaceus*, *Carduus pycnocephalus*, *Cerastium glomeratum*, *Cynosurus echinatus*, *Geranium dissectum*, *Hordeum marinum*, *Hypochaeris glabra*, *Lactuca saligna*, *Leontodon taraxacoides*, *Lythrum hyssopifolium*, *Mentha pulegium*, *Parentucellia viscosa*, *Picris echioides*, *Ranunculus muricatus*, *Rumex pulcher*, and *Sherardia arvensis*.

## Associations in Marin County

*Trifolium variegatum*

## Classification Comments

None.

**References:** Buck-Diaz et al. 2011, Buck-Diaz et al. 2012, Buck-Diaz et al. 2013, Klein et al. 2007

**Global Rarity Rank:** G3?

**State Rarity Rank:** S3?

## Surveys Used for Description

**Total: N=3; Marin County (n=3):** MARIN212, MARIN235, MMWD0022

## Alliance Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Herb										
	<i>Trifolium variegatum</i>	100	27.0	21.3	9.0	35.0	X			X
	<i>Lolium perenne</i>	67	10.0	6.7	0.2	20.0				X
	<i>Bromus hordeaceus</i>	67	5.6	3.4	0.2	10.0				X
	<i>Mimulus guttatus</i>	67	2.8	2.7	0.2	8.0				X
	<i>Juncus bufonius</i>	67	2.5	2.4	0.2	7.0				X
	<i>Hordeum marinum</i>	67	1.5	1.3	1.0	3.0				X
	<i>Hemizonia congesta</i>	67	0.2	0.1	0.2	0.2				X
	<i>Pleuropogon californicus</i>	33	10.5	7.0	21.0	21.0				
	<i>Hypochaeris glabra</i>	33	8.4	5.0	15.0	15.0				
	<i>Trifolium fucatum</i>	33	6.1	3.7	11.0	11.0				
	<i>Lythrum hyssopifolium</i>	33	3.8	3.7	11.0	11.0				
	<i>Leontodon taraxacoides</i>	33	3.4	3.3	10.0	10.0				
	<i>Bromus diandrus</i>	33	4.5	2.7	8.0	8.0				
	<i>Mentha pulegium</i>	33	2.7	2.7	8.0	8.0				
	<i>Juncus xiphioides</i>	33	1.0	1.0	3.0	3.0				
	<i>Ranunculus muricatus</i>	33	1.0	1.0	3.0	3.0				
	<i>Juncus phaeocephalus</i>	33	1.5	1.0	3.0	3.0				
	<i>Cyperus eragrostis</i>	33	0.7	0.7	2.0	2.0				
	<i>Eleocharis macrostachya</i>	33	0.7	0.7	2.0	2.0				
	<i>Glyceria</i> spp.	33	0.7	0.7	2.0	2.0				
	<i>Picris echioides</i>	33	0.3	0.3	1.0	1.0				
	<i>Lactuca saligna</i>	33	0.5	0.3	1.0	1.0				
	<i>Lotus micranthus</i>	33	0.6	0.3	1.0	1.0				

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<i>Plagiobothrys nothofulvus</i>	33	0.6	0.3	1.0	1.0				
	<i>Sherardia arvensis</i>	33	0.6	0.3	1.0	1.0				
	<i>Avena</i> spp.	33	0.6	0.3	1.0	1.0				
	<i>Lotus humistratus</i>	33	0.6	0.3	1.0	1.0				
	<i>Anagallis arvensis</i>	33	0.1	0.1	0.2	0.2				
	<i>Montia fontana</i>	33	0.1	0.1	0.2	0.2				
	<i>Cardamine oligosperma</i>	33	0.1	0.1	0.2	0.2				
	<i>Eschscholzia californica</i>	33	0.1	0.1	0.2	0.2				
	<i>Dichelostemma capitatum</i>	33	0.1	0.1	0.2	0.2				
	<i>Cynosurus echinatus</i>	33	0.1	0.1	0.2	0.2				
	<i>Chlorogalum pomeridianum</i>	33	0.1	0.1	0.2	0.2				
	<i>Cerastium glomeratum</i>	33	0.1	0.1	0.2	0.2				
	<i>Lotus unifoliolatus</i> var. <i>unifoliolatus</i>	33	0.1	0.1	0.2	0.2				
	<i>Carduus pycnocephalus</i>	33	0.1	0.1	0.2	0.2				
	<i>Astragalus gambelianus</i>	33	0.1	0.1	0.2	0.2				
	<i>Briza minor</i>	33	0.1	0.1	0.2	0.2				
	<i>Nassella pulchra</i>	33	0.1	0.1	0.2	0.2				
	<i>Geranium dissectum</i>	33	0.1	0.1	0.2	0.2				
	<i>Vulpia microstachys</i>	33	0.1	0.1	0.2	0.2				
	<i>Rumex pulcher</i>	33	0.1	0.1	0.2	0.2				
	<i>Ranunculus californicus</i>	33	0.1	0.1	0.2	0.2				
	<i>Lilaea scilloides</i>	33	0.1	0.1	0.2	0.2				
	<i>Parentucellia viscosa</i>	33	0.1	0.1	0.2	0.2				

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### ***Trifolium variegatum* Association**

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**Common Name:** Whitetip Clover Swales

**Alliance:** *Trifolium variegatum* Herbaceous Alliance

**Classification Comments**

The association circumscription is the same as that of the alliance. See above for detailed description.

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

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## ***Typha (angustifolia, domingensis, latifolia)* Herbaceous Alliance**

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**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 xglauca*, 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. xglauca*) 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. 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.

### **Local Vegetation Description**

The Cattail marshes Alliance forms an intermittent to continuous herbaceous layer. The shrub layer is open and the tree layer is absent. *Typha latifolia*, *T. angustifolia*, or *Typha domingensis* is dominant or co-dominant in the herbaceous layer, and herbs that are often to sometimes present include *Juncus effusus*, *Carex obnupta*, *Carex* spp., *Cyperus eragrostis*, *Epilobium ciliatum*, *Equisetum telmateia*, *Holcus lanatus*, *Hydrocotyle ranunculoides*, *Mentha pulegium*, and *Oenanthe sarmentosa*. Commonly associated emergent shrubs at sparse cover include *Rubus ursinus*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	3.7	0.0 – 25.0	0.3	0 – 0.5
Herb	80.3	55 – 100	1.5	1 – 2

### **Local Membership Rule**

*Typha latifolia*, *T. angustifolia*, and/or *T. domingensis* dominate in semi-permanently flooded freshwater or brackish marshes. If *Schoenoplectus acutus* or *S. californicus* is co-dominant, key to the appropriate *Schoenoplectus* Alliance.

### **Local Environmental Description**

**Elevation:** Mean 48 m, Range 4 – 241 m

**Aspect:** Flat (4), SW (2)

**Slope:** Mean 0 degrees, Range 0 – 1 degrees

**Macro Topography:** Bottom (5), Edge of basin/wetland (1)

**Large Rock:** 0.0%

**Small Rock:** Mean 0.0%, Range 0.0 – 0.2%

**Fines Cover:** Mean 17.4%, Range 3.0 – 45.0%

**Litter Cover:** Mean 34.5%, Range 1.0 – 90%

**Soil Texture (field assessed):** Muck (3), Fine silty clay (1), Moderately fine clay loam (1), Moderately fine silty clay loam (1)

**Geology (field or map data):** Franciscan melange (3), Sandstone and other sedimentary (3), Alluvium (2), Sandstone, shale, and conglomerate (1), Granitic (1)

**Marin County Watersheds:** Bolinas (3), Lagunitas Creek (2), Point Reyes (2), San Rafael (2), Petaluma River (1)

### **Site Impacts**

This alliance has low non-native plant cover (average 6.1%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Holcus lanatus* and *Mentha pulegium*.

### **Associations in Marin County**

*Typha (latifolia, angustifolia)*

*Typha domingensis*

### **Classification Comments**

None.

**References:** AECOM 2013, Boul et al. 2021, Buck and Evens 2010, Buck-Diaz et al. 2012, Evens and Kentner 2006, Evens and San 2005, Evens et al. 2014, Hickson and Keeler-Wolf 2007, Junak et al. 2007, Keeler-Wolf and Vaghti 2000, Klein et al. 2007, Klein et al. 2015, Reyes et al. 2020a, Pickart 2006, Rodriguez et al. 2017, Sproul et al. 2011

**Global Rarity Rank:** G5

**State Rarity Rank:** S5

**Surveys Used for Description**

**Total: N=10; Marin County (n=10):** GGNRA272, MARIN001, MMWD0127, MMWD0131, MMWD0184, MOSD0309, PGA278, PGA280, PGA588, PGA7691

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Rubus ursinus</i>	40	30.4	1.2	3.0	3.0				
<b>Herb</b>										
	<b><i>Typha latifolia</i></b>	<b>60</b>	<b>29.6</b>	<b>31.2</b>	<b>25.0</b>	<b>99.0</b>				<b>X</b>
	<i>Juncus effusus</i>	50	10.3	14.1	0.2	80.0				<b>X</b>
	<i>Oenanthе sarmentosa</i>	40	3.0	3.6	5.0	15.0				
	<b><i>Typha spp.</i></b>	<b>30</b>	<b>27.6</b>	<b>20.5</b>	<b>48.0</b>	<b>80.0</b>				
	<i>Carex obnupta</i>	30	2.6	3.6	1.0	20.0				
	<i>Mentha pulegium</i>	20	2.2	1.5	0.2	15.0				
	<i>Cyperus eragrostis</i>	20	1.9	1.2	2.0	10.0				
	<i>Carex spp.</i>	20	0.8	0.7	0.2	7.0				
	<i>Holcus lanatus</i>	20	0.9	0.5	0.2	5.0				
	<i>Hydrocotyle ranunculoides</i>	20	0.4	0.3	0.2	3.0				
	<i>Equisetum telmateia</i>	20	0.4	0.2	0.2	2.0				
	<i>Epilobium ciliatum</i>	20	0.0	0.0	0.2	0.2				

## *Typha (latifolia, angustifolia) Association*

**Common Name:** Broadleaf or Narrowleaf Cattail Marsh

**Alliance:** *Typha (angustifolia, domingensis, latifolia)* Herbaceous Alliance

### Local Vegetation Description

The Broadleaf or Narrowleaf Cattail Marsh Association forms an intermittent to continuous herbaceous layer. The shrub layer is sparse and the tree layer is absent. *Typha latifolia* or *T. angustifolia* is dominant or co-dominant in the herbaceous layer, and other herbs that are sometimes present include *Carex* spp., *Cyperus eragrostis*, *Equisetum telmateia*, *Juncus effusus*, and *Typha latifolia*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	1.6	0 – 5	0.3	0 – 0.5
Herb	81.6	60 – 95	1.5	1 – 2

### Local Environmental Description

**Elevation:** Mean 73 m, Range 4 – 241 m

**Aspect:** Flat (3)

**Slope:** Mean 0 degrees, Range 0 – 0 degrees

**Macro Topography:** Bottom (3)

**Large Rock:** 0.0%

**Small Rock:** 0.0%

**Fines Cover:** Mean 12.3%, Range 3.0 – 29.0%

**Litter Cover:** Mean 35.3%, Range 7.0 – 90%

**Soil Texture (field assessed):** Muck (2), Moderately fine clay loam (1)

**Geology (field or map data):** Franciscan melange (3), Sandstone and other sedimentary (2)

**Marin County Watersheds:** San Rafael (2), Bolinas (1), Lagunitas Creek (1), Point Reyes (1)

### Site Impacts

This association has very low non-native plant cover (average 0.1%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Mentha pulegium* and *Picris echioides*.

### Classification Comments

None.

**References:** Evens and Kentner 2006, Evens and San 2005, Evens et al. 2014, Hickson and Keeler-Wolf 2007, Keeler-Wolf and Vaghti 2000, Klein et al. 2007, Pickart 2006

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** N

### Surveys Used for Description

**Total: N=5; Marin County (n=5):** MMWD0127, MMWD0131, MMWD0184, PGA280, PGA588

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Rubus ursinus</i>	40	38.7	1.2	3.0	3.0				
<b>Herb</b>										
	<b><i>Typha</i> spp.</b>	<b>60</b>	<b>55.2</b>	<b>41.0</b>	<b>48.0</b>	<b>80.0</b>				<b>X</b>
	<b><i>Typha latifolia</i></b>	<b>40</b>	<b>25.7</b>	<b>24.0</b>	<b>40.0</b>	<b>80.0</b>				
	<i>Juncus effusus</i>	40	4.5	4.0	0.2	20.0				
	<i>Cyperus eragrostis</i>	40	3.8	2.4	2.0	10.0				
	<i>Carex</i> spp.	40	1.6	1.4	0.2	7.0				
	<i>Equisetum telmateia</i>	40	0.7	0.4	0.2	2.0				

## ***Typha domingensis* Association**

**Common Name:** Southern Cattail Marsh

**Alliance:** *Typha* (*angustifolia*, *domingensis*, *latifolia*) Herbaceous Alliance

### **Local Vegetation Description**

The Southern Cattail Association forms an open to continuous herbaceous layer. The shrub layer is absent and the tree layer is absent. *Typha domingensis* is dominant or co-dominant in the two stands sampled. Those herbs often present include *Mentha pulegium*, *Picris echioides*, *Schoenoplectus acutus*, and *Typha* spp.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	0.0	0.0 – 0	no data	
Herb	49.0	23 – 75	1.5	1 – 2

### **Local Environmental Description**

**Elevation:** Mean 4 m, Range 2 – 5 m

**Aspect:** Flat (2)

**Slope:** Mean 0 degrees, Range 0 – 0 degrees

**Macro Topography:** Bottom (2)

**Large Rock:** 0.0%

**Small Rock:** Mean 0.1%, Range 0.0 – 0.2%

**Fines Cover:** Mean 33.5%, Range 22.0 – 45.0%

**Litter Cover:** Mean 57.0%, Range 40.0 – 74%

**Soil Texture (field assessed):** Fine silty clay (1), Muck (1)

**Geology (field or map data):** Alluvium (1), Sandstone, shale, and conglomerate (1)

**Marin County Watersheds:** Petaluma River (1)

**Other Watersheds, Sonoma Co.:** Sonoma Creek (1)

### **Site Impacts**

This association has low non-native plant cover (average 14.3%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Mentha pulegium* and *Picris echioides*.

### **Classification Comments**

Since the number of surveys of this association in Marin are low, data from nearby counties were included.

**References:** AECOM 2013, Boul et al. 2021, Buck and Evens 2010, Buck-Diaz et al. 2012, Evens et al. 2014, Junak et al. 2007, Klein et al. 2015, Reyes et al. 2020a, Rodriguez et al. 2017, Sproul et al. 2011

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** N

### **Surveys Used for Description**

**Total: N=2; Marin County (n=1):** MOSD0309

Sonoma County (n=1): SONO0380

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Herb</b>										
	<i>Typha domingensis</i>	100	59.6	36.5	23.0	50.0	X	X		X
	<i>Typha</i> spp.	50	25.9	12.5	25.0	25.0				X
	<i>Mentha pulegium</i>	50	10.7	7.5	15.0	15.0				X
	<i>Picris echioides</i>	50	3.6	2.5	5.0	5.0				X
	<i>Schoenoplectus acutus</i>	50	0.2	0.1	0.2	0.2				X

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## *Zostera (marina, pacifica)* Pacific Aquatic Herbaceous Alliance

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**Common Name:** Eelgrass beds

**NVC Alliance Code:** A4364. *Zostera marina* Temperate Pacific Eelgrass Bed Alliance

### Statewide Description

*Zostera marina* or *Zostera pacifica* is dominant and occurs often in monotypic stands or beds, with no other vascular plants. Occasionally co-occurring with algae including *Sargassum muticum* and *Ulva intestinalis*. It can be challenging to morphologically differentiate *Z. marina* and *Z. pacifica* individuals (see Thorne et al. 2020). The state-wide distribution and abundance of *Z. pacifica*, as well as its general ecology, is not as well documented as *Z. marina*.

*Zostera* spp. can form dense clonal mats and occur nearly exclusively in monotypic stands, known as beds or meadows, with no other vascular plants. Occurrences can be small sporadic patches of less than a square meter to large dense meadows of tens of hectares such as in Humboldt Bay, Humboldt County, and in Drakes Estero and Tomales Bay, in Marin County. Occasionally co-occurring with the invasive brown algae, Japanese wireweed (*Sargassum muticum*), the green algae, sea lettuce (*Ulva intestinalis*), and the introduced red beard sponge (*Clathria prolifera*). In upper tidal sloughs, *Z. maritima* can co-occur directly adjacent to ditch-grass (*Ruppia maritima*), but the taxa do not appear to occur in mixed stands and are separated by slight differences in salinity, substrate, or water velocity. In open ocean locations such as in Monterey Bay and on the Southern Bight and Channel Islands, *Z. pacifica* can occur directly adjacent to but not intermixed with giant kelp (*Macrocystis pyrifera*) forests, however the populations are segregated by water depth (steep seafloor drop off that eliminates *Z. pacifica*), and rocky substrate, which is required by giant kelp.

### **Local Vegetation Description**

The Eelgrass beds Alliance was not adequately sampled in Marin County or in surrounding counties, but field verification and fine-scale mapping validate its existence in bays, estuaries, and inlets. Large eelgrass beds occur in Tomales Bay and Drakes Estero. Stands appear to be dominated by *Zostera marina*.

### **Local Membership Rule**

*Zostera marina* and/or *Z. pacifica* dominate in sub-tidal and aquatic marine settings.

### **Associations in Marin County**

*Zostera marina*\*

### **Surveys Used for Description**

**Total: N=0; Marin County (n=0)**

**References:** Bockelmann et al. 2013, Coyer et al. 2008, Cullen-Unsworth and Unsworth 2016, Duarte 2002, Flora of North America Editorial Committee 1993+, Gilkerson and Merkel 2017, Green and Short 2003, Kim et al. 2014, Leppig and Garwood 2018, Meling-Lopez and Ibarra-Obando 1999, NOAA 2014, NOAA 2019, Schlosser and Eicher 2007 Sherman and DeBruyckere 2018 SWRCB 2020 Thorne et al. 2012, Williams 2007, Zimmerman 2006

**Global Rarity Rank:** GNR

**State Rarity Rank:** S3

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### ***Zostera marina* Association**

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**Common Name:** Eelgrass beds

**Alliance:** *Zostera (marina, pacifica)* Pacific Aquatic Herbaceous Alliance

### **Local Vegetation Description**

The association circumscription is the same as that of the alliance. See above for the description. This association is considered provisional since it does not have adequate sampling in its expected range.

**Global Rarity Rank:** GNR

**State Rarity Rank:** S3

**State Rare:** Y



## SPARSE VEGETATION

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### ***Allium* spp. – *Streptanthus* spp. – *Hesperolinon* spp. Serpentinite Sparsely Vegetated Alliance**

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**Common Name:** Onion – twistflower – dwarf-flax serpentinite sparse vegetation

**NVC Alliance Code:** A3783. *Allium* spp. - *Streptanthus* spp. - *Hesperolinon* spp. Serpentinite Sparse Rock Vegetation Alliance

#### **Statewide Description**

*Allium* spp., *Eriogonum luteolum*, *Hesperolinon* spp. and/or *Streptanthus* spp. are diagnostic herbs at sparse cover in the herbaceous layer, which is variable but commonly includes *Allium burlewii*, *A. cratericola*, *A. falcifolium*, *Asclepias cordifolia*, *Asclepias solanoana*, *Aspidotis densa*, *Chlorogalum pomeridianum*, *Claytonia exigua*, *Dudleya abramsii*, *Dudleya caespitosa*, *Eriogonum* spp., *Hesperolinon adenophyllum*, *H. bicarpellatum*, *H. breweri*, *H. californicum*, *H. clevelandii*, *H. congestum*, *H. didymocarpum*, *H. disjunctum*, *H. micranthum*, *H. spergulinum*, *H. tehamense*, *Lomatium* spp., *Nassella pulchra*, *Plantago erecta*, *Streptanthus batrachopus*, *S. breweri*, *S. glandulosus* or *S. morrisonii*. Sparse shrubs may be present at low cover including *Adenostoma fasciculatum*, *Arctostaphylos* spp., *Ceanothus* spp., *Eriogonum* spp. and *Quercus durata*. Emergent conifers may be present such as *Hesperocyparis* spp., *Pinus attenuata*, *P. jeffreyi* or *P. sabiniana*. Non-vascular lichens may have high cover in some stands.

A host of distinctive annual and perennial plants are adapted to and/or thrive on harsh, infertile peridotite and serpentinite soils whereby the species composition of this alliance is variable. Often called 'serpentine barrens', they usually include one or more species of *Allium* (especially *A. falcifolium* or *A.*

*cratericola*), *Streptanthus*, *Hesperolinon*, *Dudleya*, and annual or perennial *Eriogonum* spp. (Klein et al. 2015, Buck-Diaz et al. 2021) among many others.

Stands of this alliance typically have sparse cover characterized by annual and perennial herbs, with occasional low-growing shrubs. Woody species such as *Quercus durata*, *Arctostaphylos* spp., and *Ceanothus* spp. (particularly *C. jepsonii* or *C. cuneatus*) may be widely scattered. Occasionally, emergent conifers can be present (NatureServe 2020).

Stands are restricted to serpentine, or other ultramafic substrates that are characteristically high in magnesium and low in calcium, and often include chemically harsh elements. The combination of a substrate toxic to most plants and a location on frequently unstable talus or scree slopes (often called barrens) makes these landscapes poorly vegetated, but rich in serpentine-tolerant endemic plants. All major serpentine regions within the state contain such barrens. However, there is insufficient vegetation data to characterize all of them (Klein et al. 2015). This alliance is known to occupy serpentinite outcrops of the central and southern Sierra Nevada, central and northern Coast Ranges, and Klamath Mountains (NatureServe 2020).

### **Local Vegetation Description**

The Onion – twistflower – dwarf-flax serpentinite sparse vegetation Alliance forms a sparse to open herbaceous layer. The shrub layer is sparse and the tree layer is sparse. Stands on serpentine rocky outcrops have variable species composition that often to characteristically include *Allium falcifolium*, *Claytonia exigua*, *Chlorogalum pomeridianum*, *Eriogonum luteolum*, *Streptanthus glandulosus* and *Vulpia microstachys*. Herbs that are sometimes present include *Achillea millefolium*, *Aspidotis densa*, *Avena* spp., *Bromus hordeaceus*, *Calystegia subacaulis*, *Clarkia* spp., *Danthonia californica*, *Elymus multisetus*, *Epilobium minutum*, *Eschscholzia californica*, *Hesperovax sparsiflora*, *Hesperolinon congestum*, *Koeleria macrantha*, *Layia platyglossa*, *Lolium perenne*, *Lomatium dasycarpum*, *Lotus humistratus*, *Melica torreyana*, *Microseris douglasii*, *Mimulus guttatus*, *Minuartia douglasii*, *Nassella pulchra*, *Pentagramma triangularis*, *Plantago erecta*, *Sisyrinchium bellum*, and *Streptanthus batrachopus*. Commonly associated emergent shrubs at sparse cover include *Adenostoma fasciculatum*. Commonly associated non-vascular plants include Lichen and Moss.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0.2	7.5	5 – 10
Regenerating or Shrubby Tree	0.0	0 – 0	3.5	2 – 5
Shrub	1.4	0 – 5	0.4	0 – 1
Herb	9.2	1 – 21	0.3	0 – 1

### **Local Membership Rule**

Sparsely vegetated herbaceous stands (generally less than 2% absolute cover) characterized by *Allium falcifolium*, *Claytonia exigua*, *Dudleya* spp., *Eriogonum luteolum*, *E. nudum*, *Plantago erecta*, *Streptanthus batrachopus*, and/or *S. glandulosus* growing on steep serpentine barrens with exposed gravel and bedrock.

### **Local Environmental Description**

**Elevation:** Mean 453 m, Range 91 – 744 m

**Aspect:** NW (2), SE (2), NE (2), SW (2)

**Slope:** Mean 20 degrees, Range 12 – 26 degrees

**Macro Topography:** Middle 1/3 of slope (5), Middle to Upper 1/3 of slope (3)

**Large Rock:** Mean 20.3%, Range 1 – 56%

**Small Rock:** Mean 53.8%, Range 11 – 84%

**Fines Cover:** Mean 19.2%, Range 0.2 – 75%

**Litter Cover:** Mean 6.5%, Range 0.2 – 27%

**Soil Texture (field assessed):** Not recorded (3), Coarse, loamy sand (2), Fine silty clay (1), Medium silt (1), Moderately fine sandy clay loam (1)

**Geology (field or map data):** Serpentine (4), Franciscan melange (2), Ultramafic (type unknown) (1), Ultramafic rocks, mostly serpentine (1)

**Marin County Watersheds:** Lagunitas Creek (4), San Rafael (3), Bolinas (1)

**Site Impacts**

This alliance has low non-native plant cover (average 12.3%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Bromus hordeaceus*.

**Associations in Marin County**

*Allium falcifolium* – *Eriogonum luteolum* – *Streptanthus (batrachopus, morrisonii)*  
*Streptanthus glandulosus* – *Dudleya abramsii* / Lichen – Moss

**Classification Comments**

None.

**References:** Evens and Kentner 2006

**Global Rarity Rank:** G2G3

**State Rarity Rank:** S2S3

**Surveys Used for Description**

**Total: N=8; Marin County (n=8):** MARIN241, MARIN242, MARIN243, MARIN252, MMWD0052, MMWD0054, MOSD0111, MOSD0339

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Adenostoma fasciculatum</i>	50	14.9	0.1	0.2	0.2				X
	<i>Quercus durata</i>	25	13.4	0.7	0.2	5.0				
	<i>Heteromeles arbutifolia</i>	25	9.9	0.4	0.2	3.0				
	<i>Eriodictyon californicum</i>	25	13.1	0.1	0.2	0.2				
	<i>Ceanothus jepsonii</i>	25	2.0	0.1	0.2	0.2				
<b>Herb</b>										
	<i>Vulpia microstachys</i>	75	3.7	0.2	0.2	0.2	X			X
	<i>Chlorogalum pomeridianum</i>	75	3.0	0.2	0.2	0.2	X			X
	<i>Claytonia exigua</i>	50	7.4	0.2	0.2	1.0				X
	<b><i>Allium falcifolium</i></b>	<b>50</b>	<b>3.3</b>	<b>0.1</b>	<b>0.2</b>	<b>0.2</b>				<b>X</b>
	<b><i>Streptanthus glandulosus</i></b>	<b>50</b>	<b>2.0</b>	<b>0.1</b>	<b>0.2</b>	<b>0.2</b>				<b>X</b>
	<i>Eriogonum luteolum</i>	50	1.8	0.1	0.2	0.2				X
	<i>Nassella pulchra</i>	38	2.3	0.3	0.2	2.0				
	<i>Melica torreyana</i>	38	1.7	0.1	0.2	0.2				
	<i>Achillea millefolium</i>	38	1.0	0.1	0.2	0.2				
	<i>Aspidotis densa</i>	38	2.7	0.1	0.2	0.2				
	<i>Avena</i> spp.	38	1.4	0.1	0.2	0.2				
	<i>Sisyrinchium bellum</i>	38	1.0	0.1	0.2	0.2				
	<i>Lomatium dasycarpum</i>	38	1.0	0.1	0.2	0.2				

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<i>Elymus multisetus</i>	38	1.0	0.1	0.2	0.2				
	<b><i>Hesperolinon congestum</i></b>	<b>38</b>	<b>1.0</b>	<b>0.1</b>	<b>0.2</b>	<b>0.2</b>				
	<i>Plantago erecta</i>	38	1.0	0.1	0.2	0.2				
	<i>Minuartia douglasii</i>	38	1.9	0.1	0.2	0.2				
	<i>Lolium perenne</i>	25	6.9	1.3	3.0	7.0				
	<i>Microseris douglasii</i>	25	3.6	0.2	0.2	1.0				
	<i>Mimulus guttatus</i>	25	3.5	0.2	0.2	1.0				
	<i>Clarkia</i> spp.	25	1.5	0.1	0.2	0.2				
	<i>Lotus humistratus</i>	25	0.8	0.1	0.2	0.2				
	<i>Layia platyglossa</i>	25	0.8	0.1	0.2	0.2				
	<i>Calystegia subacaulis</i>	25	0.8	0.1	0.2	0.2				
	<i>Danthonia californica</i>	25	0.8	0.1	0.2	0.2				
	<i>Epilobium minutum</i>	25	1.7	0.1	0.2	0.2				
	<i>Eschscholzia californica</i>	25	0.3	0.1	0.2	0.2				
	<i>Hesperivax sparsiflora</i>	25	0.3	0.1	0.2	0.2				
	<i>Koeleria macrantha</i>	25	1.1	0.1	0.2	0.2				
	<i>Pentagramma triangularis</i>	25	1.8	0.1	0.2	0.2				
	<b><i>Streptanthus batrachopus</i></b>	<b>25</b>	<b>1.5</b>	<b>0.1</b>	<b>0.2</b>	<b>0.2</b>				
	<i>Bromus hordeaceus</i>	25	0.7	0.1	0.2	0.2				
<b>Non-vascular</b>										
	Lichen	50	32.9	1.3	0.2	7.0				X
	Moss	50	25.0	0.3	0.2	2.0				X
	Cryptogammic crust	25	3.9	0.4	0.2	3.0				

***Allium falcifolium* – *Eriogonum luteolum* – *Streptanthus (batrachopus, morrisonii)*  
Association**

**Common Name:** Scythe-leaf Onion – Buckwheat – Jewelflower Patches

**Alliance:** *Allium* spp. – *Streptanthus* spp. – *Hesperolinon* spp. Serpentine Sparsely Vegetated Alliance

**Local Vegetation Description**

The Scythe-leaf Onion – Buckwheat – Jewelflower Association forms sparse to open shrub and herbaceous layers with total vegetation cover less than 10%. The tree layer is generally absent. *Quercus durata* is the characteristic shrub, while other species such as *Adenostoma fasciculatum*, *Arctostaphylos montana*, *Ceanothus jepsonii*, and *Heteromeles arbutifolia* may be present at low cover. Characteristic herbs include *Allium falcifolium*, *Clarkia* spp., *Claytonia exigua*, *Eriogonum luteolum*, *Melica torreyana*, and *Streptanthus batrachopus*.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0		
Hardwood	0.0	0 – 0		
Regenerating or Shrubby Tree	0.0	0 – 0		
Shrub	3.5	1.8 – 5.2	No data	
Herb	3.5	2.6 – 4.4		

**Local Environmental Description**

**Elevation:** Mean 617 m, Range 536 – 698 m

**Aspect:** NW (1), SE (1)

**Slope:** Mean 23 degrees, Range 20 – 26 degrees

**Macro Topography:** Middle 1/3 of slope (2)

**Large Rock:** Mean 20.1%, Range 12.2 – 28.0%

**Small Rock:** Mean 72.5%, Range 70.0 – 75.0%

**Fines Cover:** Mean 7.5%, Range 5.0 – 10.0%

**Litter Cover:** Mean 0.6%, Range 0.2 – 1%

**Soil Texture (field assessed):** Coarse, loamy sand (2)

**Geology (field or map data):** Franciscan melange (1), Serpentine (1)

**Marin County Watersheds:** Bolinas (1), Lagunitas Creek (1)

**Site Impacts**

This association has low non-native plant cover (average 10.6%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Avena* spp., *Bromus diandrus*, *Bromus hordeaceus*, *Hypochaeris glabra*, and *Lythrum hyssopifolium*.

**Classification Comments**

This is a new association name which merges the former *Quercus durata* / *Allium falcifolium* – *Streptanthus batrachopus* Association (Evens and Kentner 2006) and the *Eriogonum luteolum* – *Streptanthus morrisonii* Association (Klein et al. 2015).

**References:** Evens and Kentner 2006, Klein et al. 2015

**Global Rarity Rank:** G2

**State Rarity Rank:** S2?

**State Rare:** Y

**Surveys Used for Description**

**Total: N=2; Marin County (n=2):** MMWD0052, MMWD0054

### Association Stand Table

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Quercus durata</i>	100	53.6	2.6	0.2	5.0	X	X		X
	<i>Adenostoma fasciculatum</i>	100	7.5	0.2	0.2	0.2	X			X
	<i>Arctostaphylos montana</i>	50	27.8	0.5	1.0	1.0				X
	<i>Ceanothus jepsonii</i>	50	5.6	0.1	0.2	0.2				X
	<i>Heteromeles arbutifolia</i>	50	5.6	0.1	0.2	0.2				X
<b>Herb</b>										
	<b><i>Allium falcifolium</i></b>	100	6.1	0.2	0.2	0.2	X			X
	<i>Clarkia</i> spp.	100	6.1	0.2	0.2	0.2	X			X
	<i>Claytonia exigua</i>	100	6.1	0.2	0.2	0.2	X			X
	<b><i>Eriogonum luteolum</i></b>	<b>100</b>	<b>6.1</b>	<b>0.2</b>	<b>0.2</b>	<b>0.2</b>	<b>X</b>			<b>X</b>
	<i>Melica torreyana</i>	100	6.1	0.2	0.2	0.2	X			X
	<b><i>Streptanthus batrachopus</i></b>	<b>100</b>	<b>6.1</b>	<b>0.2</b>	<b>0.2</b>	<b>0.2</b>	<b>X</b>			<b>X</b>
	<i>Bromus diandrus</i>	50	11.4	0.5	1.0	1.0				X
	<i>Mimulus guttatus</i>	50	11.4	0.5	1.0	1.0				X
	<i>Aspidotis densa</i>	50	3.8	0.1	0.2	0.2				X
	<i>Avena</i> spp.	50	2.3	0.1	0.2	0.2				X
	<i>Brodiaea elegans</i>	50	2.3	0.1	0.2	0.2				X
	<i>Bromus hordeaceus</i>	50	2.3	0.1	0.2	0.2				X
	<i>Calystegia</i> spp.	50	3.8	0.1	0.2	0.2				X
	<i>Centaureum muehlenbergii</i>	50	2.3	0.1	0.2	0.2				X
	<i>Chlorogalum pomeridianum</i>	50	2.3	0.1	0.2	0.2				X
	<i>Fritillaria affinis</i>	50	3.8	0.1	0.2	0.2				X
	<i>Galium porrigens</i>	50	3.8	0.1	0.2	0.2				X
	<i>Hypochaeris glabra</i>	50	2.3	0.1	0.2	0.2				X
	<i>Koeleria macrantha</i>	50	3.8	0.1	0.2	0.2				X
	<i>Lythrum hyssopifolium</i>	50	3.8	0.1	0.2	0.2				X
	<i>Vulpia microstachys</i>	50	3.8	0.1	0.2	0.2				X

*Allium falcifolium* – *Eriogonum luteolum* – *Streptanthus (batrachopus, morrisonii)* Association  
*Allium* spp. – *Streptanthus* spp. – *Hesperolinon* spp. Serpentinite Sparsely Vegetated Alliance

***Streptanthus glandulosus* – *Dudleya abramsii* / Lichen – Moss Association**

**Common Name:** Bristly Jewelflower – Abram's Dudleya / Lichen – Moss Patches

**Alliance:** *Allium* spp. – *Streptanthus* spp. – *Hesperolinon* spp. Serpentinite Sparsely Vegetated Alliance

**Local Vegetation Description**

The Bristly Jewelflower – Abram's Dudleya / Lichen – Moss Association forms a sparse to open herbaceous layer. The shrub layer is sparse if present and the tree layer is generally absent. Characteristic herbs include *Streptanthus glandulosus* along with *Chlorogalum pomeridianum*, *Elymus multisetus*, *Hesperolinon congestum*, *Minuartia douglasii*, *Nassella pulchra*, and *Vulpia microstachys*. Those herbs often present include *Achillea millefolium*, *Allium falcifolium*, *Aspidotis densa*, *Avena*, *Claytonia exigua*, *Epilobium minutum*, *Eriogonum luteolum*, *Eschscholzia californica*, *Hesperrevax sparsiflora*, *Lolium perenne*, *Lomatium dasycarpum*, *Lotus humistratus*, *Plantago erecta*, and *Sisyrinchium bellum*. A *Dudleya* spp. may be present. Commonly associated non-vascular plants include Lichen, Moss, and Cryptogamic crust.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0		
Hardwood	0.0	0 – 0		
Regenerating or Shrubby Tree	0.0	0 – 0		
Shrub	0.1	0.0 – 0.2	0.3	0– 0.5
Herb	10.0	1 – 21	0.3	0 –0.5

**Local Environmental Description**

**Elevation:** Mean 466 m, Range 91 – 744 m

**Aspect:** SW (2), NW (1), SE (1)

**Slope:** Mean 20 degrees, Range 18 – 22 degrees

**Macro Topography:** Middle to Upper 1/3 of slope (3), Middle 1/3 of slope (1)

**Large Rock:** Mean 29.0%, Range 4.0 – 56.0%

**Small Rock:** Mean 43.3%, Range 11.0 – 84.0%

**Fines Cover:** Mean 21.6%, Range 0.2 – 75.0%

**Litter Cover:** Mean 5.9%, Range 0.2 – 14%

**Soil Texture (field assessed):** Not recorded (3), Moderately fine sandy clay loam (1)

**Geology (field or map data):** Serpentine (3), Ultramafic (type unknown) (1)

**Marin County Watersheds:** Lagunitas Creek (3), San Rafael (1)

**Site Impacts**

This association has low non-native plant cover (average 18.6%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Anagallis arvensis*, *Avena* spp., *Bromus hordeaceus*, *Bromus madritensis*, *Lactuca saligna*, and *Lolium perenne*.

**Classification Comments**

The association is newly described here. Though the number of surveys of this association in Marin are low, there were no additional surveys from nearby counties.

**References:** none

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y

**Surveys Used for Description**

**Total: N=4; Marin County (n=4):** MARIN241, MARIN242, MARIN243, MARIN252

**Association Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Adenostoma fasciculatum</i>	25	25.0	0.1	0.2	0.2				
	<i>Eriodictyon californicum</i>	25	25.0	0.1	0.2	0.2				
<b>Herb</b>										
	<b><i>Streptanthus glandulosus</i></b>	100	4.0	0.2	0.2	0.2	X			X
	<i>Vulpia microstachys</i>	100	4.0	0.2	0.2	0.2	X			X
	<i>Nassella pulchra</i>	75	4.6	0.6	0.2	2.0	X			X
	<i>Chlorogalum pomeridianum</i>	75	1.9	0.2	0.2	0.2	X			X
	<i>Elymus multisetus</i>	75	1.9	0.2	0.2	0.2	X			X
	<i>Hesperolinon congestum</i>	75	1.9	0.2	0.2	0.2	X			X
	<i>Minuartia douglasii</i>	75	3.7	0.2	0.2	0.2	X			X
	<i>Lolium perenne</i>	50	13.9	2.5	3.0	7.0				X
	<i>Claytonia exigua</i>	50	11.8	0.3	0.2	1.0				X
	<i>Achillea millefolium</i>	50	0.5	0.1	0.2	0.2				X
	<i>Allium falcifolium</i>	50	3.5	0.1	0.2	0.2				X
	<i>Aspidotis densa</i>	50	3.5	0.1	0.2	0.2				X
	<i>Avena</i> spp.	50	1.7	0.1	0.2	0.2				X
	<i>Epilobium minutum</i>	50	3.5	0.1	0.2	0.2				X
	<i>Eriogonum luteolum</i>	50	0.5	0.1	0.2	0.2				X
	<i>Eschscholzia californica</i>	50	0.5	0.1	0.2	0.2				X
	<i>Hesperervax sparsiflora</i>	50	0.5	0.1	0.2	0.2				X
	<i>Lomatium dasycarpum</i>	50	0.5	0.1	0.2	0.2				X
	<i>Lotus humistratus</i>	50	1.6	0.1	0.2	0.2				X
	<i>Plantago erecta</i>	50	0.5	0.1	0.2	0.2				X
	<i>Sisyrinchium bellum</i>	50	0.5	0.1	0.2	0.2				X
	<i>Castilleja densiflora</i>	25	7.1	1.5	6.0	6.0				
	<i>Trifolium depauperatum</i>	25	7.1	1.5	6.0	6.0				
	<i>Allium lacunosum</i> var. <i>lacunosum</i>	25	1.5	0.3	1.0	1.0				
	<i>Grindelia hirsutula</i>	25	1.5	0.3	1.0	1.0				
	<i>Hemizonia congesta</i>	25	1.2	0.3	1.0	1.0				
	<i>Anagallis arvensis</i>	25	1.4	0.1	0.2	0.2				
	<i>Aspidotis carlotta-halliae</i>	25	0.3	0.1	0.2	0.2				
	<i>Bromus hordeaceus</i>	25	0.2	0.1	0.2	0.2				
	<i>Bromus madritensis</i>	25	1.4	0.1	0.2	0.2				
	<i>Calochortus luteus</i>	25	0.3	0.1	0.2	0.2				
	<i>Calystegia purpurata</i>	25	0.3	0.1	0.2	0.2				
	<i>Calystegia subacaulis</i>	25	0.2	0.1	0.2	0.2				
	<i>Crassula connata</i>	25	0.2	0.1	0.2	0.2				

*Streptanthus glandulosus* – *Dudleya abramsii* / Lichen – Moss Association  
*Allium* spp. – *Streptanthus* spp. – *Hesperolinon* spp. Serpentine Sparsely Vegetated Alliance



Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	<i>Cryptantha flaccida</i>	25	0.3	0.1	0.2	0.2				
	<i>Danthonia californica</i>	25	0.3	0.1	0.2	0.2				
	<i>Daucus pusillus</i>	25	0.3	0.1	0.2	0.2				
	<i>Dichelostemma capitatum</i>	25	0.2	0.1	0.2	0.2				
	<i>Dudleya farinosa</i>	25	0.3	0.1	0.2	0.2				
	<i>Epilobium</i> spp.	25	0.2	0.1	0.2	0.2				
	<i>Eriogonum nudum</i>	25	0.3	0.1	0.2	0.2				
	<i>Gilia capitata</i>	25	0.2	0.1	0.2	0.2				
	<i>Gilia clivorum</i>	25	0.2	0.1	0.2	0.2				
	<i>Koeleria macrantha</i>	25	0.3	0.1	0.2	0.2				
	<i>Lactuca saligna</i>	25	0.3	0.1	0.2	0.2				
	<i>Layia platyglossa</i>	25	0.3	0.1	0.2	0.2				
	<i>Lotus wrangelianus</i>	25	0.2	0.1	0.2	0.2				
	<i>Madia exigua</i>	25	1.4	0.1	0.2	0.2				
	<i>Melica torreyana</i>	25	0.3	0.1	0.2	0.2				
	<i>Microseris douglasii</i>	25	0.3	0.1	0.2	0.2				
	<i>Mimulus guttatus</i>	25	1.4	0.1	0.2	0.2				
	<i>Pentagramma triangularis</i>	25	2.1	0.1	0.2	0.2				
	<i>Platystemon californicus</i>	25	0.2	0.1	0.2	0.2				
	<i>Rigiopappus leptocladus</i>	25	1.4	0.1	0.2	0.2				
	<i>Sanicula bipinnatifida</i>	25	0.3	0.1	0.2	0.2				
	<i>Sanicula tuberosa</i>	25	0.3	0.1	0.2	0.2				
	<i>Trifolium microdon</i>	25	0.2	0.1	0.2	0.2				
	<i>Trifolium willdenovii</i>	25	0.3	0.1	0.2	0.2				
	<i>Triteleia laxa</i>	25	0.3	0.1	0.2	0.2				
<b>Non-vasc</b>										
	<b>Lichen</b>	100	65.8	2.7	0.2	7.0	<b>X</b>	<b>X</b>		<b>X</b>
	<b>Moss</b>	75	25.0	0.6	0.2	2.0	<b>X</b>			<b>X</b>
	Cryptogammic crust	50	7.7	0.8	0.2	3.0				<b>X</b>
	<i>Xanthoparmelia</i> spp.	25	1.5	0.1	0.2	0.2				

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***Dudleya cymosa* – *Dudleya lanceolata* / Lichen – Moss Sparsely Vegetated Alliance**

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**Common Name:** Live-forever – lichen/moss sparse herbaceous rock outcrop

**NVC Alliance Code:** A4073. *Dudleya cymosa* - *Dudleya lanceolata* - Lichen/Moss Sparse Rock Vegetation Alliance

**Statewide Description**

*Dudleya cymosa* or *Dudleya lanceolata* are some of the characteristic herbs for this alliance. Other herbs include *Bromus* spp., *Clarkia* spp., *Cryptantha* spp., *Erigeron glaucus*, *Festuca* spp., *Lewisia rediviva* and *Phacelia* spp. Shrubs may be present at sparse cover, including *Cercocarpus montanus* var. *glaber*, *Diplacus aurantiacus*, *Eriogonum* spp., and *Heteromeles arbutifolia*. Moss and lichen are often well-developed.

This alliance contains sparse herbaceous vegetation which is variable in species composition from the coast to inland. The rocky nature of the substrate defines the alliance, and non-vascular cover may be present and high in cover. While it occurs California's Coast Ranges, southern California mountains and valleys, off-shore islands, and Sierra Nevada foothills to mountains, it has not been well-documented across its range.

Live-forevers are not always present in this alliance while lichen and moss typically are, but *Dudleya* are well adapted to the harsh rocky environment where it occurs. The fleshy basal rosette of leaves in this perennial genus help the plant survive during long periods of dessication. While other *Dudleya* spp. may be found in this alliance, there are two species that are widespread and characteristic. Both are generally evergreen rather than drought deciduous. *D. cymosa* has several subspecies defined. Five subspecies are considered rare, and are limited to small ranges and rock types (Dorsey and Wilson 2011).

Ssp. *cymosa* is the most common subspecies, found as far south as the Santa Monica Mountains but ranging up to Humboldt and Tehama Counties. *D. lanceolata* is found in the southern half of the state and extends into northern Baja California. It does not occur in the Sierra Nevada or its foothills.

### **Local Vegetation Description**

The Live-forever – lichen/moss sparse herbaceous rock outcrop Alliance forms a sparse to intermittent herbaceous layer. The shrub layer is sparse and the tree layer is absent. Dominant herbs include *Dudleya farinosa*, and characteristic herbs include *Hypochaeris radicata*. Those herbs often present include *Avena* spp., *Carduus pycnocephalus*, *Eriogonum latifolium*, *Eschscholzia californica*, *Rumex acetosella*, and *Vulpia bromoides*, and herbs that are sometimes present include *Achillea millefolium*, *Briza maxima*, *Bromus diandrus*, *Cardionema ramosissimum*, *Crassula connata*, *Erigeron glaucus*, *Eriogonum nudum*, *Poa secunda*, *Polypodium californicum*, *Silene gallica*, *Spergularia rubra*, and *Trifolium willdenovii*. Commonly associated emergent shrubs at sparse cover include *Baccharis pilularis*. Commonly associated non-vascular plants include Lichen and Moss.

Lifeform	Cover (%)		Height (m)	
	Mean	Range	Mean	Range
Conifer	0.0	0 – 0	no data	
Hardwood	0.0	0 – 0	no data	
Regenerating or Shrubby Tree	0.0	0 – 0	no data	
Shrub	1.0	0 – 2	0.3	0 – 0.5
Herb	17.7	1 – 52	0.3	0 – 0.5

### **Local Membership Rule**

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

### **Local Environmental Description**

**Elevation:** Mean 93 m, Range 13 – 168 m

**Aspect:** SE (3), NE (2), SW (1)

**Slope:** Mean 37 degrees, Range 8 – 60 degrees

**Macro Topography:** Middle 1/3 of slope (3), Upper 1/3 of slope (2), Ridge top (1)

**Large Rock:** Mean 68.7%, Range 13 – 99%

**Fines Cover:** Mean 12.2%, Range 1 – 63%

**Small Rock:** Mean 17.2%, Range 0.4 – 68%

**Litter Cover:** Mean 2.2%, Range 0.2 – 4%

**Soil Texture (field assessed):** Not recorded (4), Unknown (1), Medium to very fine, loamy sand (1)

**Geology (field or map data):** Franciscan melange (2), Siltstone (1), Conglomerate (1), Metamorphic (type unknown) (1), Sandstone and other sedimentary (1)

**Marin County Watersheds:** Point Reyes (3), Lagunitas Creek (2), Walker Creek (1)

### **Site Impacts**

This alliance has moderate non-native plant cover (average 30.3%) relative to native cover. Non-native species that occur with highest frequency and abundance include *Briza maxima*, *Bromus diandrus*, *Carduus pycnocephalus*, *Hypochaeris radicata*, *Rumex acetosella*, *Silene gallica*, *Spergularia rubra*, and *Vulpia bromoides*.

### **Associations in Marin County**

*Dudleya farinosa* / Lichen – Moss

### **Classification Comments**

None.

**References:** Buck-Diaz et al. 2020

**Global Rarity Rank:** G4

**State Rarity Rank:** S4

**Surveys Used for Description**

**Total: N=6; Marin County (n=6):** MARIN137, MARIN278, MARIN292, MARIN308, MARIN317, MARIN320

**Alliance Stand Table**

\*Taxon listed more than once, Con = Constancy, Rel = Average Relative Cover, Avg = Average Absolute Cover, Min = Minimum Absolute Cover, Max = Maximum Absolute Cover, Ch = Characteristic, D = Dominant, cD = Co-dominant, Oft = Often (see front matter for definitions).

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
<b>Shrub</b>										
	<i>Baccharis pilularis</i>	50	17.9	0.2	0.2	1.0				X
	<i>Diplacus aurantiacus</i>	33	17.9	0.2	0.2	1.0				
	<i>Lupinus arboreus</i>	33	16.7	0.1	0.2	0.2				
<b>Herb</b>										
	<i>Dudleya farinosa</i>	100	32.4	5.7	0.2	17.0	X		X	X
	<i>Hypochaeris radicata</i>	83	4.9	1.6	0.2	9.0	X			X
	<i>Vulpia bromoides</i>	67	14.6	5.0	0.2	23.0				X
	<i>Eriogonum latifolium</i>	50	3.4	1.7	0.2	10.0				X
	<i>Eschscholzia californica</i>	50	3.1	0.2	0.2	1.0				X
	<i>Avena</i> spp.	50	2.1	0.1	0.2	0.2				X
	<i>Carduus pycnocephalus</i>	50	2.1	0.1	0.2	0.2				X
	<i>Rumex acetosella</i>	50	1.8	0.1	0.2	0.2				X
	<i>Eriogonum nudum</i>	33	1.6	0.2	0.2	1.0				
	<i>Achillea millefolium</i>	33	0.4	0.2	0.2	1.0				
	<i>Poa secunda</i>	33	1.7	0.1	0.2	0.2				
	<i>Briza maxima</i>	33	0.7	0.1	0.2	0.2				
	<i>Bromus diandrus</i>	33	1.7	0.1	0.2	0.2				
	<i>Cardionema ramosissimum</i>	33	0.2	0.1	0.2	0.2				
	<i>Crassula connata</i>	33	0.3	0.1	0.2	0.2				
	<i>Erigeron glaucus</i>	33	0.2	0.1	0.2	0.2				
	<i>Polypodium californicum</i>	33	1.7	0.1	0.2	0.2				
	<i>Silene gallica</i>	33	0.3	0.1	0.2	0.2				
	<i>Trifolium willdenovii</i>	33	0.3	0.1	0.2	0.2				
	<i>Spergularia rubra</i>	33	0.3	0.1	0.2	0.2				
<b>Non-vascular</b>										
	<b>Lichen</b>	<b>100</b>	<b>72.0</b>	<b>32.3</b>	<b>0.2</b>	<b>70.4</b>	<b>X</b>	<b>X</b>		<b>X</b>
	<b>Moss</b>	<b>67</b>	<b>26.1</b>	<b>10.4</b>	<b>0.2</b>	<b>40.0</b>				<b>X</b>

***Dudleya farinosa* / Lichen – Moss Provisional Association**

**Common Name:** Sea Lettuce / Lichen – Moss Patches

**Alliance:** *Dudleya cymosa* – *Dudleya lanceolata* / Lichen – Moss Sparsely Vegetated Alliance

**Classification Comments**

The association circumscription is the same as that of the alliance. See above for detailed description. This association is considered provisional since it is under-sampled in its expected range.

**Global Rarity Rank:** GNR

**State Rarity Rank:** SNR

**State Rare:** Y