FLORISTIC AFFINITIES OF HORSE MOUNTAIN, GROUSE MOUNTAIN, BOARD CAMP MOUNTAIN AND SURROUNDING AREAS, HUMBOLDT COUNTY, CALIFORNIA

By
Cara Witte Scott

A Thesis
Presented to
The Faculty of Humboldt State University

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts
In Biology

December 2010
FLORISTIC AFFINITIES OF HORSE MOUNTAIN, GROUSE MOUNTAIN, BOARD CAMP MOUNTAIN AND SURROUNDING AREAS, HUMBOLDT COUNTY, CALIFORNIA

By
Cara Witte Scott

Approved by the Master’s Thesis Committee:

Dr. Michael R. Mesler, Major Professor

Dr. John O. Sawyer, Committee Member

Dr. Erik S. Jules, Committee Member

Dr. John O. Reiss, Committee Member

Dr. Kenneth R. Aalto, Committee Member

Dr. Michael R. Mesler, Graduate Coordinator

Jená Burges, Vice Provost
Floristic studies are especially timely since habitat loss is increasing dramatically. From the conservation perspective, it is imperative to document the distribution of plant species in areas that are floristically rich. For this study, I conducted a floristic survey along a 20-mile transect in the Horse Mountain, Grouse Mountain and Board Camp Mountain areas of Humboldt County, California. I also determined the phytogeographical affinities of the taxa I found and made comparisons between my flora and 11 other northwest California floras. Additionally, I made a comparison between my flora and the historical collection of Joseph Prince Tracy, a botanist who collected extensively in the same area during the early 1900s. I used an informal stratified sampling regime to cover the different vegetation types within the study area. Five hundred and forty-eight species were identified from 77 vascular plant families, including 18 California Native Plant Society listed taxa and 28 taxa endemic to northwest California. Most had affinities to western North America (273 species) due to the lower elevational position of the study area. One fifth show affinities to the California Floristic Province (124 species, including 23 endemics), and another 17% (96 species, including 5 endemics) had boreal affinities that are found throughout the state’s mountains at higher elevations. Some 56 species are not native to the California. I used ordination and cluster analysis to compare my flora to 11 other northwest California floras. These analyses revealed two main groups: (1) montane floras of the Klamath Region and (2) low and montane elevation floras of both the Klamath Mountains (Old Gasquet Toll...
Road, 58% shared taxa) and Coast Ranges (Lassics and Snow Mountain, both 65% shared taxa). Comparisons between my flora and the Tracy collection found 295 species in common. Of the 439 taxa Tracy documented from the study area and nearby South Fork Mountain, three non-native species were present during his time suggesting an influx of 54 non-native species over the last 60 years.
ACKNOWLEDGEMENTS

First and foremost, I would like to thank my major professor, Michael Mesler, for his support, guidance, and patience through the life of this thesis. Thank you so much for teaching me about the plants of northwest California, spending countless hours verifying taxa, and for teaching me how to write the English language. Your dedication to your students is unending and your enthusiasm is contagious. I am proud to be a member of the “Mesler grad student” club.

I would also like to thank my graduate committee members, Drs. Erik Jules, John Reiss, and Ken Aalto for their advice along the way and useful comments on the manuscript. I am extremely grateful for the help of committee member, Dr. John Sawyer, for helping me gain my footing in the early stages of this thesis, teaching me how to categorize the flora into phytogeographical categories, and make sense of a very interesting ordination. It was an honor to work with you.

A special thank you to Dr. J.P. Smith who provided me with updated synonymy checklists, helped track down floras for comparison and provided information about J.P. Tracy. Also, a huge thank you to Robin Bencie for moving my collection in and out of driers, freezers, and cabinets, help with identifying difficult taxa, and for being such a great mentor during my career as a graduate student. Thank you also to Sydney Carothers for verifying my Carex specimens, help with identifying difficult taxa, and for providing moral and editorial support. I am indebted to Helen Constantine Shull and Gordon Leppig whose master’s theses I referenced constantly.

Thank you to Lisa Hoover, John McRae, and Joshua Read of Six Rivers National Forest for providing collecting permits and general information about the Forest. Ashley Hawkins and David Franklin for help with PC-ORD and lending statistical advice. Thank you also to Jenna Lee, Greg O’Connell and Dr. Dennis Walker who journeyed with me into the depths of Grouse Mountain and Board Camp; and to the University of California/Jepson Herbarium for allowing me to spend time reading J.P. Tracy’s collecting notebooks. Financial assistance was provided by Northern California Botanists and the Humboldt State University Biology Department Master’s Grant.

An extra special thank you to my friends and family, especially my parents, for their loving support and never-ending encouragement.

Last, but certainly not least, my husband, Michael Scott, who innocently dropped me off at the Library Circle in August 2001 to attend a General Botany class not know what had just begun. You have been by my side along this academic journey, and I thank you for your patience, strength, and support in helping me achieve my goals.
DEDICATION

To my loyal collecting partner, astute field assistant and mountain lion body guard, Buddy Witte Scott.

Even though you complained constantly that it was too hot and often bailed on me to chase deer, your companionship in the field was appreciated. Thank you for your commitment to this project.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABSTRACT</td>
<td>iii</td>
</tr>
<tr>
<td>ACKNOWLEDGEMENTS</td>
<td>v</td>
</tr>
<tr>
<td>DEDICATION</td>
<td>vi</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>xi</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>xii</td>
</tr>
<tr>
<td>INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>Location and Boundaries</td>
<td>2</td>
</tr>
<tr>
<td>Physiography</td>
<td>2</td>
</tr>
<tr>
<td>Climate</td>
<td>6</td>
</tr>
<tr>
<td>Geology</td>
<td>7</td>
</tr>
<tr>
<td>History of Human Impact</td>
<td>10</td>
</tr>
<tr>
<td>Botanical History</td>
<td>12</td>
</tr>
<tr>
<td>Vegetation</td>
<td>13</td>
</tr>
<tr>
<td>Phytogeography</td>
<td>18</td>
</tr>
<tr>
<td>METHODS</td>
<td>20</td>
</tr>
<tr>
<td>Field Methods</td>
<td>20</td>
</tr>
<tr>
<td>Specimen Identification Procedures</td>
<td>21</td>
</tr>
<tr>
<td>Floristic Analyses</td>
<td>24</td>
</tr>
<tr>
<td>Assignment of Phytogeographical Categories</td>
<td>24</td>
</tr>
<tr>
<td>Comparison Between Floras</td>
<td>26</td>
</tr>
<tr>
<td>Comparisons with the Tracy collection</td>
<td>28</td>
</tr>
</tbody>
</table>
Taxa Endemic to Northwest California .................................................. 29

RESULTS .................................................................................................. 32

Floristic Analysis .................................................................................. 32
  Rare and Uncommon Taxa .................................................................. 32
  Range Extensions of Regional Endemics .......................................... 32
  Northwest California Endemics ....................................................... 35
  Non-native Taxa .................................................................................. 35

Quantitative Analyses .......................................................................... 40
  Phytogeographic Elements in My Flora ........................................... 40
  Comparison among floras ................................................................. 41
  Comparison with the Tracy collection .............................................. 49

DISCUSSION ......................................................................................... 50
  Phytogeographical Origins of the Flora ............................................ 50
    Western North America ................................................................. 50
    California Floristic Province ........................................................ 52
    Boreal ................................................................................................ 53
  Non-Native Taxa ................................................................................. 54
  Comparisons with Other Floras ....................................................... 55
  Historical Changes ............................................................................. 58

LITERATURE CITED .............................................................................. 63

APPENDIX A. Annotated species list of Horse Mountain, Grouse Mountain, Board Camp Mountain and surrounding areas .................................................. 69

APPENDIX B. Environmental variables used in quantitative analysis .......... 119

APPENDIX C. Similarity matrix ............................................................. 121
APPENDIX D. Species list of taxa found by Tracy that I did not find..........................122
<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Locations of focal collecting areas</td>
</tr>
<tr>
<td>2</td>
<td>California floras used in statistical analysis</td>
</tr>
<tr>
<td>3</td>
<td>Rare plants found in the study area</td>
</tr>
<tr>
<td>4</td>
<td>Endemic taxa found in the study area</td>
</tr>
<tr>
<td>5</td>
<td>Non-native taxa found in the study area</td>
</tr>
<tr>
<td>6</td>
<td>Coefficients of determination for the correlations between ordination distances and distances in the original n-dimensional space from the analysis of primary floras</td>
</tr>
<tr>
<td>7</td>
<td>Pearson and Kendall correlations of environmental variables with ordination axes from the analysis of primary floras</td>
</tr>
</tbody>
</table>
# LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Map of Humboldt County showing the location of the study area and major landmarks.</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>Map of study area with collecting areas.</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>Geology map of study area.</td>
<td>9</td>
</tr>
<tr>
<td>4</td>
<td>Nonmetric multidimensional scaling of 12 northwest California floras.</td>
<td>43</td>
</tr>
<tr>
<td>5</td>
<td>Cluster analysis of 12 northwest California floras.</td>
<td>45</td>
</tr>
<tr>
<td>6</td>
<td>Cluster analysis of Coast and Klamath Range floras at low to montane elevations.</td>
<td>46</td>
</tr>
<tr>
<td>7</td>
<td>Cluster analysis of montane Klamath Range floras.</td>
<td>47</td>
</tr>
<tr>
<td>8</td>
<td>Cluster analysis with the Tracy collection removed.</td>
<td>48</td>
</tr>
</tbody>
</table>
INTRODUCTION

Northwest California is home to more than 3500 taxa of native plants, many of which are endemics (Smith and Sawyer 1988). This richness can be explained, in part, by the complex geological history of the region (Sawyer 2006). For example, Horse Mountain, Grouse Mountain, and Board Camp Mountain occur in an area where the Coast Ranges and Klamath Mountains come together. A mix of parent rock materials, which create a wide range of edaphic conditions, characterizes this juxtaposition. Although numerous botanists have collected in this area and an informal checklist of species is available (Anderson et al. 1995), no formal taxonomic survey had been conducted. Therefore, the primary objective of my thesis was to compile a floristic inventory of Horse Mountain, Grouse Mountain and Board Camp Mountain and surrounding areas.

During the late 1970s and early 1980s, several HSU graduate students studied floras in other parts of northwest California (Nelson 1979, Barker 1978, Ferlatte 1970, Whipple 1981). Their useful studies revealed numerous range extensions as well as many rare and new species. Unfortunately, no such floristic study has been carried out in my study area and thus confirms the need for this research method to be resurrected.

My specific objectives were to: (1) compile a floristic inventory of Horse Mountain, Grouse Mountain, Board Camp Mountain and surrounding areas, (2) assign taxa to phytogeographical categories based on a plant’s range and distribution and (3) examine the phytogeographical affinities of northwest California’s flora by comparing
my flora to 11 other floras. Finally, I attempted to use the historical collection of Joseph Prince Tracy (henceforth ‘Tracy’) to make inferences about recent extinctions of native species and invasions of non-native species into the study area.

Location and Boundaries

The study area is located in eastern Humboldt County, California (40° 52' - 40° 42' N latitude and 123° 44' -123° 38' W longitude), approximately 38 km east of Eureka, California (Figure 1). The area lies in Six Rivers National Forest and on private lands. Forest Route 1 (6N01) is a major paved road running north-south through the study area. The intersection of Forest Service Roads 6N36 and 6N38 with Forest Route 1 marks the northern and western boundaries of the study area. The eastern boundary is bound by a serpentine outcrop on Forest Service Road 4N38, and the southern boundary is marked by a jeep trail in between and Board Camp Butte (Figure 2).

Physiography

The study area covers approximately 34.5 km² and is situated at the northern extent of the Coast Ranges and southern extent of Klamath Ranges. Four main peaks are present in the region: Horse Mountain (1509 m), Spike Buck Mountain (1672 m), Grouse Mountain (1649 m) and Board Camp Mountain (1581 m). Cow Creek Ridge is the lower limit of the study area (1200 m). The western slopes of the study area drain into the upper Redwood Creek watershed while the eastern portion drains into the Trinity River watershed. The headwaters of Redwood Creek occur at Board Camp. The study area
involves only the uppermost slopes, ridges, and peaks of the two watersheds. Most of the
topographic variation comes from aspect differences. The study area lies within the
Grouse Mountain 7.5” USGS quadrangle and Board Camp Mountain 7.5” USGS
quadrangle.
Figure 1. Map of Humboldt County showing the location of the study area and major landmarks.
Figure 2. Map of study area with collecting areas.
Climate

The study area is located approximately 40 km from the Pacific Ocean, and it is influenced by maritime effects. Typical of a Mediterranean climate, winters have mild temperatures and heavy rain while summers are dry and hot. Heavy morning fog is common in the summer. Frost and snow are frequent during the winter months, and occasional snow showers can occur during the growing season. Snow banks are common in late May and may persist on north-facing slopes into early June.

No weather station exists in the study area. The closest weather data station to the study area is located in Willow Creek, California. However, this station has a much lower elevation (141 m) than the mean elevation of the study area (1291 m). The weather station with the closest elevation comparable to the study area is in Big Bar, California (40.740°N, 123.208°W, 381 m), located approximately 36.5 km from the study area. Climate data, from the Big Bar Ranger Station (1943-2009), indicates average seasonal temperatures range from 36 °C to 12° in July and 9° C to 0.5° in January (Western Regional Climate Center 2009). Average precipitation is approximately 93.5 cm while snow depth is 17.3 cm. The O’Kane gaging station on Redwood Creek, approximately 10 km from the study area, indicates mean precipitation is 129.98 cm (1984-2001) (California Department of Water Resources 2009). Minimum precipitation levels are 75.18 cm while maximum precipitation levels reach 191.52 cm. The annual precipitation at the Willow Creek weather station, for 1971-2000, is approximately 153.9 cm.
Geology

The geology of the study area is very complicated. The Coast Range Thrust Fault runs northwest, parallel to Forest Route 1, giving rise to a complex mix of geology. The study area is on the southern edge of the Klamath Mountains and the northern border of the Coast Ranges (Figure 3). Both these ranges extend in a northwest topographic trend. Horse Mountain and Grouse Mountain are within this overlapping region, while Board Camp Mountain remains within the Coast Ranges (Finch 2000).

The region has a history of subduction, collisional terrace, and transform faulting, which has led to a complex association of rock types (Finch 2000). The Franciscan Complex plate, consisting of South Fork Mountain Schist, has been migrating into the western Jurassic plate, consisting of the Josephine ophiolite and overlying metasedimentary and metavolcanic rocks (Young 1978). This faulting has created many of the ultramafic serpentinite outcrops seen in the Horse Mountain and Grouse Mountain region that host many rare and endemic species. The ultramafic material runs along the Coast Range Thrust Fault and is interpreted as being east of the fault and at the western base (Young 1978). The rock types to the east [or the western Klamath Mountains] of the study areas consist of foliated greenstone, metagreywacke, serpentinized peridotite, and diorite characteristic of the Coast Range Thrust Fault. This region was formed during the Cretaceous period or early Tertiary. The area to the northwest, the Josephine ophiolith, of the study area is geologically younger, having collided with the eastern plate around the late Jurassic to early Tertiary times. The Josephine ophiolith is derived from
protoliths of oceanic plate origin and contains dense greywacke, subordinate shale, greenstone, conglomerate, and chert (Young 1978).

This suture zone along the Coast Range thrust, between these two plates, has been described by Young (1978) as a “zone of tectonic mixing”, thus a tectonic mélange. The combining of these two plates and their rock types create an unusual composition of rock, known as the Franciscan mélange. This mélange formed due to the deforming serpentinite and contains a mixture of both upper and lower plate rocks dispersed in a serpentinite matrix (Dunn et al. 1993). This rise on the oceanic crust gives us the rock types that we see today, particularly a signature South Fork Mountain Schist and specifically, ultramafic serpentinite that we see running parallel to the suture zone near Horse Mountain and Grouse Mountain.

The plants within the study area are sorted between serpentine and non-serpentine substrates regardless of whether the rocks are Klamath or Coast Range rock types. To the northeast of the Coast Range Thrust Fault, plants have affinities to the Klamath Province and the montane forests associated with higher elevations. Plants to the southwest of this same fault are aligned with the Coast Range Province and the lower elevation vegetation types. The ultramafic outcrops within the study area are found mainly in the Horse Mountain Botanical area and on the north side of Spike Buck Mountain. Small ultramafic outcrops are present in the Grouse Mountain area and at Board Camp. These outcrops are known to host a distinct set of endemics that have adapted to the harsh conditions of this substrate (Whittaker 1954, Kruckeberg 1984, Harrison 2000).
Description of Map Units

Quaternary Units

Qls: Landslide and earthflow debris

Franciscan Complex

Jsfm: South Fork Mountain Schist
Crinkled quartz-albite-muscovite-chlorite schist and semischist

tm: zone of tectonic mixing
Foliated greenstone, metagreywacke, serpentine, and diorite intermingled in the Coast Ranges thrust zone.

KJf: Franciscan mélange
Contains blocks of greywacke and mafic volcanic rock, with less abundant

KJfv: Mélange
Composed of greywacke and mafic volcanic rock, chert pebble conglomerate, red and green ribbon chert

KJfl: Dominantly sedimentary rocks
Sheared greywacke and shale with minor conglomerate.

Klamath Mountain Province Geologic Units

Jgh: Contact Metamorphosed Galice Formation
Hornfels and fine-grained chiastolite-biotite-chlorite schists

Jg: Galice Formation
Gray phyllitic metagreywacke, slate, and phyllitic slate

Jr: Rogue Formation
Mafic to intermediate volcanic flows and tuffs, now altered to greenstones.

Ja: Ammon Ridge plutons
Diorite with marginally more mafic or granitic zones

gn: Friday Camp Gneiss
Weakly foliated hornblende-diorite gneiss

Plutonic or Ultramafic Rocks:

ps: ultramafic rocks
i: small igneous plugs, dikes, sills, and mélange blocks
gr: small granite or quartz diorite bodies

(Young 1978, Aalto et al. 1988)
History of Human Impact

Various anthropogenic activities have changed the landscape of the study area. Mining, grazing, logging, road building and fire have presumably had a strong impact on the composition of the flora. When Tracy first began visiting the study area in the early 1900s, sheep had grazed heavily, and late season fires were not suppressed. The Native American land use patterns were being muted with the natives not present to tend the land (Sawyer 2006). Many of the forest patterns that we see today were already intact. Ranchlands were extensive throughout the area. The logging industry was beginning to get underway towards the end of Tracy’s time in the study area.

A copper and nickel mine operated near Horse Mountain until 1962 (Nash 1993). Scars created by the mining operations altered local landforms and deposited tailings, which ultimately may have changed the species composition in the area. Fortunately, the area where these mining activities took place was turned into a special interest area and later a botanical area. Horse Mountain Botanical Area was established to protect the rare and endemic taxa found on the ultramafic outcrops in this region.

At the turn of the century, thousands of sheep grazed the prairies, dry meadows, and understories of the study area. As the price of wool dropped, the sheep waned and the ranchers brought in cattle. Approximately 400-500 cattle grazed per year within the study area when Tracy was collecting (J. Read pers. comm.). Since the early 1900s, two grazing allotments have been active in the study region at Grouse Mountain and Bug
Creek, near Board Camp Mountain. Although over the years, the number of cattle has declined. During my surveys, meadow habitats were found decimated by grazing in the late summer months as cattle are moved to higher elevations in search of water and forbs.

Logging was and is extensive in the study area. Private landholders as well as the Forest Service have been logging in the region since the 1950s. During the 1970s and 1980s, logging boomed in the area. As a result, different forest stages and logging-induced shrublands are frequently found. Currently, logging is not occurring on Six Rivers National Forest land in the study area. However, timber harvest plans have been filed. Private landholders are logging at Grouse Mountain, Spike Buck Mountain and near Board Camp Mountain. In the upper Redwood Creek watershed, approximately 60% of the land is owned by private landholders or timber companies (Redwood Creek Watershed Group 2006).

Road building has also impacted the study area. Road building increased in the mid 1900s as timber companies had to travel deeper into the forest to access unlogged forests. Many of the roads built during this time are still in place. In the 1980s, Forest Route 1 (6N01) was paved to a level three road increasing traffic to the area from recreationalists, hunters, and Sunday drivers.

Prescribed burning in the study area has been limited. The California Basket Weavers Association has conducted burns west of the Buck Flat area to promote the growth of *Xerophyllum tenax* (J. Kalt pers. comm.). In addition, areas around Grouse Mountain and Board Camp Mountain were burned after they were logged in the late
1980s (J. McRae pers. comm.). Natural burns, which occur with a fire return interval of 15-30 years, may also alter the composition of the flora (Sawyer 2006). The encroachment of woody plants onto prairies and dry meadows as a result of fire suppression may have changed the landscape as well (Redwood Creek Watershed Group 2006).

Botanical History

Grazing, logging and road building may have changed the make-up of the flora in the last century, causing the loss of native species and facilitating the invasion of non-natives. Fortunately, we have the basis for examining change in the last century. Joseph Prince Tracy (b.1879 - d.1953) was a local botanist who lived in the city of Eureka, California, and worked as a title examiner for Belcher Abstract & Title Company. During his leisure time, he made collecting trips throughout the surrounding backcountry. Tracy made his first of 37 visits to South Fork Mountain on October 1, 1911, and to the Grouse Mountain area on September 2, 1917 (41 visits total). Tracy did not visit the Horse Mountain area until June 20, 1926 (40 visits total), and only made one visit to the Board Camp region on June 26, 1951. He also collected extensively in the watersheds bordering South Fork Mountain in both Humboldt and Trinity counties. The Consortium of California Herbaria contains 3934 specimens collected by Tracy. 439 taxa are from Horse Mountain, Grouse Mountain, Board Camp Mountain, and South Fork Mountain. I took advantage of this information to make comparisons between the current flora and the taxa Tracy collected in order to reveal invasions of non-native plants that have
occurred due to anthropogenic effects during the last 90 years as well as taxa that may be extirpated from the region.

Vegetation

My study area saddles the border between the low-elevation forest belt and the forest types of the montane belt. As a result of the study area’s position in this transition zone, the species composition is comprised of members from each belt. In the lower elevation areas southwest of the Coast Range Thrust Fault, open prairies, dry meadows, and Douglas fir forests mix with tan oak and canyon live oak, are found. In the montane, higher elevation areas to the northeast of this fault line, one can find white fir forests, Douglas fir forests, and Jeffrey pine forests mixed with huckleberry oak chaparral. Much of this diversity in vegetation can be attributed to the mosaic of geologic substrates (serpentine and non-serpentine) as well as the geographic position of the region.

Following the advice of Dr. John Sawyer, I recognized several different vegetation types within the region: mixed evergreen forests, Douglas fir forests, white fir forests, Jeffrey pine forests, white oak woodlands, huckleberry oak chaparral, non-serpentine shrublands, recently logged areas, prairies and dry meadows, as well as wet meadows. Less common vegetation types along perennial creeks, vernal pools, rock outcrops, and talus slopes are not described here, but were present and surveyed. For the purpose of this thesis, I call the vegetation types by alliance names as defined by Sawyer et al. 2009.
Mixed evergreen forests

Mixed evergreen forests (*Abies concolor*-*Pseudotsuga menziesii* forest alliance) are found where the two forest belts (low-elevation and montane) coincide. Co-dominant conifer species include *Calocedrus decurrens* and *Pinus ponderosa*. Deciduous trees such as *Acer macrophyllum* and *Cornus nuttallii* often occur with this alliance as well. Mesic understories are rich in shrubs and herbaceous plants such as *Mahonia pinnata* var. *pinnata*, *Adenocaulon bicolor*, *Moehringia macrophylla*, *Cardamine californica* var. *californica*, *Corallorrhiza mertensiana*, and several *Viola* species.

Douglas fir forests

Several different types of Douglas fir forests (*Pseudotsuga menziesii* forest alliance) are found in the region. Old-growth Douglas fir stands are interspersed in the study area with associated taxa such as *Taxus brevifolia*. The areas of Titlow Hill and Board Camp Mountain have large old-growth stands where the understory becomes rich and diverse with herbaceous species. In drier areas, *Pseudotsuga menziesii*-*Notholithocarpus densiflorus* forest alliance is found at lower elevations and on western slopes. Associated species consist of *Arbutus menziesii*, *Quercus chrysolepis*, and *Q. garryana* var. *fruticosa*. In the understories of this forest type, the shrub layer consists of *Holodiscus discolor*, *Prunus emarginata*, *Amelanchier alnifolia* var. *semiintegrifolia* and *Corylus cornuta* var. *californica*. Lastly, different age stands of Douglas fir are present
due to logging practices. Forest patches today vary among the different forest stages (young, maturing, and old growth) that exist throughout the study area.

White fir forests

Forests of the *Abies concolor* forest alliance are found in the higher elevation areas of the study region. Extensive stand of white firs are found in the areas of Grouse Mountain, Spike Buck Mountain and Board Camp. Associated species consist of *Calocedrus decurrens*, *Cornus nuttallii*, and *Pinus ponderosa*. The shrub layer consists of *Mahonia pinnata* ssp. *pinnata*, *Symphoricarpus mollis*, and *Amelanchier alnifolia* var. *semiintegrifolia* while the understories of this forest type are rich with taxa such as *Erythronium californicum*, *Calypso bulbosa*, *Fragaria vesca*, and *Vancouveria hexandra*.

Jeffrey Pine forests

Jeffrey pine forests (*Pinus jeffreyi* forest alliance) are dominant on the serpentine outcrops of the Horse Mountain Botanical Area and near Grouse Mountain and Spike Buck Mountain. Associated conifer species are *Calocedrus decurrens*, *Chamaecyparis lawsoniana*, *Pinus attenuata*, and *Pinus lambertiana*. The shrub layer is made of *Quercus vacciniifolia*, *Arctostaphylos canescens* ssp. *canescens*, and *A. nevadensis* ssp. *nevadensis*. The scattered herb layer consists of *Viola cuneata*, *Allium falcifolium*, *Erythronium citrinium* ssp. *citrinium*, and *Angelica tomentosa*. *Rhododendron occidentalis*, *Vaccinium parvifolium*, *Eriophorum crinigerum*, and *Trifolium longipes* var.
shastense occur near creeks and in seep areas. Many rare and sensitive species were found in this vegetation type of the Horse Mountain Botanical Area. A single population of *Cypripedium californicum* was found near the Horse Mountain Mine area.

White Oak Woodlands

White oak woodlands (*Quercus garryana* woodland alliance) occur at the lower elevations of the study region. This alliance occurs at Cold Spring, White Oak Opening and along Kinsey Ridge on dry slopes and ridges. An open herb layer includes *Galium aparine, Festuca californica, Toxicodendron diversilobium, Microsteris gracilis* ssp. *gracilis, Hydrophyllum occidentale,* and *Osmorhiza occidentalis*. Rock outcrops, in dry meadows, are frequently observed and rich with species such as *Triteleia laxa, Eriophyllum lanatum* var. *achillaeoides, Streptanthus tortuosus* var. *tortuosus, Cheilanthes gracillima* and several *Sedum* species.

Shrubland Areas

Three types of shrubland exist in the study region:

Huckleberry oak chaparral (*Quercus vacciniifolia* shrubland alliance) is found associated with the Jeffrey pine forests on ultramafic substrates. In the Horse Mountain Botanical Area, co-dominant species such as *Arctostaphylos nevadensis* ssp. *nevadensis, A. canescens* ssp. *canescens* and *Frangula californica* ssp. *occidentalis* make up the shrub layer on these serpentine outcrops.
Areas of non-serpentine shrubland (*Prunus emarginata* provisional shrubland alliance) are located along Kinsey Ridge, near Grouse Mountain and at the top of Board Camp. Co-dominant species consist of *Ceanothus integerrimus*, *C. cordulatus*, and *Amelanchier alnifolia* var. semiintegrifolia.

The third type is disturbed shrubland induced by logging. The scars of clear cutting are found around the Titlow Hill area, Grouse Mountain, along Kinsey Ridge and at Board Camp. *Pteridium aquilinum*, *Rubus ursinus* var. *ursinus*, and *Ceanothus velutinus* make up the native component. Non-natives, such as *Tragopogon dubius*, *Vicia villosa* ssp. *villosa*, and *Cirsium arvense*, are also present and commonly found.

Prairies and Dry Meadows

Prairies (*Cynosurus echinatus* semi-natural herbaceous stands or *Poa secunda* herbaceous alliance) are found along the western slopes while dry meadows (*Danthonia californica* herbaceous alliance) are found along ridges. Cold Spring and White Oak Opening are areas where these alliances occurs. Herbaceous species include *Perideridia oregana*, *Trifolium microcephalum*, *Linum bienne*, *Lomatium nudicaule*, *Allium bolanderi* ssp. *bolanderi*, and *Gnaphalium palustre*. Clay balds (*Cistanthe umbellata – Gayophytum diffusum* herbaceous alliance) with spring annuals (*Microsteris gracilis* var. *gracilis*, *Navarretia divaricata* ssp. *divaricata*) that bloom quickly in early spring are found in this vegetation type.
Wet Meadows and Waterholes

Wet meadows (*Glyceria striata* herbaceous alliance) and waterholes occur occasionally throughout the study area at Bray’s Opening, Grouse Mountain, and off Forest Service Road 5N10. These species-rich meadows are near forest edges where soils are saturated in the dry summer months. The most common species are *Lilium pardalinum* ssp. *pardalinum*, *Aconitum columbianum*, *Allium validum*, *Plantanthera dilatata* var. *leucostachys*, and *Boykinia occidentalis*. Ferns, rushes, and sedges are frequent as well. Wet habitats are generally under-represented in the study area.

Phytogeography

Phytogeography is defined as the study of the spatial distribution of plants and their populations. To examine these patterns of distribution, phytogeographers have devised a method of dividing the world into regions, floristic provinces, or natural geographical units (Cain 1944, Takhtajan 1986). The criteria for defining these floristic units are based on the presence of different plant families, genera and species as well as plant communities (Takhtajan 1986). Endemism plays a fundamental role in the classification of these floristic regions, as endemic taxa are what make a particular floristic province distinct (Cain 1944, Good 1964, Takhtajan 1986).

To determine the phytogeographic relationships of a floristic region, historically phytogeographers use ploidy levels (Daubenmire 1978, Raven and Axelrod 1978, Stott 1981, Stebbins 1982), evolutionary history based on fossils (Cain 1944, Daubenmire
1978, Raven and Axelrod 1978, Stott 1981, Stebbins 1982), centers of origin or
taxonomic diversity (Daubenmire 1978, Sawyer et al. 2007) and locations of closely
related taxa (Cain 1944, Stebbins and Major 1965, Raven and Axelrod 1978).

The purpose of my study was to reveal insights about the floristic relationships
between my flora and 11 other northwestern California floras. This investigation
uncovers information about the distribution of plant species and which taxa have
affinities to floristic regions.
METHODS

Field Methods

Sampling was conducted in Six Rivers National Forest and on private lands in Humboldt County, California, from Spring 2007 to Fall 2009. Prior to sampling, collecting permits were obtained from Six Rivers National Forest. The California Native Plant Society Rare Plant Inventory (Tibor et al. 2001) and California Natural Diversity Database were consulted for possible rare and sensitive plants in the study area (CNDDB 2006). I submitted California Natural Diversity Database Field Survey forms to California Department of Fish and Game for listed taxa found in my survey.

Sampling began .8 km. north of the intersection with Forest Service Road 6N38 and Forest Route 1, approximately 8 km. from Highway 299. Sampling ended approximately 1.6 km. south of Board Camp Mountain near Forest Service Road 3N05, approximately 32 km. to the south. I sampled along the paved road (Forest Route 1) and its major forks and branches as well as hiking trails. The study area was delineated using a lower elevational cut-off of 1200 meters to include dry meadows at Cold Springs and along Kinsey Ridge.

Over the course of 79 days of fieldwork, I collected 1070 specimens. Of these, 956 specimens were identified, and deposited to the Humboldt State University Herbarium (HSC). Duplicate specimens were sent to California State University, Chico (CHSC), University of California, Berkeley, University and Jepson Herbaria (UC-JEP),
and California Academy of Sciences (CAS). I limited my collection to all vascular species (pteridophytes, conifers and flowering plants) in the study area.

To survey the area, I used an informal stratified sampling regime according to the different vegetation types. Focal collecting areas were established on the basis of richness and phenology of the season (Table 1). On average, I visited each focal sampling site once per week. During a typical day, I surveyed the area and collected plants not already documented, and made notes on when to revisit based on the phenology of the site. For each specimen collected, I noted the locality, vegetation type and associated species. Specimens were assigned the following abundance categories based on field observations: common, frequent, occasional, uncommon, and rare.

Specimen Identification Procedures

Table 1. Locations of focal collecting areas. UTM.s used WGS 84 datum.

<table>
<thead>
<tr>
<th>Locality</th>
<th>Elevation (m)</th>
<th>Township</th>
<th>Range</th>
<th>Section</th>
<th>Quarter</th>
<th>UTME</th>
<th>UTMN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Along Route 1 on Kinsey Ridge. Approximately 3.2 km southeast of intersection with 5N04. “Cattle guard stop”</td>
<td>1371</td>
<td>5N</td>
<td>4E</td>
<td>35</td>
<td>SW 1/4</td>
<td>441460</td>
<td>4512726</td>
</tr>
<tr>
<td>Along Route 1. Near Kinsey Ridge. 1.2 km south of intersection with 4N06.</td>
<td>1256</td>
<td>4N</td>
<td>4E</td>
<td>14</td>
<td>SW 1/4</td>
<td>440980</td>
<td>4508385</td>
</tr>
<tr>
<td>Ammon Ridge Road. Approximately .4 km east of intersection with Route 1.</td>
<td>1548</td>
<td>5N</td>
<td>4E</td>
<td>25</td>
<td>SW 1/4</td>
<td>442736</td>
<td>4515235</td>
</tr>
<tr>
<td>At intersection with Forest Service Road 5N10C and Forest Service Road 5N10.</td>
<td>1346</td>
<td>5N</td>
<td>4E</td>
<td>11</td>
<td>SE 1/4</td>
<td>441695</td>
<td>4519514</td>
</tr>
<tr>
<td>Board Camp Butte. Forest Service Road 4E27.</td>
<td>1502</td>
<td>4N</td>
<td>4E</td>
<td>34</td>
<td>NE 1/4</td>
<td>440402</td>
<td>4504388</td>
</tr>
<tr>
<td>Board Camp Mountain. Forest Service Road 4N38.</td>
<td>1430</td>
<td>4N</td>
<td>4E</td>
<td>27</td>
<td>NW 1/4</td>
<td>439348</td>
<td>4505803</td>
</tr>
<tr>
<td>Board Camp Mountain. Forest Service Road 4N38. Along Redwood Creek</td>
<td>1409</td>
<td>4N</td>
<td>4E</td>
<td>27</td>
<td>SE 1/4</td>
<td>440520</td>
<td>4505519</td>
</tr>
<tr>
<td>Board Camp Mountain. Pack trail 4E26.</td>
<td>1463</td>
<td>4N</td>
<td>4E</td>
<td>28</td>
<td>SE 1/4</td>
<td>438602</td>
<td>4505459</td>
</tr>
<tr>
<td>Board Camp Mountain Forest Service Road 4N38 to Tri Board Camp.</td>
<td>1577</td>
<td>4N</td>
<td>4E</td>
<td>27</td>
<td>SW 1/4</td>
<td>439319</td>
<td>4505332</td>
</tr>
<tr>
<td>Brays Opening on Route 1. .8 km north of intersection with 4N38.</td>
<td>1393</td>
<td>4N</td>
<td>4E</td>
<td>26</td>
<td>NW 1/4</td>
<td>440616</td>
<td>4505953</td>
</tr>
<tr>
<td>Buck Flat. Intersection of Route 1 and Forest Service Road 5N01. &quot;Camassia hideout&quot;</td>
<td>1547</td>
<td>5N</td>
<td>4E</td>
<td>25</td>
<td>NW 1/4</td>
<td>442784</td>
<td>4515085</td>
</tr>
<tr>
<td>Cold Spring. .8 km south of Titlow Hill.</td>
<td>1386</td>
<td>5N</td>
<td>4E</td>
<td>10</td>
<td>NW 1/4</td>
<td>439999</td>
<td>4519900</td>
</tr>
<tr>
<td>Cow Creek Ridge. Forest Service Road 4N06.</td>
<td>1195</td>
<td>4N</td>
<td>4E</td>
<td>13</td>
<td>NW 1/4</td>
<td>442210</td>
<td>4509558</td>
</tr>
<tr>
<td>Forest Service Road 4N06A. Cow Creek Ridge.</td>
<td>1237</td>
<td>4N</td>
<td>4E</td>
<td>11</td>
<td>SE 1/4</td>
<td>442018</td>
<td>4509848</td>
</tr>
<tr>
<td>Forest Service Road 4N32</td>
<td>1414-1463</td>
<td>4N</td>
<td>5E</td>
<td>6</td>
<td>S 1/2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Forest Service Road 4N32. 1.6 km south of intersection with Forest Service Road 4N32E.</td>
<td>1455</td>
<td>4N</td>
<td>4E</td>
<td>6</td>
<td>NW 1/4</td>
<td>444253</td>
<td>4512207</td>
</tr>
<tr>
<td>Forest Service Road 5N10.</td>
<td>1353-1486</td>
<td>5N</td>
<td>4E</td>
<td>2,3,4,11</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
Table 1 (continued). Locations of focal collecting areas.

<table>
<thead>
<tr>
<th>Locality</th>
<th>Elevation (m)</th>
<th>Township</th>
<th>Range</th>
<th>Section</th>
<th>Quarter</th>
<th>UTME</th>
<th>UTMN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grouse Mountain Lookout. Forest Service Road 4N70.</td>
<td>1641</td>
<td>4N</td>
<td>4E</td>
<td>1</td>
<td>SE 1/4</td>
<td>443446</td>
<td>4512146</td>
</tr>
<tr>
<td>Grouse Mountain. Forest Service Road 5N04. Near spring.</td>
<td>1583</td>
<td>4N</td>
<td>4E</td>
<td>1</td>
<td>NW 1/4</td>
<td>443183</td>
<td>4512471</td>
</tr>
<tr>
<td>Horse Mountain Botanical Area. Along Forest Service 6N38.</td>
<td>1311</td>
<td>6N</td>
<td>4E</td>
<td>33</td>
<td>SE 1/4</td>
<td>439436</td>
<td>4523470</td>
</tr>
<tr>
<td>Horse Mountain Botanical Area. At intersection of 6N36B and Forest Service Road 6N36A.</td>
<td>1355</td>
<td>6N</td>
<td>4E</td>
<td>34</td>
<td>SW 1/4</td>
<td>439544</td>
<td>4524473</td>
</tr>
<tr>
<td>Horse Mountain Botanical Area. End of Forest Service Road 6N38. “Hastingsia spot”</td>
<td>1220</td>
<td>6N</td>
<td>4E</td>
<td>34</td>
<td>SW 1/4</td>
<td>439802</td>
<td>4523268</td>
</tr>
<tr>
<td>Horse Mountain Botanical Area. Forest Service Road 6N18. At end of the road.</td>
<td>1407</td>
<td>6N</td>
<td>4E</td>
<td>28</td>
<td>NW 1/4</td>
<td>438008</td>
<td>4525933</td>
</tr>
<tr>
<td>Horse Mountain Botanical Area. Forest Service Road 6N18. Near utility towers and old ski hill.</td>
<td>1483</td>
<td>6N</td>
<td>4E</td>
<td>28</td>
<td>SW 1/4</td>
<td>438415</td>
<td>4524857</td>
</tr>
<tr>
<td>Horse Mountain Botanical Area. Horse Mountain Mine.</td>
<td>1283</td>
<td>6N</td>
<td>4E</td>
<td>33</td>
<td>SE 1/4</td>
<td>439366</td>
<td>4523368</td>
</tr>
<tr>
<td>Horse Mountain Botanical Area. Junction of 6N36 and 6N36A.</td>
<td>1388</td>
<td>6N</td>
<td>4E</td>
<td>27</td>
<td>SW 1/4</td>
<td>439448</td>
<td>4524488</td>
</tr>
<tr>
<td>Route 1. 2.2 km south of Titlow Hill. Old-growth Douglas fir spot.</td>
<td>1439</td>
<td>5N</td>
<td>4E</td>
<td>10</td>
<td>SE 1/4</td>
<td>440998</td>
<td>4519272</td>
</tr>
<tr>
<td>Route 1. .8 km south from intersection with Forest Service Road 6N01B. &quot;Swertia turn&quot;</td>
<td>1575</td>
<td>5N</td>
<td>4E</td>
<td>14</td>
<td>NE 1/4</td>
<td>441629</td>
<td>4518651</td>
</tr>
<tr>
<td>Forest Service Road 5N10. 3.2 km south of intersection with Friday Ridge Road. Near waterhole sign. Taxus spot.</td>
<td>1224</td>
<td>5N</td>
<td>4E</td>
<td>11</td>
<td>SE 1/4</td>
<td>441661</td>
<td>4519507</td>
</tr>
<tr>
<td>Spike Buck Mountain. Forest Service Road 5N18.</td>
<td>1589</td>
<td>5N</td>
<td>4E</td>
<td>36</td>
<td>NW 1/4</td>
<td>442842</td>
<td>4514465</td>
</tr>
<tr>
<td>Titlow Hill. 1.6 km north of turn off to Cold Spring.</td>
<td>1473</td>
<td>5N</td>
<td>4E</td>
<td>10</td>
<td>NW 1/4</td>
<td>439911</td>
<td>4520787</td>
</tr>
<tr>
<td>Waterhole off Forest Service Road 5N10. Approximately 3.2 km east of intersection with Route 1. &quot;Juncus delight&quot;</td>
<td>1346</td>
<td>5N</td>
<td>4E</td>
<td>3</td>
<td>SW 1/4</td>
<td>439394</td>
<td>4521834</td>
</tr>
<tr>
<td>White Oak Opening.</td>
<td>1257</td>
<td>4N</td>
<td>4E</td>
<td>23</td>
<td>NW 1/4</td>
<td>441153</td>
<td>4507167</td>
</tr>
</tbody>
</table>
Floristic Analyses

I used a multi-part approach to analyze the phytogeographical relationships of the flora in the study area. My first analysis described the flora of the study area. My second analysis was to assign taxa to one of four phytogeographic categories. My third analysis estimated the floristic similarities of my flora and the other 11 northwest California floras, using nonmetric multidimensional scaling ordination (henceforth ‘NMS ordination’) and cluster analysis. These methods collectively help to determine the affinities of a taxon to a phytogeographical category as well as the geographic affinities of floras (Stott 1981).

Assignment of Phytogeographical Categories

Following the methods used by Potter (1983), Constantine-Shull (2000) and Leppig (2002), I assigned each taxon to one of the four categories based on its geographic range and elevation. Categories included: California Floristic Province, boreal, western North American, and non-native. Sources included Hickman (1993), Kartez (1999), and The Flora of North America Editorial Committee (2010). Dr. John Sawyer confirmed the determinations.

I used the following criteria to place taxa in the categories:

• Plants of the California Floristic Province phytogeographic category occur below montane elevations (900 m-2100 m) and have ranges centered west of the Cascade-Sierran axis, south of the Rogue River in Oregon and north
of Baja California. Takhtajan (1986) refers to this category as part of the California Province of the Madrean Region, but places portions of the Sierra Nevada Range, the Klamath Mountains and Coast Ranges as well as the Modoc Plateau into his Vancouverian Province. I will refer to these plants as those of the CA element.

- The plants of the boreal phytogeographic category grow above 2100 m in the mountains of northern California. Members of this group originated from the northern latitudes and higher elevations of North America and have migrated down to the study area. Takhtajan (1986) defines this category as the Vancouverian Province. It is the western portion of the Rocky Mountain Region (Takhtajan 1986). I will refer to these plants as those of the boreal element.

- Plants of the western North American phytogeographic category grow throughout western North America, below montane elevations (< 2100 m), and extend beyond the California Floristic Province. Taxa in this group range from Alaska to Mexico and east to the Rocky Mountains. I will refer to these plants as those of the western NA element.

- Plants of the non-native category are introduced into the California flora. These non-indigenous species are present either by accident or through purposeful introduction into the study area’s landscape (Hickman 1993). Many of these taxa are native to Europe, Asia, or Africa (Hickman 1993).
Comparison Between Floras

My second approach compared the species composition of my flora to 11 other northwest California floras using NMS ordination and cluster analysis (Table 2). NMS ordination places floras on a scatter plot based on floristic similarity. Indirect ordination was used to explore the environmental variables that might contribute to the relationships of the floras and help discriminate the patterns of floristic affinities. For the indirect ordination, a secondary matrix was constructed using the geographic information provided in each flora, or estimated using locality information. Cluster analysis divides the floras into groups based on the proportions of shared taxa.

Availability and proximity to the study area dictated which floras were used in the comparisons, but I attempted to find floras that were located in the four cardinal directions from my study area. For each flora, I developed a species list using current nomenclature (Smith and Sawyer 2009, Flora of North America Editorial Committee 2010). In addition, I calculated a series of geographic variables such as distance from coast and highest elevation (Appendix B). Four regional floras, whose species list include more than 700 taxa, and the smallest flora with 255 taxa, were initially included in the analyses, but were ultimately exclude because of the large difference in the number of taxa.

A binary data matrix (presence = 1, absence = 0) was compiled consisting of 2304 species (columns) from 12 floras (rows). Uncommon taxa, occurring in fewer than four floras, were excluded resulting in the final matrix consisting of 886 species. A Beals smoothing data transformation was performed due to the large number of zeros in the
heterogeneous dataset (McCune 1994). After the initial analyses including the 12 floras, I ran a series of analyses consisting: lower elevation and montane floras of both the Coast Ranges and Klamath Ranges, montane floras of the Klamath Region only, and 11 northwest California floras with the Tracy collection removed. I chose this last analysis to present here as Tracy’s collection was based on entries within the Consortium of California Herbaria. Unfortunately, not all of Tracy’s collection has been entered into the Consortium. Specimens collected from the study area that are not in the Consortium are housed in California Academy of Sciences and Humboldt State University Herbarium.

I used the Sørensen coefficient of similarity for both NMS ordination and cluster analysis. This coefficient gives weight to shared species between floras rather than weight to species occurring in individual floras. The Sørensen coefficient of similarity is

\[ S = \frac{2w}{(A + B)} \]

where \( w \) is the number of shared species between two floras, and \( A \) and \( B \) are the number of species in each flora (McCune 2002).

Ordination

NMS ordination, using PC-ORD’s “slow and through” autopilot mode, found the best solution for the optimum number of axes with the lowest final stress (McCune 1999). Monte Carlo permutations were conducted with 40 runs of real data and 50 runs of randomized data. I carried out indirect ordination by overlaying the scatter plot with joint-plot vectors generated from the secondary matrix to determine which environmental variables influenced the floristic affinities of the groups.
Cluster Analysis

I used the hierarchal agglomerative method with flexible beta group linkage (-0.25 beta value) because this method groups all the floras together initially, and then determines groups based on the similarity of taxa (Sneath and Sokal 1973, Gauch 1981, McCune 1999, 2002). A flexible beta group linkage was used because it is space conserving and the links formed in the clustering process do not chain (McCune 2002).

Comparisons with the Tracy collection

To examine any changes that have taken place in the last 60 years, I conducted a search, within the California Herbaria Consortium, of all Tracy specimens documented from the study area. Richard Moe, the technical editor of the Consortium, helped to gather the 6084 Consortium entries on record for Tracy. I eliminated all duplicate entries. This search found 439 species, from Horse Mountain, Grouse Mountain, Board Camp Mountain, and South Fork Mountain, were used in the analysis. I chose to include species from the South Fork Mountain region due to the close proximity and the high number of specimens collected, particularly at McKay Camp. The collection I derived in this fashion was treated as other northwestern California floras in the quantitative analyses.
Taxa Endemic to Northwest California

Following Smith and Sawyer’s delineation of northwest California, taxa were classified as endemics if their geographic distributional range is south of the Oregon border, west of Interstate 5, east of the Pacific Ocean and north of the Sonoma-Mendocino County line (Smith et al. 2009). I used the following resources to determine whether the distribution of a taxon was considered endemic: A Checklist of the Ferns, Conifers, and Flowering Plants of Northwestern California (Smith et al. 2009), The Flora of North America (2010), the Consortium of California Herbaria (2010), and the Consortium of Pacific Northwest Herbaria (2010).
Table 2. Northwest California floras used for ordination and cluster analyses. * = Denotes excluded regional and small floras. Size codes: 1 = smaller than the study area, 2 = the same size as the study area, 3 = larger than the study area, 4 = regional flora (4)

<table>
<thead>
<tr>
<th>Name</th>
<th>Reference</th>
<th>Elevation (m)</th>
<th>Number of Taxa</th>
<th>Size</th>
<th>Longitude Midpoint</th>
<th>Latitude Midpoint</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floristic Affinities of Horse Mountain, Grouse Mountain and Board Camp Mountain, Humboldt County, CA</td>
<td>This study</td>
<td>1195 - 1649</td>
<td>548</td>
<td>2</td>
<td>123° 43'W</td>
<td>40° 48' N</td>
</tr>
<tr>
<td>Tracy collection</td>
<td>Tracy (Consortium of Ca. Herbaria)</td>
<td>1067 - 1769</td>
<td>439</td>
<td>3</td>
<td>123° 41'W</td>
<td>40° 46'N</td>
</tr>
<tr>
<td>Flora of El Capitan and surrounding areas, Siskiyou County, CA</td>
<td>Kraemer &amp; Butler (1972)</td>
<td>1402 - 2081</td>
<td>311</td>
<td>1</td>
<td>123° 36'W</td>
<td>41° 53'N</td>
</tr>
<tr>
<td>A flora of the Trinity Alps of northern California</td>
<td>Ferlatte (1974)</td>
<td>732 - 2744</td>
<td>608</td>
<td>3</td>
<td>123° 02'W</td>
<td>40° 54'N</td>
</tr>
<tr>
<td>A study of the flora of Preston Peak, Siskiyou County, CA</td>
<td>Ground (1972)</td>
<td>1204 - 2228</td>
<td>337</td>
<td>2</td>
<td>123° 36'W</td>
<td>41° 51'N</td>
</tr>
<tr>
<td>Flora of Marble Valley</td>
<td>Muth (1967)</td>
<td>1792 - 2271</td>
<td>336</td>
<td>1</td>
<td>123° 09'W</td>
<td>41° 34'N</td>
</tr>
<tr>
<td>The vascular plants of the High Lake Basin in the vicinity of English Peak, Siskiyou County, CA</td>
<td>Oettinger (1975)</td>
<td>1341 - 2174</td>
<td>492</td>
<td>3</td>
<td>123° 12'W</td>
<td>41° 25'N</td>
</tr>
<tr>
<td>A flora of Mount Eddy, Klamath Mountains, CA</td>
<td>Whipple (1981)</td>
<td>2544 - 2751</td>
<td>391</td>
<td>1</td>
<td>122° 31' W</td>
<td>41° 19' N</td>
</tr>
<tr>
<td>Vascular plants of Snow Mountain, North Coast Ranges, CA</td>
<td>Heckard &amp; Hickman (1985)</td>
<td>1500 - 2151</td>
<td>517</td>
<td>2</td>
<td>122° 45' W</td>
<td>39° 23' N</td>
</tr>
<tr>
<td>A flora of the Old Gasquet Toll Road, Del Norte County, CA</td>
<td>Barker (1978)</td>
<td>122 - 930</td>
<td>404</td>
<td>2</td>
<td>123° 92' W</td>
<td>41° 85' N</td>
</tr>
</tbody>
</table>
Table 2 (continued). Northwest California floras used for ordination and cluster analyses. Size codes: 1 = smaller than the study area, 2 = the same size as the study area, 3 = larger than the study area, 4 = regional flora (4)

<table>
<thead>
<tr>
<th>Name</th>
<th>Reference</th>
<th>Elevation (m)</th>
<th>Number of Taxa</th>
<th>Size</th>
<th>Longitude Midpoint</th>
<th>Latitude Midpoint</th>
</tr>
</thead>
<tbody>
<tr>
<td>A flora of the Lassics, Humboldt and Trinity Counties, CA</td>
<td>Nelson (1979)</td>
<td>1463 - 1795</td>
<td>436</td>
<td>1</td>
<td>123° 54' W</td>
<td>40° 33' N</td>
</tr>
<tr>
<td>Forest types on ultramafic parent materials of the southern Siskiyou Mountains in the Klamath region of CA</td>
<td>Simpson (1980)</td>
<td>182 - 1463</td>
<td>296</td>
<td>2</td>
<td>123° 68' W</td>
<td>41° 27' N</td>
</tr>
</tbody>
</table>

The following floras were included in the initial analyses, but ultimately excluded due to the number of taxa.

<table>
<thead>
<tr>
<th>Name</th>
<th>Reference</th>
<th>Elevation (m)</th>
<th>Number of Taxa</th>
<th>Size</th>
<th>Longitude Midpoint</th>
<th>Latitude Midpoint</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meadow vegetation on metasedimentary and metavolcanic parent materials in the north-central Marble Mountains, CA</td>
<td>Stillman (1980)</td>
<td>1550 - 2275</td>
<td>255</td>
<td>2</td>
<td>123° 21' W</td>
<td>41° 60' N</td>
</tr>
<tr>
<td>Flora of the vascular plants of Mendocino County, CA</td>
<td>Smith and Wheeler (1990)</td>
<td>1577 - 2269</td>
<td>820</td>
<td>4</td>
<td>123° 96' W</td>
<td>39° 73' N</td>
</tr>
<tr>
<td>Floral record of the Siskiyou Mountains</td>
<td>Hobart (1970)</td>
<td>378 - 2150</td>
<td>961</td>
<td>4</td>
<td>123° 45' W</td>
<td>42° N</td>
</tr>
<tr>
<td>A botanical survey of the Siskiyou Mountains of northern California and southern Oregon</td>
<td>Gillespie (1931)</td>
<td>1256 - 2335</td>
<td>871</td>
<td>4</td>
<td>123° 08' W</td>
<td>41° 58' N</td>
</tr>
</tbody>
</table>
RESULTS

Floristic Analysis

The flora of Horse Mountain, Grouse Mountain, Board Camp Mountain, and surrounding areas consisted of 548 species from 294 genera and 77 families (Appendix A). Asteraceae was the most diverse plant family (54 species, or 10% of the total flora). Poaceae (47 species), Liliaceae (38 species), Fabaceae (29 species), and Rosaceae (23 species) together comprised another 34% of the total flora. Carex was the largest genus (13 species). Other diverse genera found in the study area included: Trifolium (9 species), Epilobium and Viola (both 7 species), and Agrostis, Castilleja, Juncus, Poa, Potentilla and Ribes (all with 6 species).

Rare and Uncommon Taxa

In the study area, 18 rare taxa were present (Table 3). Most of these taxa (89%) are centered in the California Floristic Province. Two species, Veratrum insolitum and Pleuropogon refractus, have broad western NA affinities. These species are found throughout Washington and Oregon, but are locally rare in the study region and have limited distributions in California.

Range Extensions of Regional Endemics

My flora extends the ranges of Erigeron klamathensis and Fritillaria glauca from their previously known distributions and documents these new populations:
*Erigeron klamathensis*, a northwest California endemic, was located in the Board Camp region and along Kinsey Ridge on Forest Route 1. The closest previously documented population is found at Horse Linto Creek near Hoopa, California approximately 26 km northeast of the Kinsey Ridge population (Consortium of California Herbaria 2009, California Academy of Sciences pers. comm.). The Board Camp locality is the southern extension of its range. *Erigeron klamathensis* was found in a dry meadow in the western portion of Board Camp while the Kinsey Ridge population was found growing on a dry rock outcrop.

*Fritillaria glauca*, a charismatic member of the Liliaceae, was found on a talus slope in the Board Camp region. This small population (< 25 individuals) is the first record for Humboldt County. The closest known populations exist in the Lassics (Black and Red Lassics) in Trinity County, approximately 47 km southeast from the Board Camp population.
<table>
<thead>
<tr>
<th>Family</th>
<th>Scientific name</th>
<th>CNPS Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asteraceae</td>
<td><em>Antennaria suffrutescens</em></td>
<td>List 4.3</td>
</tr>
<tr>
<td>Asteraceae</td>
<td><em>Arnica cernua</em></td>
<td>List 4.3</td>
</tr>
<tr>
<td>Asteraceae</td>
<td><em>Arnica spathulata</em></td>
<td>List 4.3</td>
</tr>
<tr>
<td>Asteraceae</td>
<td><em>Erigeron maniopotamicus</em></td>
<td>List 1B.2</td>
</tr>
<tr>
<td>Asteraceae</td>
<td><em>Wyethia longicaulis</em></td>
<td>List 4.3</td>
</tr>
<tr>
<td>Crassulaceae</td>
<td><em>Sedum laxum ssp. flavidum</em></td>
<td>List 4.3</td>
</tr>
<tr>
<td>Ericaceae</td>
<td><em>Arctostaphylos canescens ssp. sonomensis</em></td>
<td>List 1B.2</td>
</tr>
<tr>
<td>Liliaceae</td>
<td><em>Erythronium citrinum var. citrinum</em></td>
<td>List 4.3</td>
</tr>
<tr>
<td>Liliaceae</td>
<td><em>Fritillaria glauca</em></td>
<td>List 4.2</td>
</tr>
<tr>
<td>Liliaceae</td>
<td><em>Fritillaria purdyi</em></td>
<td>List 4.3</td>
</tr>
<tr>
<td>Liliaceae</td>
<td><em>Lilium pardalinum ssp. vollmeri</em></td>
<td>List 4.3</td>
</tr>
<tr>
<td>Liliaceae</td>
<td><em>Lilium washingtonianum ssp. purpurascens</em></td>
<td>List 4.3</td>
</tr>
<tr>
<td>Liliaceae</td>
<td><em>Veratrum insolitum</em></td>
<td>List 4.3</td>
</tr>
<tr>
<td>Malvaceae</td>
<td><em>Iliamna latibracteata</em></td>
<td>List 1B.2</td>
</tr>
<tr>
<td>Malvaceae</td>
<td><em>Sidalcea oregana ssp. eximia</em></td>
<td>List 1B.2</td>
</tr>
<tr>
<td>Orchidaceae</td>
<td><em>Cypripedium californicum</em></td>
<td>List 4.2</td>
</tr>
<tr>
<td>Poaceae</td>
<td><em>Pleuro pogon refractus</em></td>
<td>List 4.2</td>
</tr>
<tr>
<td>Polemoniaceae</td>
<td><em>Collomia tracyi</em></td>
<td>List 4.3</td>
</tr>
</tbody>
</table>
Northwest California Endemics

Twenty-eight northwest California endemic plants (5% of the total flora) were found in the study area. The limited distribution of these species extends from the Klamath Region into the Coast Ranges. Nine endemics are from the Liliaceae while six are from the Asteraceae. Twenty-three taxa are limited to the California Floristic Province while five are boreal endemics (Table 4). Nine endemic taxa were found in the Board Camp area. Ten endemic taxa were found on ultramafic outcrops within the Horse Mountain Botanical Area.

Non-native Taxa

Fifty-five species, or 10% of the flora are not native in California (Table 5). Non-native grasses comprised the largest group. The most common non-native genus was *Poa* with three species: *P. bulbosa, P. palustris, and P. pratensis ssp. pratensis*. Non-natives were commonly found in disturbed meadows and mixed evergreen forests (36%). Ten of the non-natives found in the study area are members of the Asteraceae. *Cytisus scoparius var. scoparius* was found in a disturbed mixed evergreen forest along Kinsey Ridge very close to Forest Route 1. The California Invasive Plant Council lists this non-native as potentially having high ecological impact on native plant populations and landscapes (California Invasive Plant Council 2010).
Table 4. Northwestern California endemic plants found in the study area

<table>
<thead>
<tr>
<th>Family</th>
<th>Scientific Name</th>
<th>Phytogeographical Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asteraceae</td>
<td>Antennaria suffrutescens</td>
<td>CA element</td>
</tr>
<tr>
<td>Asteraceae</td>
<td>Arnica cernua</td>
<td>CA element</td>
</tr>
<tr>
<td>Asteraceae</td>
<td>Erigeron klamathensis</td>
<td>CA element</td>
</tr>
<tr>
<td>Asteraceae</td>
<td>Erigeron maniopotamicus</td>
<td>CA element</td>
</tr>
<tr>
<td>Asteraceae</td>
<td>Wyethia longicaulis</td>
<td>CA element</td>
</tr>
<tr>
<td>Boraginaceae</td>
<td>Hackelia bella</td>
<td>CA element</td>
</tr>
<tr>
<td>Brassicaceae</td>
<td>Arabis subpinnatifida</td>
<td>Boreal element</td>
</tr>
<tr>
<td>Crassulaceae</td>
<td>Sedum laxum ssp. flavidum</td>
<td>CA element</td>
</tr>
<tr>
<td>Crassulaceae</td>
<td>Sedum laxum ssp. laxum</td>
<td>CA element</td>
</tr>
<tr>
<td>Ericaceae</td>
<td>Arctostaphylos canescens ssp. sonomensis</td>
<td>CA element</td>
</tr>
<tr>
<td>Fabaceae</td>
<td>Trifolium longipes ssp. oreganum</td>
<td>CA element</td>
</tr>
<tr>
<td>Fabaceae</td>
<td>Trifolium longipes ssp. shastense</td>
<td>Boreal element</td>
</tr>
<tr>
<td>Liliaceae</td>
<td>Dichelostemma ida-maia</td>
<td>CA element</td>
</tr>
<tr>
<td>Liliaceae</td>
<td>Erythronium californicum</td>
<td>CA element</td>
</tr>
<tr>
<td>Liliaceae</td>
<td>Erythronium citrinum var. citrinum</td>
<td>CA element</td>
</tr>
<tr>
<td>Liliaceae</td>
<td>Fritillaria glauca</td>
<td>CA element</td>
</tr>
<tr>
<td>Liliaceae</td>
<td>Fritillaria purdyi</td>
<td>CA element</td>
</tr>
<tr>
<td>Liliaceae</td>
<td>Hastingsia serpentinicola</td>
<td>Boreal element</td>
</tr>
<tr>
<td>Liliaceae</td>
<td>Lilium pardalinum ssp. vollmeri</td>
<td>CA element</td>
</tr>
</tbody>
</table>
Table 4 (continued). Northwestern California endemic plants found in the study area.

<table>
<thead>
<tr>
<th>Family</th>
<th>Scientific Name</th>
<th>Phytogeographical Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liliaceae</td>
<td><em>Lilium washingtonianum</em> ssp. purpurascens</td>
<td>CA element</td>
</tr>
<tr>
<td>Malvaceae</td>
<td><em>Sidalcea oregana</em> ssp. <em>eximia</em></td>
<td>CA element</td>
</tr>
<tr>
<td>Plantaginaceae</td>
<td><em>Penstemon anguineus</em></td>
<td>Boreal element</td>
</tr>
<tr>
<td>Polygonaceae</td>
<td><em>Eriogonum umbellatum</em> var. <em>nelsoniorum</em></td>
<td>CA element</td>
</tr>
<tr>
<td>Portulacaceae</td>
<td><em>Claytonia saxosa</em></td>
<td>Boreal element</td>
</tr>
<tr>
<td>Ranunculaceae</td>
<td><em>Delphinium decorum</em> ssp. <em>tracyi</em></td>
<td>CA element</td>
</tr>
<tr>
<td>Ranunculaceae</td>
<td><em>Delphinium trolliifolium</em></td>
<td>CA element</td>
</tr>
<tr>
<td>Rosaceae</td>
<td><em>Rosa gymnocarpa</em> var. <em>serpentina</em></td>
<td>CA element</td>
</tr>
<tr>
<td>Santalaceae</td>
<td><em>Arceuthobium siskiyouense</em></td>
<td>CA element</td>
</tr>
</tbody>
</table>
Table 5. Non-native taxa of the study area.

<table>
<thead>
<tr>
<th>Family</th>
<th>Scientific Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amaranthaceae</td>
<td>Chenopodium botrys</td>
</tr>
<tr>
<td>Apiaceae</td>
<td>Torilis arvensis</td>
</tr>
<tr>
<td>Asteraceae</td>
<td>Centaurea diffusa</td>
</tr>
<tr>
<td>Asteraceae</td>
<td>Cirsium arvense</td>
</tr>
<tr>
<td>Asteraceae</td>
<td>Cirsium vulgare</td>
</tr>
<tr>
<td>Asteraceae</td>
<td>Lactuca biennis</td>
</tr>
<tr>
<td>Asteraceae</td>
<td>Leucanthemum vulgare</td>
</tr>
<tr>
<td>Asteraceae</td>
<td>Matricaria discoidea</td>
</tr>
<tr>
<td>Asteraceae</td>
<td>Rafinesquia californica</td>
</tr>
<tr>
<td>Asteraceae</td>
<td>Senecio jacobaea</td>
</tr>
<tr>
<td>Asteraceae</td>
<td>Taraxacum officinale</td>
</tr>
<tr>
<td>Asteraceae</td>
<td>Tragopogon dubius</td>
</tr>
<tr>
<td>Brassicaceae</td>
<td>Barbarea verna</td>
</tr>
<tr>
<td>Brassicaceae</td>
<td>Brassica nigra</td>
</tr>
<tr>
<td>Brassicaceae</td>
<td>Lepidium campestre</td>
</tr>
<tr>
<td>Caryophyllaceae</td>
<td>Cerastium fontanum ssp. vulgare</td>
</tr>
<tr>
<td>Caryophyllaceae</td>
<td>Cerastium glomeratum</td>
</tr>
<tr>
<td>Caryophyllaceae</td>
<td>Dianthus armeria</td>
</tr>
<tr>
<td>Caryophyllaceae</td>
<td>Isolepis setaceus</td>
</tr>
<tr>
<td>Caryophyllaceae</td>
<td>Petrorhagia dubia</td>
</tr>
<tr>
<td>Caryophyllaceae</td>
<td>Saponaria officinalis</td>
</tr>
<tr>
<td>Caryophyllaceae</td>
<td>Spergularia rubra</td>
</tr>
<tr>
<td>Dipsacaceae</td>
<td>Dipsacus fullonum</td>
</tr>
<tr>
<td>Fabaceae</td>
<td>Cytisus scoparius var. scoparius</td>
</tr>
<tr>
<td>Fabaceae</td>
<td>Lotus corniculatus</td>
</tr>
<tr>
<td>Fabaceae</td>
<td>Medicago sativa</td>
</tr>
<tr>
<td>Fabaceae</td>
<td>Melilotus alba</td>
</tr>
<tr>
<td>Fabaceae</td>
<td>Trifolium hirtum</td>
</tr>
<tr>
<td>Fabaceae</td>
<td>Trifolium repens</td>
</tr>
<tr>
<td>Geraniaceae</td>
<td>Erodium cicutarium</td>
</tr>
</tbody>
</table>
Table 5 (continued). Non-native taxa of the study area.

<table>
<thead>
<tr>
<th>Family</th>
<th>Scientific Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guttiferae</td>
<td>Hypericum perforatum</td>
</tr>
<tr>
<td>Lamiaceae</td>
<td>Mentha pulegium</td>
</tr>
<tr>
<td>Linaceae</td>
<td>Linum bienne</td>
</tr>
<tr>
<td>Plantaginaceae</td>
<td>Plantago lanceolata</td>
</tr>
<tr>
<td>Plantaginaceae</td>
<td>Veronica arvensis</td>
</tr>
<tr>
<td>Poaceae</td>
<td>Agrostis capillaris</td>
</tr>
<tr>
<td>Poaceae</td>
<td>Agrostis gigantea</td>
</tr>
<tr>
<td>Poaceae</td>
<td>Aira caryophyllea</td>
</tr>
<tr>
<td>Poaceae</td>
<td>Bromus arvensis ssp. arvensis</td>
</tr>
<tr>
<td>Poaceae</td>
<td>Bromus sterilis</td>
</tr>
<tr>
<td>Poaceae</td>
<td>Cynosurus echinatus</td>
</tr>
<tr>
<td>Poaceae</td>
<td>Dactylis glomerata</td>
</tr>
<tr>
<td>Poaceae</td>
<td>Elymus elongatus</td>
</tr>
<tr>
<td>Poaceae</td>
<td>Elymus hispidus</td>
</tr>
<tr>
<td>Poaceae</td>
<td>Hordeum marinum ssp. gussonianum</td>
</tr>
<tr>
<td>Poaceae</td>
<td>Phleum pratense</td>
</tr>
<tr>
<td>Poaceae</td>
<td>Poa bulbosa</td>
</tr>
<tr>
<td>Poaceae</td>
<td>Poa palustris</td>
</tr>
<tr>
<td>Poaceae</td>
<td>Poa pratensis ssp. pratensis</td>
</tr>
<tr>
<td>Polygonaceae</td>
<td>Polygonum polystachyum</td>
</tr>
<tr>
<td>Polygonaceae</td>
<td>Rumex acetosella ssp. acetosella</td>
</tr>
<tr>
<td>Polygonaceae</td>
<td>Rumex crispus</td>
</tr>
<tr>
<td>Polygonaceae</td>
<td>Rumex obtusifolius</td>
</tr>
<tr>
<td>Scrophulariaceae</td>
<td>Verbascum blattaria</td>
</tr>
<tr>
<td>Scrophulariaceae</td>
<td>Verbascum thapsus</td>
</tr>
</tbody>
</table>
Quantitative Analyses

Phytogeographic Elements in My Flora

The flora is much like the rest of western North America at low elevations. About half of the taxa (273) found in the study area, belong to the western NA element. The majority of these taxa were found in mixed evergreen forests (35%), dry meadows near white oak woodlands (21%), and wet meadows in mixed evergreen forests (18%). Sixty-four of the 273 taxa were found on ultramafic substrates. Taxa included in this group are Philadelphus lewisii, Aralia californica, Pteridium aquilinum, and Luina hypoleuca.

One hundred and twenty-four taxa with affinities to the CA element comprised 22% of the total flora. Many of these taxa (39%) occurred in the understories of mixed evergreen forests while another 26% occurred in Jeffrey pine forests associated with serpentine substrates. 34% of the CA element taxa are found in mixed evergreen forests and barren outcrops associated with ultramafic substrates. Twenty-three endemic taxa have origins in the California Floristic Province including with seven Liliaceae and five Asteraceae. Silene californica, Toxicodendron diversilobium, Polygala cornuta var. cornuta, and Pinus jeffreyi are members of this category.

Ninety-six taxa, only 17% of the total flora, were in the boreal element. Half of these (47 taxa) occurred in mixed evergreen forests, and another 27 taxa were found on ultramafic outcrops. Several of these taxa were found in moist, north-facing pockets of late snowmelt or “snow coves” of mixed evergreen and white fir forests. These spots are
similar to areas found in montane forests with higher elevations and latitudes than the study area. Examples include *Linnaea borealis* ssp. *longiflora*, *Botrychium multifidum* and *Noccaea montana* var. *montana*. The five boreal endemics were found in either seeps of mixed evergreen forests or in mesic understories of white fir forests.

Fifty-five taxa, or 10% of the total, were non-native. Almost half of the taxa are from the Poaceae (26%) and Asteraceae (20%). The majority of the non-native taxa occurred in wet meadows associated with mixed evergreen forests or in dry meadows. Examples include *Saponaria officinalis* and *Dianthus ameria* as well as *Medicago sativa* and *Chenopodium botrys*. The California Invasive Plant Inventory (California Invasive Plant Council 2010) lists 19 of these non-native taxa as having either moderate or limited ecological impact.

**Comparison among floras**

My flora was most similar to the Tracy collection and the flora of the Lassics (both 65% shared taxa). My flora was the least similar to the floras of Mount Eddy and Klamath Mountains (both 38%). Overall, the most similar pair of floras, in my analysis, was the flora of the Trinity Alps and the flora of High Basin Lake near English Peak in the Siskiyou Mountains (73%). The most dissimilar pair of floras was the flora of the Old Gasquet Toll Road and the flora of the Marble Valley (27%) (Appendix C).

Both the NMS ordination and cluster analysis suggests that the 12 floras fall into two subgroups: montane floras of the Klamath Region, and floras of low to montane elevations in the Coast Range and Klamath Range (Lassics, Snow Mountain, Old
Gasquet Toll Road) as well as Tracy’s collection (Figures 4, 5, 6). My flora was most similar to the group of floras at low to montane elevations in the Coast Ranges and Klamath Ranges. The montane Klamath Region group comprises: the flora of El Capitan and surrounding areas, the floras of the Trinity Alps, Preston Peak, Marble Valley, and Mount Eddy, the vascular plants of the High Lake Basin near English Peak, and the study of forest types on ultramafic parent materials of the southern Siskiyou Mountains (Figure 7).

NMS ordination found two axes to be the best solution from the Monte Carlo simulations. The two axes account for 88.8% of the variation in species composition of the 12 floras (Table 6). The first axis is most highly correlated with the latitude midpoint variable ($r^2=0.462$), and the number of taxa in each flora ($r^2=0.346$). The second axis is strongly correlated with elevation ($r^2=0.801$), distance from the coast ($r^2=0.530$) and longitude midpoint ($r^2=0.417$) (Table 7). The final stress for the two-dimensional solution from NMS ordination was 2.606. The cumulative $r^2$ values were extremely high for all floras. Using McCune’s suggestion that outliers may be dominating the relationships of the dataset, I reran the ordination without the two dissimilar floras (the flora of the Old Gasquet Toll Road and the flora of Marble Valley), and obtained an equally high cumulative $r^2$ value (95.5%) (McCune 2002). When I removed the Tracy collection, I found that my flora is aligned with the flora of Old Gasquet Toll Road (Figure 8).
Figure 4. Nonmetric multidimensional scaling of 12 northwest California floras. ■ = floras whose area is less than my study area, ▲ = floras of equal size, and ● = floras with a larger area.
Table 6. Coefficients of determination for the correlations between ordination distances and distances in the original n-dimensional space of 12 northwest California floras.

<table>
<thead>
<tr>
<th>Axis</th>
<th>R squared increment</th>
<th>Cumulative</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.888</td>
<td>0.888</td>
</tr>
<tr>
<td>2</td>
<td>0.093</td>
<td>0.982</td>
</tr>
</tbody>
</table>

Table 7. Pearson and Kendall correlations of environmental variables with ordination axes from the analysis of 12 northwest California floras.

<table>
<thead>
<tr>
<th></th>
<th>Axis 1 r²</th>
<th>Axis 2 r²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latitude Midpoint</td>
<td>0.462</td>
<td>0.011</td>
</tr>
<tr>
<td>Longitude Midpoint</td>
<td>0.002</td>
<td>0.417</td>
</tr>
<tr>
<td>Difference in Latitude</td>
<td>0.049</td>
<td>0.003</td>
</tr>
<tr>
<td>Difference in Longitude</td>
<td>0.007</td>
<td>0.051</td>
</tr>
<tr>
<td>Distance From Coast</td>
<td>0.013</td>
<td>0.530</td>
</tr>
<tr>
<td>Elevation Span</td>
<td>0.080</td>
<td>0.000</td>
</tr>
<tr>
<td>Highest Elevation</td>
<td>0.148</td>
<td>0.801</td>
</tr>
<tr>
<td>Number of Taxa</td>
<td>0.346</td>
<td>0.015</td>
</tr>
</tbody>
</table>
Figure 5. Cluster analysis of 12 northwest California floras.
Cluster analysis of Coast and Klamath Range floras at low to montane elevations.

Figure 6.
Figure 7. Cluster analysis of montane Klamath Range floras.
Figure 8. Cluster analysis with the Tracy collection removed.
Comparison with the Tracy collection

53% of the taxa collected by Tracy were still present in the study area. This number included 167 taxa from Horse Mountain, 238 taxa from Grouse Mountain, 10 taxa from Board Camp Mountain, and 244 taxa from South Fork Mountain. I did not find 144 taxa that Tracy found (Appendix D).

Noteworthy taxa collected by both Tracy and me include six *Ribes* species (*R. binominatum*, *R. lacustre*, *R. lobbii*, *R. roezlii* var. *cruentum*, *R. sanguineum* var. *sanguineum*, and *R. viscosissimum*). We also both found four species of *Silene* (*S. bernardina*, *S. californica*, *S. campanulata* ssp. *glandulosa*, and *S. lemmonii*), and three species of *Veratrum* (*V. californicum* var. *caudatum*, *V. insolitum*, and *V. viride* var. *eschscholzianum*). Four species of *Ceanothus* were also located (*C. cordulatus*, *C. cuneatus* ssp. *cuneatus*, *C. integerrimus*, and *C. pumilus*). We both documented the hybrid that occurs between *Ceanothus pumilus* and *Ceanothus cuneatus* ssp. *cuneatus* in the Horse Mountain Botanical Area.

Upon comparison of my species list with the species list generated from the Consortium of California Herbaria, I found a large increase in the number of non-native species. Tracy only collected three non-native species, *Cirsium arvense*, *Senecio sylvaticus*, and *Trifolium repens*. I found 56 non-native species currently in the study area, suggesting an influx of 54 non-native species over the last 60 years. I did not document *Senecio sylvaticus*.
DISCUSSION

With 548 taxa, the flora of Horse Mountain, Grouse Mountain, and Board Camp Mountain area is diverse. The flora comprises 77 families, including a large number of Asteraceae and Liliaceae, 28 northwest California endemics (5% of the total flora), and 55 non-native species (10%). This high diversity can be attributed to a variety of factors including the overlap of low-elevation and montane forest belts, a complex lithology, topographic variation, and a Mediterranean climate that together create a heterogeneous landscape that supports a rich, but poorly documented flora (Sawyer 2007).

My flora shows affinities to both the Coast Ranges and Klamath Ranges, with botanical elements from each floristic region. The area consists of plants from the western NA element, CA element, and boreal element as well as non-native plants. My flora closely resembles previously described floras from the Coast Ranges and Klamath Ranges at low to montane elevations: the Tracy collection, the flora of the Lassics, Snow Mountain, and Old Gasquet Toll Road. These floras share the presence of prairies and dry meadows that host a distinct assemblage of plants as well as many taxa having affinities to the western NA element.

Phytogeographical Origins of the Flora

Western North America

More than half of the taxa found in my flora belong to the western NA element. Given that these generalists grow in many different environments and at wide elevational
ranges, it is not surprising that this category comprises the largest component of the flora. Since the study area is positioned where low-elevation and montane forests coincide, this overlap contributes generalist species from both types of forests. Mixed evergreen forests, prairies and dry meadows are frequently found throughout the study area, which provide suitable habitats for many of these taxa.

One hundred and seventeen (41%) of the western NA taxa have broad elevational ranges extending from the coastal zone to the upper montane zone. Many of these taxa occur along the Pacific Coast from Baja to the Pacific Northwest. Examples include *Thysanocarpus curvipes*, *Artemisia douglasiana*, and *Epilobium densiflorum*. Others have southern affinities from northern California to Mexico include *Rupertia physodes*, *Quercus kelloggii*, and *Ceanothus cordulatus*.

Another subset of the western NA taxa has an even broader elevational range. Forty-five taxa have ranges that extend from the coast to the alpine. Examples include orchids, *Piperia unalascensis* and *Spiranthes romanzoffiana*, and ferns such as *Cystopteris fragilis*, *Pteridium aquilinum*, and *Polypodium glycyrrhiza*.

Many of the taxa in the western NA element have affinities to eastern North America. Species whose distributions extend to the eastern seaboard include *Apocynum androsaemifolium*, *Fragaria vesca*, *Galium triflorum*, *Viola adunca* var. *adunca*, and *Pterospora andromedea*. This wide distributional range can be attributed to these plants' ability to adapt to many different environments.
California Floristic Province

Taxa belonging to the CA element represent the second most important phytogeographic elements in my study area (124 taxa, 22%). I found this number to be surprisingly small as the study area is located in the California Floristic Province. However, since the elevation of the study area is relatively low, one can understand why only a fifth of the found taxa have affinities to the CA element.

Four taxa in this category range from the coast to the alpine zone: Senecio integerrmis var. major, Triantha occidentalis ssp. occidentalis, Veronica americana, and Frangula californica ssp. occidentalis. The ranges of Pinus jeffreyi and Viola purpurea ssp. purpurea also extend into the subalpine, but their lowest elevation begins around 450 m. Another set of taxa range from only the coast to the lower elevation coastal prairies, including Zigadenus micranthus and Limnanthes douglasii var. nivea.

Eighty-one taxa from the CA element are found in the montane zone occurring at elevations greater than 900 m. Of these 81 taxa, the elevational range of 57 taxa begins on the coast while another 24 taxa have a narrower distribution with ranges beginning in the low-elevation zone (300-900 m). Taxa in the later group are found in prairies, white oak woodlands, and dry meadows. Examples include Arbutus menziesii, Wyethia longicaulis, Arnica cernua, and Eriogonum umbellatum ssp. goodmanii. Several of these 24 taxa are endemics.

Half of the taxa in the Liliaceae (18 taxa, or 47%) belong to the CA element category making it the largest plant family of this group. This proportion is not
surprising since the region including northwest California and southwest Oregon is a center of diversity for the Liliaceae (Raven and Axelrod 1978). The Asteraceae with 13 taxa (24%) is the second largest taxonomic group in the CA element.

**Boreal**

In the study area, 17% of the taxa have affinities to the boreal element. This comparatively small proportion is expected given that the elevation of the study area is relatively low. In areas of the Klamath Mountains (e.g. Little Duck Lake), a high proportion of taxa with affinities to the boreal element are found in moist habitats at higher elevations (Leppig 2002). Overall, the study area lacks these environments, but since the region overlaps into the montane zone, areas with moist, north facing habitats that frequently host boreal species can be found. I documented many taxa with affinities to the boreal element in concavities of north facing slopes where snowmelt is late (Sawyer pers. comm.).

The majority of taxa in the boreal element are centered from the lower montane to the subalpine. Examples include *Phlox diffusa* ssp. *diffusa*, *Kellogia galioides*, *Silene bernardina*, and *Swertia radiata*. These five taxa are also found in the Rocky Mountains. Axelrod and Raven along with Stebbins considered many higher elevation taxa to have originated in the Rocky Mountains and subsequently migrated into California (Stebbins 1982, Axelrod and Raven 1985). Thirty-one of the boreal taxa have distributions that range from California to either British Columbia or the Rocky Mountains. Seven taxa,
including Montia fontana, Populus trichocarpa, and Chimaphila umbellata ssp. occidentalis have disjunct ranges into eastern North America.

A subset of taxa (21) with affinities to the boreal element is found along the coast having migrated down from higher elevations and latitudes. Taxa such as Achillea millefolium, Chamerion angustifolium ssp. circumvagum, and Hypericum anagalloides are found on the coast and in the alpine. These widely distributed taxa are regarded as cosmopolitan as their ranges extend to the Rocky Mountains and Canada.

Four species of Ribes are classified as boreal. Ribes binominatum, R. lacustre, and R. lobbii are all distributed from the lower montane to the upper montane and subalpine. Ribes binominatum has limited distributions in the Coast Ranges and Klamath Mountains. Ribes lacustre reaches the high elevation areas of eastern and western North America while R. lobbii is restricted to the Cascadian-Sierran ranges. Ribes viscosissimum reaches the alpine (3100 m) in the western states including the Great Basin.

Four species of Polygonum also have affinities to the boreal element. Polygonum douglasii var. douglasii, Polygonum sawatchense ssp. oblivium, Polygonum phytolaccifolium, and Polygonum polygaloides ssp. kelloggii all range from the lower montane zone to the alpine.

Non-Native Taxa

Non-native taxa comprise 10% of the flora. These 55 species were found mainly in both wet and dry meadows. Three species, Taraxacum officinale, Rumex acetosella
ssp. *acetosella* and *Poa pratensis* ssp. *pratensis*, reach the alpine with worldwide ranges outside the study area. The remaining 52 species range from the coast to the upper montane. The majority of these non-natives are native to Europe, Asia, or Africa.

Many of these non-natives are agricultural, grassland, field, or roadside weeds that have migrated into the study area by grazing sheep or cattle, or on logging trucks and automobiles. As stated earlier, the study area has been subjected to heavy grazing since the early 1900s and the presence of these non-natives made be an artifact of these land use practices.

**Comparisons with Other Floras**

Indirect ordination revealed that elevation, distance from coast, and latitude had the greatest influence on the pattern of floristic affinities. The 12 floras tended to fall into two groups along these ecological dimensions. The first group consists of floras from the Coast Ranges and Klamath Ranges at low to montane elevations: the flora of the Lassics, the flora of Snow Mountain, the Tracy collection as well as the flora of Old Gasquet Toll Road (Figures 4, 5, 6 and 8). The second group comprises the montane Klamath Range floras: the floras of El Capitan, Preston Peak, Trinity Alps, Marble Valley, English Peak, Mount Eddy and the forest types of the Siskiyou Mountains (Figures 4, 5, 7). My flora belongs with the first group.

Floras from the Coast and Klamath Range at low to montane elevations are bound together by numerous factors. These floras are positioned at similar elevations, comparable distances from the coast, have similar vegetation types as well as a presence
of ultramafic substrates. The elevational range of the first group of floras spans from 930 m to 1795 m (Appendix B). The five floras are approximately 21 to 72 km from the coast, and with the exception of the flora of the Old Gasquet Toll Road, all the low elevation floras occur below 40°55’ latitude. These positions allow for a distinct composition of plants that one does not find in the montane Klamath Range floras.

In addition, these low and montane elevation floras are also related by the presence of prairies and dry meadows, which support comparable assemblages of plant species. Such vegetation types are poorly represented in size and area within the higher Klamath Range areas. The area where Tracy collected, the Lassics, and Snow Mountain all include meadows which host a different composition of plant that one would find in montane meadows (Tracy Consortium of Ca. Herbaria 2010, Nelson 1979, Heckard et al. 1985). The areas of Cold Spring, Kinsey Ridge, and White Oak Opening, all feature prairies or large meadows. These vegetation types revealed many of the same taxa found by Tracy, Nelson, and Heckard & Hickman. At McKay Camp and Blake Lookout on South Fork Mountain, shared taxa include *Bromus carinatus* var. *carinatus*, *Collinsia parviflora*, *Festuca occidentalis*, *Sanicula tuberosa* and *Viola sheltonii*. On serpentine meadows in the Lassics region, Nelson found shared taxa such as *Stipa lemmonii*, *Viola hallii*, *Lomatium macrocarpum*, *Madia gracilis*, *Lotus denticulatus* and *Wyethia longicaulis*. In the meadows of Snow Mountain, shared taxa were *Cirsium cymosum* var. *cymosum*, *Eschscholzia californica*, *Clarkia purpurea* ssp. *quadrivulnera*, *Navarretia divaricata*, and *Brodiaea elegans* ssp. *elegans*. 
Prairies and meadows do not occur along the Old Gasquet Toll Road. Instead, much of the similarity between the flora of this region and the Coast Range floras can be attributed to the presence of ultramafic outcrops. 20% of the 235-shared taxa are serpentine endemics that occur in both my study area and along Old Gasquet Toll Road. These include *Allium falcifolium*, *Ceanothus pumilus*, *Antennaria suffrutescens*, and *Cypripedium californicum*. Shared taxa with affinities to serpentine substrates also link my flora and the other Coast Range floras. For example, Tracy and I both found *Phacelia corymbosa*, *Quercus vacciniifolia*, and *Angelica tomentosa* in the Horse Mountain area. Likewise, Nelson reported *Erythronium californicum*, *Arnica cernua*, and *Eriogonum umbellatum var. nelsoniorum* from the Lassics area, and in the Snow Mountain region, Heckard and Hickman found taxa such as *Polystichum scopulinum*, *Aspidotis densa*, *Rigiopappus leptocladus* and *Noccaea montana var. montana*. All of these taxa occur in my flora.

My flora is quite different from the montane Klamath Range floras, which is expected given the differences in elevation, vegetation types, and substrates in the two areas. For example, red fir forests, mountain hemlock forests, and white pine forests are common in the Klamath Mountains at elevations above 1300m, but do not occur in my study area. Likewise granite and limestone substrates support distinctive floristic elements of the Klamath, but are largely absent from the study area. Stillman (1980) found on the limestone outcrops of the Marble Mountains taxa such as *Cercocarpus ledifolius*, *Ivesia gordonii*, *Gentiana newberryi*, *Antennaria racemosa*, and *Lilium*.
kelleyanum. Oettinger (1967) and Ferlatte (1974) found on granitic substrates in the Trinity Alps and on English Peak, respectively, taxa such as *Juncus drummondii, Carex nigricans, Perideria gairdneri*, and *Dodecatheon jeffreyi*. None of these taxa occur in my study area. Serpentine outcrops occur in both the Klamath Mountains and Coast Ranges, but plant assemblages are different, probably due to the influence of elevation. For example, on Mount Eddy (elevation 2751 m), Whipple found serpentine endemics including *Polemonium chartaceum, Epilobium siskiyouense, Anemone drummondii*, and *Astragalus whitneyi* var. *siskiyouensis*. These taxa are not found in the floras of Coast Ranges and Klamath Ranges at low to montane elevations. Many of the shared taxa occurring on serpentine outcrops in both groups include generalists that are tolerant of a range of elevations. Serpentine endemics such as *Allium falcifolium, Hieracium bolanderi, Noccaea montana* var. *montana*, and *Lomatium dasycarpum ssp. dasycarpum* are found on ultramafic outcrops in both provinces.

**Historical Changes**

My survey suggests substantial changes in the flora of the study area since Tracy’s first visit in 1911. Tracy spent 49 days over a span of 33 years (1917-1951) in the study area and in the adjacent South Fork Mountain region. In this time, he documented 439 native taxa and only three non-natives. My collection, which was made over 79 days in two years, found a total of 548 taxa, including 54 non-native taxa and 199 native taxa that Tracy did not see. In contrast, I did not collect 144 native taxa that Tracy documented.
The dramatic increase in the number of non-native taxa is probably not an artifact of a collection bias on the part of Tracy against non-natives. In fact, herbarium collections from the coast areas reveal that he collected many non-natives. Rather, the 17-fold increase is likely the result of continued input and spread of non-native seeds via cattle and motorized vehicles as well as the increase in the availability of disturbed habitat related to logging. In 1950s, at the end of Tracy’s collecting years, an estimated 400-500 cattle grazed within the study area per year (J. Read pers. comm.). While the number of cattle has decreased over the last 50 years, the effect of this long-term land management practice persists, particularly in areas where cattle graze throughout the summer, and move from meadow to meadow in search of water and forbs (J. Read pers. comm.). Most of the non-native taxa in the study area were found in areas frequently grazed and trampled by cattle such as: the prairie at Cold Springs which is adjacent to a private ranch; a wet meadow in the Grouse Mountain grazing allotment; and in mixed evergreen forests at Board Camp near the Bug Creek grazing allotment.

Concurrent with long-term grazing has been the continued logging of Douglas fir forests in the study area. This activity has increased the amount of fragmented forests and creates open disturbed habitats suitable for non-natives. Once established in a region, the potential for these non-natives to spread into other vegetation types, particularly moist habitats frequented by cattle, increases.

Changes in the road system may have also contributed to an increase in the number of non-native taxa. The paving of Forest Route 1, which serves as a thoroughfare
between Highway 299 and Highway 36, has lead to more traffic in the region increasing the potential for non-natives to be dispersed. In addition, over time the increase in the number of smaller logging roads has provided a greater opportunity for non-natives to move across the landscape as logging trucks can transport the seeds of non-natives.

Apparent changes in the composition of the native flora are equally striking. I did not find 26% of the native taxa that Tracy collected. Of these 144 undocumented taxa, 32 are from Horse Mountain, 60 are from Grouse Mountain, and 72 are from South Fork Mountain where I did not survey (Appendix D). Some of the discrepancy may represent a loss of species via local extinction, perhaps related to changes in climate, a shift in range or habitat disturbance. Widespread taxa that may have been extirpated from the study area include *Scirpus microcarpus*, *Navarretia squarrosa*, and *Stachy ajugoides var. rigida*.

In contrast, some of the loss of native taxa may be more apparent than real. For example, I simply may have overlooked taxa during my survey or did not survey in all the places where Tracy surveyed, particularly in areas where rare taxa may have been. In fact, two of the 144 “missing” taxa are CNPS listed plants (*Lomatium tracyi* and *Epilobium oreganum*). These rare plants have limited distributions and were possibly found at the edge of their natural range, or in satellite populations far from their normal distribution. The probability of encountering these plants during the survey was small. Further, many of the documented taxa not encountered are found in montane and
subalpine forests at elevations above 1800 meters, which is much higher than the

elevation of the study area.

Another reason for the large number of “missing” taxa relates to Tracy’s habit of
using broad geographical locality names on his labels. For example, Grouse Mountain
appears on numerous labels of plants that most certainly would not grow in my study
area. For example, the Consortium states that Tracy collected *Darmera peltata* at Grouse
Mountain. However, this plant commonly occurs on stream banks along rivers at much
lower elevations than the study area suggesting a tendency to use a “broad-brush”
approach for locality information. Several of the taxa I did not document have a Horse
Mountain locality on their specimen labels. However, the elevation of these documented
plants is much lower (914 m.) than the actual elevation of Horse Mountain proper. Tracy
probably found them in the foothills of Horse Mountain. Therefore, it is seems that
Tracy’s delineation of Horse Mountain was more extensive than mine.

About 36% of the taxa I collected represent possible additions to the native flora
of my study area; I collected 199 native plants not reported by Tracy. Although some of
these taxa may have migrated into the study area since Tracy’s time, possibly in response
to changes in climate and land use practices, most were probably present during Tracy’s
time. He may have failed to collect them simply because of the places and times he
visited. Road building since Tracy’s time also provided me with greater access to some
parts of the study area. Areas where Tracy probably did not survey. In addition, some of
these apparent additions to the flora are because Tracy evidently did not collect, or at
least thoroughly collect, all categories of plants. For example, he did not collect common woody taxa like *Acer macrophyllum, Calocedrus decurrens, Notholithocarpus densiflorus* var. *densiflorus*, or any *Mahonia* species that were most certainly present. Finally, I was not able to verify all of Tracy’s specimens and therefore, some of the discrepancy may be attributed to errors in identification on Tracy’s part.


Finch, A. 2000. Geology in the vicinity of Spike Buck Mountain, Willow Creek quadrangle, Humboldt County, CA. Senior project, Dept. of Geology, Humboldt State University, Arcata, CA.


Kalt, J. 2007. Local botanist. Personal communication


Moe, R. 2009. Manager of collection data at the University and Jepson Herbaria. Personal communication.


Nash, G. 1993. Little horseplay on Horse Mountain. Humboldt Historian 41: 4-11


Read, J. 2010. Range Manager at Six Rivers National Forest. Personal communication


Tracy, J.P. Collecting notebooks #1-34. University and Jepson Herbaria Archives. Berkeley, CA.


Appendix A. Annotated species list of Horse Mountain, Grouse Mountain, Board Camp Mountain and surrounding areas. Collection numbers are in parenthesis after the author’s name. Phytogeographical affinity of each taxon is also given. California Native Plant Society Ranks is noted when pertinent.

FERNS AND FERN ALLIES

BLECHNACEAE

Blechnum spicant (L.) Roth (959) Uncommon. Found in wet meadows of mixed evergreen forests; 1641 m. Western North America

DRYOPTERIDACEAE

Athyrium filix-femina (L.) Roth var. cyclosorum Rupr. (626, 995) Occasionally found in wet meadows in mixed evergreen forests; 1346-1583m. Western North America

Cystopteris fragilis (L.) Bernh. (103, 161A, 203,563,704) Common in dried creek beds, Jeffrey pine forests, mixed evergreen forests, and dry meadows of white oak woodlands; 1386-1547m. Western North America

Polystichum imbricans (D.C. Eat.) D.H. Wagner ssp. imbricans (96, 583, 707, 929, 1039) Common in mixed evergreen forests, huckleberry oak chaparral, and dry meadows; 1257-1402 m. Western North America

Polystichum munitum (Kaulf.) C. Presl. (597, 857, 864) Common in open gaps of mixed evergreen forests, or in the understories of Douglas fir forests; 1195-1443 m. Western North America

Polystichum scopulinum (D.C. Eat.) Maxon (469, 708) Uncommon. Found in huckleberry oak chaparral; 1294-1349 m. Boreal

DENNSTAEDTIACEAE

Pteridium aquilinum (L.) Kuhn (173, 608) Common in mixed evergreen forests, dry meadows, and recently logged shrubland; 1649-1441 m. Western North America
EQUISETACEAE

_Equisetum arvense_ L. (505, 622, 737) Common in wet meadows of mixed evergreen forests, or dry understories of mixed evergreen forests; 1487-1583 m. Western North America

_Equisetum laevigatum_ A. Braun (580) Uncommon. Found near creeklets of mixed evergreen forests; 1290 m. Western North America

_Equisetum telmateia_ Ehrh. ssp. _braunii_ (Milde) Hauke (942) Occasionally found on edges of roadside springs; 1252 m. California Floristic Province

OPHIOGLOSSACEAE

_Botrychium multifidum_ (Gmel.) Trev. (381) Uncommon. Found in the understory of a mixed evergreen forest; 1426 m. Boreal

POLYPODIACEAE

_Polypodium glycyrrhiza_ D. C. Eat. (713) Uncommon. Found on rock outcrops in Douglas fir forests; 1265 m. Western North America

PTERIDACEAE

_Adiantum aleuticum_ (Rupr.) Paris (161, 514) Common near creeklets of mixed evergreen forest and Jeffrey pine forests; 1300-1350 m. Western North America.

_Aspidotis densa_ (Brack.) Lellinger (91, 669, 715) Common on rock outcrops of Jeffrey pine forests; 1395-1570 m. Boreal

_Cheilanthes gracillima_ D.C. Eat. (97, 628, 656B, 1044, 1062) Common in old growth Douglas fir forests, rock outcrops of white oak woodlands, and mixed evergreen forests on serpentine substrates; 1402-1483 m. Western North America

_Pellaea brachyptera_ (T. Moore) Baker (629, 714) Occasionally found on rock outcrops of Jeffrey pine forests; 1382-1413 m. Boreal

SELAGINELLACEAE

_Selaginella wallacei_ Hieron. (686a, 1063) Common on rock outcrops in Jeffrey pine forests; 1426-1456 m. Western North America
THELYPTERIDACEAE

*Thelypteris nevadensis* (Baker) Clute ex Morton (1070) Uncommon. One population was found growing on a roadside cutbank in an open mixed evergreen forest; 1466 m. Western North America

GYMNOSPERMS

CUPRESSACEAE

*Calocedrus decurrens* (Torr.) Florin (648B, 886, 1053) Common in mixed evergreen forests of serpentine and non-serpentine substrates; 1623-1649 m. California Floristic Province

*Chamaecyparis lawsoniana* (A. Murr.) Parl. (636, 772) Common in Jeffrey pine forests; 1365-1402 m. California Floristic Province

PINACEAE

*Abies concolor* (Gord. & Glend.) Lindl. ex Hildebr. var. *lowiana* (Gord. & Glend.) Lemmon (645, 648, 700, 719, 745, 811, 1059) Common in mixed evergreen forests, and white fir forests; 1282-1649 m. Boreal

*Pinus attenuata* Lemmon (640, 752) Common in Jeffrey pine forests; 1428-1448 m. California Floristic Province

*Pinus jeffreyi* Grev. (754) Common in Jeffrey pine forests; 1428 m. California Floristic Province

*Pinus lambertiana* Dougl. (753) Common in Jeffrey pine forests; 1428 m. California Floristic Province

*Pinus monticola* Dougl. ex D. Don (638, 679, 835) Common in Jeffrey pine forests; 1259-1415. Boreal

*Pinus ponderosa* P. & C. Lawson var. *ponderosa* (725, 787, 859) Common in mixed evergreen forests, and white fir forests; 1241-1455 m. Boreal

*Pseudotsuga menziesii* (Mirbel) Franco var. *menziesii* (814, 884) Common in mixed evergreen forests, Douglas fir forests, and white fir forests; 1574-1641 m. Western North America
TAXACEAE

*Taxus brevifolia* Nutt. (687, 1000) Uncommon. Found in moist canyons of old-growth Douglas fir forests; 1346 -1416 m. Western North America

DICOTS

ADOXACEAE

*Sambucus nigra* L. ssp. *caerulea* (Rafinesque-Schmaltz) R. Bolli (362) Occasionally found in open gaps of mixed evergreen forest or white fir forests; 1583 m. Western North America

APIACEAE

*Angelica tomentosa* S. Wats. (470, 578, 600, 999, 1027) Frequently found in Jeffrey pine forests; 1283-1554 m. California Floristic Province

*Heracleum maximum* Bartr. (453, 920) Occasionally found in wet meadows of mixed evergreen forest, white fir forests, and on edges of mixed evergreen forests; 1228-1554 m. Western North America

*Ligusticum apiifolium* (Nutt. ex Torr. & Gray) Gray (405) Occasionally found in meadows of mixed evergreen forests; 1231 m. Western North America

*Ligusticum californicum* Coult. & Rose (551, 769, 957) Frequently found in open mixed evergreen forests, and seep areas; 1242-1592 m. California Floristic Province

*Lomatium ciliolatum* Jepson var. *ciliolatum* (142) Occasionally found in dry meadows; 1510 m. Boreal

*Lomatium dasycarpum* (Torr. & Gray) Coult. & Rose ssp. *dasycarpum* (743) Occasionally found in huckleberry oak chaparral of Jeffrey pine forests; 1375 m. California Floristic Province

*Lomatium dissectum* var. *multifidum* (T. & G.) Math. & Const. (76, 151) Common in the understories of Douglas fir forests, and white oak woodlands; 1393-1422 m. Western North America
Lomatium macrocarpum (Nutt. ex Torr. & Gray) Coult. & Rose (58, 695)
Common in dry meadows, or on talus slopes; 1427-1509 m. Western North America

Lomatium nudicaule (Pursh) Coult. & Rose (125, 234) Occasionally found on clay balds of dry meadows near white oak woodlands; 1238 m. Western North America

Lomatium vaginatum Coult. & Rose (193) Occasionally found in dry meadows near edges of white oak woodlands; 1386 m. Western North America

Osmorhiza occidentalis (Nutt. ex Torr. & Gray) Torr. (85, 790) Common in white oak woodlands, understories of white fir forests, or mixed evergreen forests; 1390-1508 m. Western North America

Perideridia howellii (Coult. & Rose) Mathias (613) Occasionally found in dry meadows; 1257 m. California Floristic Province

Perideridia kelloggii (Gray) Mathias (1029) Occasionally found in dry meadows; 1579 m. California Floristic Province

Perideridia oregana (S. Wats.) Mathias (421, 447, 511, 601, 602, 943) Common in dry meadows, and Jeffrey pine forests; 1496-1578 m. Western North America

Sanicula graveolens DC. (705B) Occasionally found in huckleberry oak chaparral of Jeffrey pine forests; 1438 m. Western North America

Sanicula tuberosa Torr. (2, 40, 54, 692, 856) Common in dry meadows near white oak woodlands, and in the understories of white fir and mixed evergreen forests; 1393-1503 m. California Floristic Province

Torilis arvensis (Hudson) Link (393) Occasionally found on edges of white oak woodlands; 1406 m. California Floristic Province

AMARANTHACEAE

Chenopodium botrys L. (617) Uncommon. A single population was found growing out of road asphalt (Ammon Ridge Road); 1297m. Not native to California
APOCYNACEAE

*Apocynum androsaemifolium* L. (289, 301, 498, 887) Commonly found on edges of mixed evergreen forests, or near non-serpentine rock outcrops; 1243 -1641 m. Western North America

*Asclepias speciosa* Torr. (406) Two populations found in a rocky drainage in a dry meadow (White Oak Opening); 1242 m. Western North America

ARALIACEAE

*Aralia californica* S. Wats. (579) One population found near a creek in a mixed evergreen forest; 1290 m. Western North America

ARISTOLOCHIACEAE

*Asarum caudatum* Lindl. (379, 727, 982) Commonly found in wet meadows in mixed evergreen forests; 1426-1533 m. Western North America

*Asarum hartwegii* S. Wats. (388) One population found growing near a culvert in a mixed evergreen forest on Friday Ridge Road; 1278 m. California Floristic Province

ASTERACEAE

*Achillea millefolium* L. (320) Common in the understory of Douglas fir forests, white fir forests, and dry meadows; 1419 m. Boreal

*Adenocaulon bicolor* Hook. (326) Common in the understory of Douglas fir, and white fir forests; 1430 m. Western North America

*Agoseris grandiflora* (Nuttall) Greene var. *leptophylla* G.I.Baird (956, 1008) Occasionally found in recently logged shrublands; 1416-1592 m. Western North America

*Agoseris heterophylla* (Nutt.) Greene (89, 684A) Common on clay balds of dry meadows, and Jeffrey pine forests; 1395-1441 m. Western North America

*Anaphalis margaritacea* (L.) Benth. & Hook. f. ex C.B. Clarke (596) Common in mixed evergreen forests; 1438 m. Western North America
Antennaria suffrutescens Greene (242) Occasionally found in huckleberry oak chaparral of Jeffrey pine forests; 1311 m. California Floristic Province, Endemic. CNPS List 4.3

Arnica cernua T.J. Howell (119, 681) Occasionally found in huckleberry oak chaparral of Jeffrey pine forests; 1276-1476 m. California Floristic Province, Endemic. CNPS List 4.3

Arnica discoidea Benth. (430, 576, 882) Commonly found on shady slopes in mixed evergreen forests or non-serpentine shrubland; 1327-1589 m. Western North America

Arnica spathulata Greene (851) Occasionally found in dry meadows and prairies; 1239 m. California Floristic Province. CNPS List 4.3

Artemisia douglasiana Bess. (642, 1022, 1036) Commonly found in mixed evergreen forests, or dry meadows; 1283-1332 m. Western North America

Centaurea diffusa Lam. (634) Occasionally found in dry meadows; 1584 m. Not native to California

Chaenactis douglasii (Hook.) H. & A. var. douglasii (241) Occasionally found near creekbeds of Jeffrey pine forests; 1311 m. Boreal

Cirsium arvense (L.) Scop. (619, 1025) Occasionally found in recently logged shrubland; 1407-1548 m. Not native to California

Cirsium cymosum (Greene) J.T. Howell var. cymosum (472, 981) Common in Jeffrey pine forests, or huckleberry oak chaparral; 1349-1426 m. Western North America

Cirsium occidentale (Nutt.) Jeps. var. candidissimum (Greene) J.F. Macbr. (318) Occasionally found on roadside cutbanks of mixed evergreen forests; 1390 m. Western North America

Cirsium remotifolium (Hooker) de Candolle var. odontolepis Petrak (595, 806, 910, 1001) Common in Douglas fir forests, creekbeds of mixed evergreen forests, and recently logged shrubland; 1366- 1416 m. California Floristic Province

Cirsium vulgare (Savi) Ten. (588, 1047B) Occasionally found in open gaps of mixed evergreen forests, and non-serpentine shrubland; 1283-1410 m. Not native to California
Crepis pleurocarpa Gray (207, 310, 871A, 953) Common in Jeffrey pine forests; 1386-1565 m. Western North America

Ericameria greenei (Gray) Nesom (1038) Occasionally found growing near rock outcrops in a dry meadows; 1257 m. Boreal

Ericameria nauseosa (Pallas ex Pursh) Nesom & Baird var. speciosa (Nuttall) G.L. Nesom & Baird (650) Occasionally found on roadside cutbanks of Jeffrey pine forests; 1666 m. Western North America

Erigeron alicae T.J. Howell (265, 449, 509, 805) Common in understories of white fir and Douglas fir forests, dry meadows, and recently logged shrubland; 1401-1591 m. Boreal

Erigeron inornatus (Gray) var. inornatus (590, 850) Common in non-serpentine shrubland and prairies; 1237-1283 m. Western North America

Erigeron klamathensis (G.L. Nesom) G.L. Nesom (219, 448, 978) Common in dry meadows, and rock outcrops; 1267-1496m. California Floristic Province, Endemic

Erigeron maniopotamicus G.L. Nesom & T.W. Nelson (339) One population found in non-serpentine shrubland of a white fir forest; Board Camp; 1486 m. California Floristic Province, Endemic. CNPS List 1B.2

Eriophyllum lanatum (Pursh) Forbes var. achillaeoides (DC.) Jepson (129, 205, 299) Common on rock outcrops of dry meadows, or prairies near white oak woodlands; 1238-1393 m. Western North America

Eriophyllum lanatum (Pursh) Forbes var. grandiflorum (Gray) Jepson (311) Occasionally found in huckleberry oak chaparral of Jeffrey pine forests; 1386 m. California Floristic Province

Eriophyllum lanatum (Pursh) Forbes var. integrifolium (Hook.) Smiley (948) Occasionally found in dry meadows; 1565 m. Boreal

Eucephalus ledophyllus (Gray) Greene var. ledophyllus (1020) Occasionally found on rock outcrops of mixed evergreen forests; 1589 m. Western North America

Gnaphalium palustre Nutt. (338, 632) Occasionally found in dry meadows, or wet meadows of mixed evergreen forests; 1259-1583 m. Boreal
**Helenium bigelovii** Gray (1010) One population found near a seep in a white fir forest at Board Camp; 1486 m. Boreal

**Hemizonella minima** (Gray) Gray (55, 92) Common in open gaps of Douglas fir forests, and in Jeffrey pine forests; 1394 m. California Floristic Province

**Hieracium albiflorum** Hook. (371, 577, 963) Common in the understory of mixed evergreen forests; 1327-1589 m. Boreal

**Hieracium greenei** Gray (466) Occasionally found in dry meadows; 1641 m. California Floristic Province.

**Hieracium scouleri** Hook. (407) Occasionally found on clay balds in dry meadows; 1242 m. Western North America

**Lactuca biennis** (Moench) Fern. (591) Uncommon. Found in a recently logged shrubland; 1283 m. Not native to California

**Leucanthemum vulgare** Lam. (462) Uncommon. Found in the understory of a Douglas fir forest; 1508 m. Not native to California

**Luina hypoleuca** Benth. (535) Occasionally found on rock outcrops near non-serpentine shrublands; 1368 m. Western North America

**Madia elegans** Lindl. (180) Occasionally found in dry meadows near edges of white oak woodlands; 1386 m. Boreal

**Madia gracilis** (Smith) Keck (217, 403, 483) Occasionally found on rock outcrops, and roadside cutbanks of mix evergreen forests; 1371-1396 m. Boreal

**Malacothrix clevelandii** Gray (845) Occasionally found on roadside cutbanks; 1267 m. California Floristic Province

**Malacothrix floccifera** (DC.) Blake (427, 572) Common in mixed evergreen forests; 1462-1536 m. California Floristic Province

**Matricaria discoidea** de Candolle (Pursh.) Rydb. (533) Uncommon. Found in open gaps of Douglas fir forests; 1427 m. Not native to California

**Petasites frigidus** var. **palmatus** (Ait.) Cronq. (680) A single population was found growing on a north facing slope of a mixed-evergreen forest; 1276 m. Western North America
Rafinesquia californica Nutt. (536) Uncommon. Found on roadside cutbanks in Douglas fir forests; 1263 m. Western North America

Rigiopappus leptocladus Gray (794) Uncommon. Found on a rock outcrop; 1406 m. Western North America

Senecio integerrimus Nutt. var. major (Gray) Cronq. (696, 950) Common in the understory of white fir forests, and on talus slopes; 1509-1565 m. California Floristic Province

Senecio jacobaea L. (986D) Uncommon. Found in a recently logged area; 1569 m. Not native to California

Senecio triangularis Hook. (361) Uncommon. Found in mixed evergreen forests; 1583m. Boreal

Sericocarpus oregonensis Nutt. var. oregonensis (592, 610, 1032, 1035) Common in dry meadows, and in non-serpentine shrublands; 1262-1552 m. Western North America

Symphyotrichum eatonii (Gray) G.L. Nesom (986C) Frequent found in dry meadows; 1589 m. Western North America

Taraxacum officinale G.H. Weber ex Wiggers (37) Uncommon. Found in the understory of a Douglas fir forest; 1456 m. Not native to California

Tragopogon dubius Scop. (400, 848, 955) Common in mixed evergreen forests, prairies, dry meadows, and recently logged areas; 1237-1592 m. Not native to California

Wyethia angustifolia (DC.) Nutt. (485, 797) Frequent found near rock outcrops of dry meadows; 1396-1406 m. Western North America

Wyethia longicaulis Gray (67, 546, 778) Common in dry meadows, and in mixed evergreen forests; 1257-1482 m. California Floristic Province, Endemic. CNPS List 4.3

BERBERIDACEAE

Achlys californica Fukuda & Baker (177) Frequently found in white fir forests; 1365 m. Western North America
*Mahonia aquifolium* (Pursh) Nutt. (776) Occasionally found in the understory of mixed evergreen forests; 1462 m. Western North America

*Mahonia nervosa* (Pursh) Nutt. var. *nervosa* (892) Occasionally found in non-serpentine shrubland, and understory of mixed evergreen forests; 1407 m. Western North America

*Mahonia pinnata* (Lag.) Fedde ssp. *pinnata* (71, 802, 1034) Common in mixed evergreen forests, previously logged Douglas fir forests, and the understory of Douglas fir forests; 1267-1476 m. California Floristic Province

*Mahonia piperiana* Abrams (651) Uncommon. Single population found in old growth Douglas fir forest; 1422 m. California Floristic Province

*Vancouveria hexandra* (Hook.) Morr. & Dcne. (325, 839, 1026) Common in the understory of Douglas fir forests, and moist canyons of mixed evergreen forests; 1224-1548 m. Western North America

*Vancouveria planipetala* Calloni (838) Occasionally found in the understory of mixed evergreen forests; 1346 m. California Floristic Province

**BETULACEAE**

*Alnus viridis* ssp. *sinuata* (Regel) A.& D. Love (831, 908) Occasionally found near moist springs of north-facing slopes, or on creekbeds of mixed evergreen forests; 1409-1474. Boreal


**BORAGINACEAE**

*Cryptantha affinis* (Gray) Greene (139, 552B) Common on rock outcrops, dry meadows, and understories of white fir forests; 1369-1502 m. Boreal

*Cryptantha torreyana* (Gray) Greene (796) Occasionally found on rock outcrops in dry meadows; 1406 m. Western North America

*Cynoglossum grande* Dougl. ex Lehm. (9, 804) Common in dry meadows, white oak woodlands, and recently logged areas; 1400 m. Western North America
Hackelia bella (Gray) I.M. Johnston (143, 461) Occasionally found in dry meadows; 1500 m. California Floristic Province, Endemic

Hydrophyllum occidentale (S. Wats.) Gray (84, 823) Common in white oak woodlands, and near creekbeds of mixed evergreen forests; 1400 m. Western North America

Nemophila menziesii H. & A. var. atomaria (Fisch. & C.A. Mey.) Chandler (1) Common in dry meadows near white oak woodlands; 1410 m. California Floristic Province

Nemophila parviflora Douglas ex Bentham var. austiniae (Eastw.) Brand (50) Occasionally found in the understory of Douglas fir forests; 1419 m. Boreal

Phacelia corymbosa Jepson (735) Occasionally found in Jeffrey pine forests; 1401 m. California Floristic Province

Phacelia egena (Greene ex Brand) Greene ex J.T. Howell (137) Occasionally found growing near rock outcrops of mixed evergreen forests; 1369 m. California Floristic Province

Phacelia heterophylla Pursh ssp. virgata (Greene) Heckard (416) Occasionally found on roadside cutbanks of serpentine substrates; 1268 m. Western North America

Phacelia mutabilis Greene (915) Occasionally found near creeks of mixed evergreen forests; 1409 m. Boreal

Phacelia procera Gray (255) Occasionally found in recently logged areas and the understory of Douglas fir forests; 1564 m. Boreal

BRASSICACEAE

Arabis subpinnatifida S. Wats. (93, 668, 672) Common in dry meadows of serpentine substrates and Jeffrey pine forests; 1373-1570 m. Boreal, Endemic

Athysanus pusillus (Hook.) Greene (724) Occasionally found on serpentine outcrops of huckleberry oak chaparral; 1417 m. Western North America

Barbarea orthoceras Ledeb. (248) Occasionally found in the understory of Douglas fir forests; 1525 m. Western North America
Barbarea verna (P. Mill.) Aschers. (903) Occasionally found near creekbeds in mixed evergreen forests; 1409 m. Not native to California

Brassica nigra (L.) W.D.J. Koch (573) Occasionally found in mixed evergreen forests; 1441 m. Not native to California

Cardamine californica (Nutt.) Greene var. californica (5, 21, 33, 744, 808, 918) Common in the understory of Douglas fir forests, white fir forests, mixed evergreen forests, and huckleberry oak chaparral; 1375-1456 m. California Floristic Province

Erysimum capitatum (Dougl. ex Hook.) Greene (206) Common in open rock outcrops of mixed evergreen forests; 1413 m. Western North America

Lepidium campestre (L.) R. Brown (538) Occasionally found in the understory of mixed evergreen forests, and white fir forests; 1447 m. Not native to California

Noccaea montana (L.) F. K. Meyer var. montana (216, 314, 423, 777) Common in mixed evergreen forests, and Jeffrey pine forests; 1394-1578 m. Boreal

Rorippa palustris (L.) Bess. ssp. occidentalis (S. Wats.) Abrams (237, 740) Common in a wet ditches of mixed evergreen forests, and found near a vernal pool; 1395 -1569 m. Western North America

Streptanthus tortuosus Kell. var. orbiculatus (Greene) Hall (152, 730) Common on roadside cutbanks of mixed evergreen forests, and on rock outcrops of white oak woodlands; 1299-1460m. California Floristic Province

Thysanocarpus curvipes Hook. Var. curvipes (194) Uncommon. Found in prairies near white oak woodlands; 1386 m. Western North America

Turritis glabra (L.) Benth. var. glabra (154, 157) Common in dry meadows of serpentine and non-serpentine substrates; 1300m. Western North America

CAMPANULACEAE

Asyneuma prenanthoides (Dur.) McVaugh (454, 539) Common on roadside cutbanks of mixed evergreen forests, and in the understory of Douglas fir forests; 1388-1554 m. Western North America
Campanula scouleri Hook. ex A. DC. (414, 568, 919) Common in dried creekbeds, white fir forests, and recently logged areas; 1259-1522 m. Western North America

Downingia elegans (Dougl. ex Lindl.) Torr. (396) Uncommon. Found in only one collecting site, Mud Lake (vernal pool); 1569 m. Western North America

Githopsis specularioides Nutt. (303) Uncommon. Found on rock outcrops in dry meadows; 1393m. Western North America

Heterocodon rariflorum Nutt.(476, 486) Common in the understory of Douglas fir forests, cleistogamous; 1400 m. Western North America

CAPRIFOLIACEAE

Symphoricarpos albus (L.) Blake var. laevigatus (Fern.) Blake (611, 1057) Common in dry meadows; 1256-1341 m. Western North America

Symphoricarpos mollis Nutt. (609) Uncommon. Found in the understory of mixed evergreen forests, and on edges of dry meadows; 1568 m. Western North America

CARYOPHYLLACEAE

Cerastium fontanum Baumg. ssp. vulgare (Hartman) Greuter & Burdet (621, 986A) Common in recently logged areas, and on banks of riparian creekbeds; 1550 m. Not native to California

Cerastium glomeratum Thuill. (384) Occasionally found near wet meadows of mixed evergreen forests; 1426 m. Not native to California

Dianthus armeria L. (618) One population found growing out of asphalt; 1222 m. Not native to California

Eremogone congesta (Nuttall ex Torrey & Gray) Ikonnikov var. congesta (961) Occasionally found on edges of mixed evergreen forests on serpentine substrates; 1589 m. Boreal

Minuartia nuttallii (Pax) Briquet ssp. gregaria (Heller) Maguire (164) Occasionally found in huckleberry oak chaparral; 1311 m. Boreal
Moehringia macrophylla (Hook.) Fenzl (27, 51, 112) Common in Jeffrey pine forests, in the understory of Douglas fir forests, and on clay balds of dry meadows; 1419-1635 m. Western North America

Petrorhagia dubia (Raf.) G. Lopez & Romo (272) Occasionally found on rock outcrops; 1393 m. Not native to California

Pseudostellaria jamesiana (Torr.) Weber & Hartm. (985B) Uncommon. On edges of ephemeral creeks in the understory of mixed evergreen forests; 1589 m. Boreal

Saponaria officinalis L. (615) Uncommon. Found on roadside cutbanks; 1414 m. Not native to California

Silene bernardina S. Wats. (1014) Uncommon. Found in the understory of white fir forests; 1486 m. Boreal

Silene californica Durand (275) Common on roadside cutbanks, and in mixed evergreen forests; 1319 m. California Floristic Province

Silene campanulata Watson ssp. glandulosa C.L. Hitchc. & Maguire (253, 353, 710) Common in the understory of mixed evergreen forests, and Jeffrey pine forests; 1286-1578 m. Western North America

Silene lemmonti S. Wats. (254) Occasionally found in understory of mixed evergreen forests; 1578 m. Boreal

Spergularia rubra (L.) J. Presl. & C. Presl. (627) Occasionally found in wet meadows of mixed evergreen forests; 1583 m. Not native to California

Stellaria nitens Nutt. (16) Occasionally found in dry meadows; 1451 m. Western North America

CELASTRACEAE

Euonymus occidentalis Nutt. ex Torr. var. occidentalis (966) One population found in a seep area in a mixed evergreen forest; 1514 m. Western North America

Paxistima myrrisinites (Pursh) Raf. (525, 662, 780) Common in the understory of mixed evergreen forests; 1252-1487 m. Boreal
CONVOLVULACEAE

Calystegia occidentalis (Gray) Brummitt ssp. occidentalis (187, 350, 868, 967) Common in dry meadows of white oak woodlands, non-serpentine shrublands, and in open gaps of mixed evergreen forests; 1302-1565 m. Western North America

Cuscuta californica H. & A. var. californica (422, 793, 987A) Occasionally found growing on various host plants in mixed evergreen forests and non-serpentine shrublands; 1406-1589 m. California Floristic Province

CORNACEAE

Cornus nuttallii Audubon ex Torr. & Gray (72, 159) Common in mixed evergreen forests; 1272 -1551 m. Western North America

Cornus sericea L. ssp. occidentalis (Torr. & Gray) Fosberg (377) Occasionally found near moist creekbeds of mixed evergreen forests; 1474 m. Western North America

CRASSULACEAE

Sedum laxum (Britt.) Berger ssp. flavidum Denton (873) One population found growing on a rock outcrop in a Jeffrey pine forest; 1589 m. California Floristic Province, Endemic. CNPS List 4.3

Sedum laxum (Britt.) Berger ssp. laxum (294) Uncommon. Found growing on a rock outcrop in a Jeffrey pine forest; 1220 m. California Floristic Province, Endemic

Sedum radiatum S. Wats. ssp. radiatum (285, 440, 552A, 837, 916) Common on rock outcrops in dry meadows, white oak woodlands, and near a creekbed in mixed evergreen forests. Sometimes found on serpentine substrates; 1238-1502 m. California Floristic Province

Sedum spathulifolium Hook. (222) Uncommon. Found on rock outcrops of mixed evergreen forest; Western North America
CUCURBITACEAE

_Marah oreganus_ (Torr. ex S. Wats.) T.J. Howell (181, 674, 1003) Common in dry meadows of white oak woodlands, and on roadside cutbanks in mixed evergreen forests; 1300-1400 m. Western North America

DIPSACACEAE

_Dipsacus fullonum_ L. (646) Occasionally found in open gaps of mixed evergreen forests; 1473 m. Not native to California

ERICACEAE

_Arbutus menziesii_ Pursh (661, 1040) Uncommon. Found in mixed evergreen forests; 1450-1500 m. California Floristic Province

_Arctostaphylos canescens_ Eastw. ssp. _canescens_ (24, 28, 836, 1045) Common in Jeffrey pine forests, huckleberry oak chaparral, and non-serpentine shrublands; 1300-1500 m. California Floristic Province

_Arctostaphylos canescens_ Eastw. ssp. _sonomensis_ (Eastw.) P.V. Wells (676) Rare. A single plant was found in huckleberry oak chaparral and Jeffrey pine forest; 1300 m. California Floristic Province, Endemic. CNPS List 1B.2

_Arctostaphylos glandulosa_ Eastw. ssp. _glandulosa_ (987) Uncommon. Found in non-serpentine shrublands; 1569 m. California Floristic Province

_Arctostaphylos manzanita_ Parry ssp. _manzanita_ (686) Occasionally found in the understory of white fir forests; 1562 m. California Floristic Province

_Arctostaphylos nevadensis_ Gray ssp. _nevadensis_ (29, 684, 774, 1058) Common in Jeffrey pine forests, and open gaps of mixed evergreen forests on serpentine substrates; 1200-1500m. Boreal

_Arctostaphylos patula_ Greene (817, 865, 1019) Common in open gaps of mixed evergreen forests, non-serpentine shrublands, and dry meadows; 1250-1575 m. Western North America

_Chimaphila menziesii_ (R. Br. ex D. Don) Spreng. (358) Occasionally found in huckleberry oak chaparral; 1341 m. Boreal
**Chimaphila umbellata** (Linnaeus) Barton ssp. *occidentalis* (Rydb.) Hulten (446B) Uncommon. Found in huckleberry oak of a Jeffrey pine forest; 1496 m. Boreal

*Gaultheria shallon* Pursh (771, 993) Uncommon. Found in wet meadows of mixed evergreen forests; 1350 m. Western North America

*Pterospora andromedea* Nutt. (624) Rare. One population found in mixed evergreen forest on serpentine substrate; 1409 m. Western North America

*Pyrola minor* L. (939) Uncommon. Found in the understory of mixed evergreen forests; 1319 m. Boreal

*Pyrola picta* Sm. (355, 397, 474, 532, 980) Common on open, dry slopes of Jeffrey pine forests, the understory of mixed evergreen forests and old growth Douglas-fir forests; 1300-1550 m. Western North America

*Rhododendron occidentale* (Torr. & Gray ex Torr.) Gray var. *occidentale* (290) Occasionally found near creekbeds of huckleberry oak chaparral and Jeffrey pine forests; 1289 m. Western North America

*Vaccinium membranaceum* Dougl. ex Torr. (524) Occasionally found in the understory of mixed evergreen forests; 1252 m. Boreal

*Vaccinium parvifolium* Sm. (113) Occasionally found near creekbed in mixed evergreen forests on serpentine substrates; 1578 m. Western North America

**EUPHORBIACEAE**

*Croton setigerus* Hooker (1031) Occasionally found growing in asphalt near dry meadows; 1336 m. Western North America

*Euphorbia crenulata* Engelm.(102, 766, 992) Common in the understory of mixed evergreen forests on serpentine and non-serpentine substrates; 1200-1400 m. Western North America

**FABACEAE**

*Cyrtis scoparius* (L.) Link var. *scoparius* (768) One population found near a disturbed mixed evergreen forest; 1250 m. Not native to California
Hosackia oblongifolia (Bentham) Brouillet var. oblongifolia (239) Occasionally found near creekbeds of huckleberry oak chaparral; 1350 m. Western North America

Lathyrus nevadensis S. Wats ssp. nevadensis (148) Occasionally found in mixed evergreen forests; 1500 m. Western North America

Lathyrus polyphyllus Nutt (279) Occasionally found in mixed evergreen forests; 1256 m. Western North America

Lotus corniculatus L. (386) Common on roadside cutbanks; 1426 m. Not native to California

Lotus crassifolius (Benth.) Greene var. crassifolius (357, 520, 747, 928) Common in huckleberry oak chaparral, near small springs of mixed evergreen forests, and mixed evergreen forests on serpentine substrates; 1250-1400 m. Western North America

Lotus denticulatus (E. Drew) Greene (343) Occasionally found in non-serpentine shrublands near mixed evergreen forests; 1475 m. Western North America

Lotus micranthus Benth. (60) Occasionally found in prairies on western slopes; 1250 m. Western North America

Lotus nevadensis (Wats.) Greene var. douglasii (Greene) Ottley (284) Occasionally found in dry meadows of white oak woodlands; 1250 m. California Floristic Province

Lotus unifoliatulus (Hook.) Benth var. unifoliatulus (370, 1021) Common in mixed evergreen forests; 1350-1500m. Western North America

Lupinus adsurgens E. Drew var. adsurgens (349) Occasionally found in recently logged areas; 1575 m. Western North America

Lupinus albicaulis Dougl. (182, 468) Common on edges of white oak woodlands, or dry meadows; 1375-1650 m. Boreal

Lupinus albusfrons Benth. var. collinus Greene (136, 819) Occasionally found on rock outcrops and non-serpentine shrublands near mixed evergreen forests; 1350-1575 m. California Floristic Province
*Lupinus bicolor* Lindl. (224) Occasionally found in dry meadows and prairies; 1263 m. Western North America

*Lupinus latifolius* Lindl. ex J.G. Agardh ssp. *latifolius* (323, 749, 807) Common mixed evergreen forests on serpentine substrates, or in the understory of Douglas fir forests; 1400-1450 m. Western North America

*Medicago sativa* L. (537) One population found in heavily grazed meadow in mixed evergreen forest; 1225 m. Not native to California

*Melilotus alba* Medikus (529) Occasionally found on roadside cutbanks of Douglas fir forests; 1353 m. Not native to California

*Rupertia physodes* Hook. (280) Occasionally found in non-serpentine shrublands near mixed evergreen forests; 1258 m. Western North America

*Trifolium cyathiferum* Lindl (195, 565) Common in dry meadows near white oak woodlands, and mixed evergreen forests; 1375-1475 m. Western North America

*Trifolium eriocephalum* Nutt ssp. *eriocephalum* (225) Occasionally found in dry meadows; 1263 m. Western North America

*Trifolium hirtum* L. (226) Uncommon in dry meadows; 1260 m. Not native to California

*Trifolium longipes* Nutt ssp. *hansenii* (Greene) J. Gillett (166, 319) Common near moist creekbeds of huckleberry oak chaparral, and mixed evergreen forests; 1350-1400 m. Western North America

*Trifolium longipes* Nutt ssp. *oreganum* (T.J. Howell) J. Gillett (821) Uncommon. Found in the understory of a mesic, mixed evergreen forest; 1400 m. California Floristic Province, Endemic

*Trifolium longipes* Nutt. ssp. *shastense* (House) J. Gillett (44, 706, 779) Common in dry meadows, on rock outcrop of mixed evergreen forests, and seeps of huckleberry oak chaparral; 1400-1575 m. Boreal, Endemic

*Trifolium microcephalum* Pursh (229) Occasionally found in dry meadows, and on clay balds of dry meadows; 1238 m. Western North America
Trifolium repens L. (503) Uncommon in wet meadows of mixed evergreen forests; 1583 m. Not native to California

Trifolium wormslootii Leh. (188) Uncommon. Found in dry meadows near white oak woodlands; 1386 m. Western North America

Vicia americana Muhl. ex Willd var. americana (350B, 803, 914) Common in recently logged areas, and near creekbeds of mixed evergreen forests; 1400-1565 m. Western North America

Vicia villosa Roth ssp. villosa(127) Occasionally found in dry meadows near white oak woodlands; 1238 m. Not native to California

FAGACEAE

Chrysolepis chrysophylla (Dougl. ex Hook.) Hjelmqvist var. chrysophylla (649, 941) Common in mixed evergreen forests; 1300-1650 m. Western North America

Chrysolepis chrysophylla (Douglas ex Hooker) Hjelmquist var. minor (Benth.) Munz (639, 786) Common in Jeffrey pine forests, and in open gaps of mixed evergreen forests; 1250-1400 m. California Floristic Province

Notholithocarpus densiflorus (Hook. & Arn.) Rehder var. echinoides (R. Br.) Abrams (644, 746, 852, 940) Common in mixed evergreen forests, and in open gaps of mixed evergreen forests; 1200-1400 m. California Floristic Province

Notholithocarpus densiflorus (Hook. & Arn.) Rehder var. densiflorus (1048) Occasionally found in open gaps of mixed evergreen forests; 1410 m. California Floristic Province

Quercus chrysolepis Liebm. var. chrysolepis (820, 827, 891, 1013) Common in the understory of Douglas fir forests, non-serpentine shrublands near mixed evergreen forests, and Jeffrey pine forests; 1400-1600 m. Western North America

Quercus chrysolepis Liebm. var. nana (Jepson) Jepson (866) Common in open gaps of mixed evergreen forests; 1254 m. California Floristic Province

Quercus garryana Douglas ex Hooker var. fruticosa (Engelmann) Govaerts in Govaerts & Frodin (716, 1041) Common in open chaparral of mixed evergreen forests, and serpentine rock outcrops; 1373-1500 m. California Floristic Province
Quercus garryana Douglas ex Hooker. var. garryana (898, 1037) Common in white oak woodlands; 1275-1400 m. Western North America

Quercus kelloggii Newb. (785, 885, 1060) Common in mixed evergreen forests of serpentine and non-serpentine substrates; 1250-1650 m. Western North America

Quercus vacciniifolia Kellogg (867) Common in huckleberry oak chaparral, and the understory of mixed evergreen forests; 1400-1425 m. Boreal

GARRYACEAE

Garrya flavescens S. Wats. (829) Occasionally found on edges of white oak woodlands and white fir forests; 1512 m. California Floristic Province

Garrya fremontii Torr. (425, 530, 750, 800) Common on non-serpentine shrublands, roadside cutbanks of Douglas fir forests, and mixed evergreen forests on serpentine substrates; 1350-1536 m. Western North America

GENTIANACEAE

Swertia radiata (Kell.) Kuntze (825) Uncommon. Found in open Jeffrey pine forests; 1575 m. Boreal

GERANIACEAE

Erodium cicutarium (L.) L'Her. ex Ait. (20) Uncommon. Found on a rock outcrop; 1368 m. Not native to California

GROSSULARIACEAE

Ribes binominatum Heller (944) Found in a dry meadow; 1591 m. Boreal

Ribes lacustre (Pers.) Poir. (162B, 781) Uncommon. Found near a creekbed in the understory of a white fir forest; 1450-1550 m. Boreal

Ribes lobbii Gray (742) Uncommon. Found in Jeffrey pine forests; 1580 m. Western North America

Ribes roezlii Regel var. cruentum (Greene) Rehder (101, 970) Common in huckleberry oak chaparral; 1417 m. Western North America
Ribes sanguineum Pursh var. sanguineum (32, 147) Common in mixed evergreen forests; 1400-1500 m. California Floristic Province

Ribes viscosissimum Pursh (110, 783) Common in non-serpentine shrublands; 1450-1600 m. Boreal

GUTTIFERAEE

Hypericum anagalloides C. & S. (380) Common in wet meadows of mixed evergreen forests; 1426 m. Boreal

Hypericum perforatum L. (402) Occasionally found in dry meadows, and on rock outcrops of mixed evergreen forests; 1370 m. Not native to California

HYDRANGEACEAE

Philadelphus lewisii Pursh (484) Occasionally found near rock outcrops of white oak woodlands; 1396 m. Western North America

Whipplea modesta Torr. (133, 1046) Common in mixed evergreen forests; 1250-1400 m. Western North America

LAMIACEAE

Agastache urticifolia (Benth.) Kuntze (363, 553) Common in white fir forests, and mixed evergreen forests; 1500-1600 m. Western North America

Mentha pulegium L. (991) Occasionally found in non-serpentine shrublands; 1291m. Not native to California

Monardella odoratissima Benth. ssp. pallida(Heller) Epl. (240, 390) Common in open gaps of mixed evergreen forests, and huckleberry oak chaparral; 1350-1475 m. Boreal

Monardella sheltonii Torr. (457, 587, 603, 604) Common in mixed evergreen forests on serpentine substrates; 1350-1425 m. California Floristic Province

Monardella villosa Benth. ssp. villosa (830) Occasionally found on roadside cutbanks; 1512 m. California Floristic Province

Prunella vulgaris L. var. lanceolata (Barton) Fernald (410) Occasionally found in wet meadows and roadside seeps; 1392 m. Western North America
**Scutellaria antirrhinoides** Benth. (218, 481, 918A) Common in mixed evergreen forests near creekbeds, dry meadows, and rock outcrops; 1350-1400 m. California Floristic Province

**Stachys ajugoides** Benth. var. *ajugoides* (490, 451, 863) Common in mixed evergreen forests, wet meadows, and seeps; 1200-1346 m. California Floristic Province

**LIMNANTHACEAE**

*Limnanthes douglasii* R. Br. ssp. *nivea* (C.T. Mason) C.T. Mason (191)
Occasionally found in dry meadows near white oak woodlands; 1386 m. California Floristic Province

**LINACEAE**

*Linum bienne* Miller (192, 228) Occasionally found in dry meadows near white oak woodlands; 1225-1386 m. Not native to California

**LINNAEACEAE**

*Linnaea borealis* L. var. *longiflora* Torrey (523) Uncommon. Found in the understory of a mixed evergreen forest; 1252 m. Boreal

**MALVACEAE**

*Iliamna latibracteata* Wiggins (455) Rare. One population found in the opening of a mixed evergreen forest; 1466 m. California Floristic Province. CNPS List 1B.2

*Sidalcea malviflora* (DC.) Benth. ssp. *nana* (Jeps.) C.L. Hitchc. (286, 582)
Common in dry meadows near white oak woodlands, and mixed evergreen forests on serpentine substrates; 1225-1275 m. California Floristic Province.

*Sidalcea oregana* (Nutt. ex Torr. & Gray) Gray ssp. *eximia* (Greene) C.L. Hitchc. (545) Rare. One population found in the opening of a Douglas fir forest; 1560 m. California Floristic Province, Endemic. CNPS List 1B.2
MYRSINACEAE

*Trientalis borealis* Rafinesque ssp. *latifolia* (Hook.) Hulten (168) Frequent in mixed evergreen forests on serpentine substrates; 1382 m. Western North America

ONAGRACEAE

*Chamerion angustifolium* (L.) Holub ssp. *circumvagum* (Mosquin) Hoch (998) Common in open gaps of mixed evergreen forests; 1416 m. Western North America

*Circaea alpina* L. ssp. *pacific* (Aschers. & Magnus) Raven (507, 567, 974) Common in wet meadows, and understories of mixed evergreen forests; 1450-1600 m. Western North America

*Clarkia purpurea* (Curt.) A. Nels. & Macbr. ssp. *quadrivulnera* (Doudl.) H. & M. Lewis (282) Occasionally found in dry meadows near white oak woodlands; 1238 m. Western North America

*Clarkia purpurea* (Curt.) A. Nels. & Macbr. ssp. *vimea* (Dougl. ex Hook.) H.F. & M.E. Lewis (401) Uncommon. Found growing near a rock outcrop; 1371 m. Western North America

*Clarkia rhomboidea* Dougl. ex Hook. (309, 795) Occasionally found in Jeffrey pine forests, and huckleberry oak chaparral; 1375-1400 m. Western North America

*Epilobium brachycarpum* C. Presl (571, 589, 612, 979) Common in disturbed mixed evergreen forests, dry meadows, and roadside cutbanks; 1484 m. Western North America

*Epilobium canum* (Greene) Raven ssp. *latifolium* (Hook.) Raven (438) Uncommon. Found in dry meadows; 1498 m. Boreal

*Epilobium ciliatum* Raf. ssp. *glandulosum* (Lehm.) Hoch & Raven (238, 584) Common in seeps of mixed evergreen forests; 1225-1395 m. Boreal

*Epilobium densiflorum* (Lindl.) Hoch & Raven (408, 543, 620, 633, 860, 946) Common in prairies and ephemeral wet depressions of dry meadows; 1250-1600 m. Western North America
Epilobium glaberrimum Barbey ssp. fastigiatum (Nutt.) Hoch & Raven (477) Occasionally found in the understory of Douglas fir forests; 1391 m. Boreal

Epilobium hornemannii Reichenb. ssp. hornemannii (324) Uncommon. Found in the understory of Douglas fir forests; 1430 m. Boreal

Epilobium minutum Lindley ex Lehmann (87, 877) Occasionally found in dry meadows, and mixed evergreen forests of serpentine substrates; 1400-1600 m. Western North America

Gayophytum diffusum Torrey & Gray ssp. parviflorum Lewis & Szweyk. (424, 502, 947) Common in non-serpentine shrublands, wet meadows of mixed evergreen forests, and dry meadows; 1536-1591 m. Western North America

OROBANCHACEAE

Castilleja affinis H. & A. ssp. affinis (19, 184, 185, 614) Common on rock outcrops, and dry meadows near white oak woodlands; 1375-1500 m. California Floristic Province

Castilleja applegatei Fern. ssp. pinetorum (Fern.) Chuang & Heckard (875) Uncommon. Found on rock outcrops; 1589 m. Boreal

Castilleja pruinosa Fern. (163, 513, 678) Common in huckleberry oak chaparral, non-serpentine shrublands near mixed evergreen forests, and dry meadows on serpentine substrates; 1300-1600 m. Western North America

Castilleja rubicundula (Jepson) Chuang & Heckard ssp. lithospermoides (Benth.) Chuang & Heckard (283) Uncommon. Found in dry meadows near white oak woodlands; 1238 m. California Floristic Province

Castilleja tenuis (Heller) Chuang & Heckard (186) Occasionally found in dry meadows near white oak woodlands; 1386 m. Boreal

Cordylanthus tenuis Gray ssp. viscidus (T.J. Howell) Chuang & Heckard (512) Occasionally found in dry meadows on serpentine substrates; 1591 m. Western North America

Orobancha fasciculata Nutt. (894) Uncommon. Found in the understory of mixed evergreen forests on serpentine substrates; 1380 m. Boreal
Orobanche uniflora L. (733) Uncommon. Found in the understory of white oak woodlands; 1410 m. Boreal

Triphysaria pusilla (Benth.) Chuang & Heckard (200, 734) Occasionally found in dry meadows near white oak woodlands, and growing on clay balds of dry meadows; 1375-1400 m. Western North America

PAPAVERACEAE

Dicentra formosa (Haw.) Walp. ssp. formosa (738) One population found growing near a creekbed of an old growth Douglas fir forest; 1433 m. Western North America

Dicentra pauciflora S. Wats. (703, 729) Occasionally found in dry meadows, and on roadside cutbanks; 1500-1525 m. Boreal.

Eschscholzia californica Cham. (317, 465) Occasionally found in dry meadows; 1450-1650 m. California Floristic Province

PHRYMACEAE

Mimulus alsinoides Dougl. ex Benth. (82) Frequently found in crevices of rock outcrops in white oak woodlands; 1392 m. Western North America

Mimulus breweri (Greene) Cov. (249, 341) Occasionally found in dry meadows, and non-serpentine shrublands near mixed evergreen forests; 1475-1575 m. Boreal

Mimulus guttatus DC. (199, 557) Common in wet depressions of dry meadows near white oak woodlands, and open gaps of white fir forests; 1375-1500 m. Western North America

Mimulus moschatus Lindl. (558, 876) Common in open gaps of white fir forests, and near creekbeds of huckleberry oak chaparral; 1500-1600 m. Western North America

Mimulus pulsiferae Gray (202, 304, 833) Common in dry meadows near white oak woodlands, mixed evergreen forests, and huckleberry oak chaparral; 1375-1450 m. Western North America
PLANTAGINACEAE

*Callitriche heterophylla* Pursh ssp. *bolanderi* (Hegelm.) Calder & Taylor (479) Uncommon. Found in spring fed pond within a mixed evergreen forest; 1391 m. Western North America

*Collinsia grandiflora* Lindl. (10) Common in dry meadows and white oak woodlands; 1397 m. Western North America

*Collinsia linearis* Gray (94, 313, 788) Common in Jeffrey pine forests, and open gaps of mixed evergreen forests; 1375-1400 m. California Floristic Province

*Collinsia parviflora* Lindl. (14, 18, 57) Common in wet, roadside ditches, and dry meadows; 1400-1550 m. Boreal

*Keckiella lemmonii* (Gray) Straw (605) Uncommon. Found on a roadside cutbank; 1585 m. Western North America

*Penstemon anguineus* Eastw. (266, 321, 547, 762) Common in the understory of white fir and Douglas fir forests; 1400-1550 m. Boreal, Endemic

*Penstemon laetus* Gray ssp. *sagittatus* Keck (141, 417, 432) Common on rock outcrops, and non-serpentine shrublands; 1250-1475 m. Western North America

*Plantago lanceolata* L. (855) Occasionally found in recently logged areas, and open gaps of mixed evergreen forests; 1326 m. Not native to California

*Tonella tenella* (Benth.) A. A. Heller (74) Occasionally found in white oak woodlands; 1422 m. Western North America

*Veronica americana* (Raf.) Benth (160) Uncommon. Found in the understory of mixed evergreen forest; 1551 m. California Floristic Province

*Veronica arvensis* L. (331A, 723) Common in mixed evergreen forests on serpentine substrates, and dry meadow; 1250-1400 m. Not native to California

*Veronica peregrina* L. ssp. *xalapensis* (Kunth) Pennell (166F, 331B) Common in disturbed Douglas fir forests, and dry meadows; 1250-1550 m. Western North America
POLEMONIACEAE

Collomia grandiflora Dougl. ex Lindl. (368, 985) Common in mixed evergreen forests, and recently logged areas; 1500-1575 m. Western North America

Collomia heterophylla Dougl. ex Hook. (146) Common in the understory of mixed evergreen forests; 1489 m. Western North America

Collomia tinctoria Kellogg (88, 138) Occasionally found in mixed evergreen forests on serpentine substrates; 1350-1400 m. Western North America

Collomia tracyi Mason (569, 812) Uncommon. Found in white fir forests, and on a talus slope in a mixed evergreen forests; 1500-1600 m. California Floristic Province. CNPS List 4.3

Gilia capitata Sims ssp. capitata (158, 346) Occasionally found in non-serpentine shrublands, and edges of mixed evergreen forests; 1300-1575 m. Western North America

Leptosiphon ciliatus (Bentham) Jepson ssp. ciliatus (431) Occasionally found in non-serpentine shrublands; 1463 m. Western North America

Microsteris gracilis (Douglas ex Hooker) Greene var. gracilis (15, 56, 83, 111) Common in wet, roadside ditches, clay balds of dry meadows, rocky slopes of white oak woodlands; 1400-1650 m. Western North America

Navarretia capillaris (Kellogg) Kuntze (436) Uncommon. Found in a dry meadow; 1498 m. Boreal

Navarretia divaricata (Torr. ex Gray) Greene ssp. divaricata (235, 322, 759) Common on clay balds of dry meadows, and understories of Douglas fir forests; 1375-1575 m. Western North America

Phlox diffusa Benth. ssp. diffusa (23) Common in Jeffrey pine forests, and huckleberry oak chaparral; 1483 m. Boreal

POLYGALACEAE

Polygala cornuta Kellogg var. cornuta (475, 927) Common in huckleberry oak chaparral, and Jeffrey pine forests; 1300-1360 m. California Floristic Province
POLYGONACEAE

_Eriogonum compositum_ Dougl. ex Benth. var. _compositum_ (140, 308) Common on rock outcrops, and Jeffrey pine forests; 1350-1400 m. Western North America

_Eriogonum nudum_ Dougl. ex Benth. var. _nudum_ (296, 445, 446A, 467, 902) Common in huckleberry oak chaparral, steep shale slopes, dry meadows, and white oak woodlands; 1250-1650 m. Western North America

_Eriogonum nudum_ Dougl. ex Benth. var. _oblongifolium_ S. Wats. (297, 394) Occasionally found on steep dry meadows, and edges of white oak woodlands; 1375-1400 m. California Floristic Province

_Eriogonum umbellatum_ Torr. var. *argus* Reveal (307) Uncommon. Found in Jeffrey pine forests; 1386 m. California Floristic Province

_Eriogonum umbellatum_ Torr. var. _goodmanii_ Reveal (404, 458, 585, 607) Common on rocky cutbanks, Jeffrey pine forests, and open gaps of mixed evergreen forests; 1300-1525 m. California Floristic Province

_Eriogonum umbellatum_ Torrey var. _nelsoniorum_ Reveal (854, 888) Uncommon. Found on rock outcrops of prairies, and on talus slopes of Jeffrey pine forests; 1250-1450 m. California Floristic Province, Endemic

_Polygonum douglasii_ E. Greene var. _douglasii_ (508, 630) Common in wet meadows of mixed evergreen forests; 1583 m. Boreal

_Polygonum phytolaccifolium_ Meisn. ex Small (506, 741) Occasionally found in wet meadows of mixed evergreen forests, and Jeffrey pine forests; 1575-1600 m. Boreal

_Polygonum polygaloides_ Meisner in A.P.& A.L.P.P. de Candolle ssp. _kelloggii_ (Greene) Hickman (264) Occasionally found in the understory of white fir forests; 1583 m. Boreal

_Polygonum polystachyum_ Wallich ex Meisn. (244) Occasionally found in non-serpentine shrublands; 1628 m. Not native to California

_Polygonum sawatchense_ Small ssp. _sawatchense_ (312, 799) Occasionally found in Jeffrey pine forests; 1375-1400 m. Western North America
Polygonum sawatchense Small ssp. oblivium Costea & Tardiff (420) Occasionally found in Jeffrey pine forests; 1578 m. Boreal

Polygonum spargariiforme Meisner ex Small (463, 630, 647, 895, 983) Common in Jeffrey pine forests, rock outcrops, and recently logged areas; 1400-1650 m. Western North America

Rumex acertosella L. ssp. acetosella (69, 570) Frequently found in dry meadows, prairies, Douglas fir forests, and shady drainages of mixed evergreen forests; 1250-1475 m. Not native to California

Rumex crispus L. var. crispus (897) Uncommon. Found in a moist depression of a mixed evergreen forest; 1440 m. Not native to California

Rumex obtusifolius L. (1015) Uncommon. Found on edge of a creekbed in a mixed evergreen forest; 1416 m. Not native to California

Rumex salicifolius var. transitorius (Rech. f.) Hickman (951) Uncommon. Found near an ephemeral creekbed in a mixed evergreen forest on serpentine substrate; 1565 m. Western North America

PORTULACACEAE

Calyptridium monospermum Greene (122, 214, 789, 815) Common on clay balds of dry meadows, white oak woodlands, and mixed evergreen forests; 1400-1575 m. Western North America

Claytonia lanceolata Pursh (663) Occasionally found in Jeffrey pine forests; 1588 m. Boreal

Claytonia rubra (T.J. Howell) Tidestrom ssp. rubra (6, 17) Common in white oak woodlands, and dry meadows; 1400-1450 m. Western North America


Claytonia sibirica L. (35, 53) Common in the understory of Douglas fir forests; 1400-1475 m. Western North America

Lewisia nevadensis (Gray) B.L. Robins. (52, 879) Common in open gaps of Douglas fir forests, and wet seeps on serpentine substrates; 1400-1600 m. Boreal
**Lewisia triphylla** (S. Wats.) B.L. Robins. (45, 145) Common in dry meadows; 1500-1575 m. Boreal

**Montia fontana** L. (693) Uncommon. Found in a moist meadow; 1454 m. Boreal

**Montia linearis** (Dougl. ex Hook.) Greene (63) Occasionally found in dry meadows; 1257 m. Western North America

**Montia parvifolia** (Moc. ex DC.) Greene ssp. parvifolia (765) Occasionally found on rocky slopes of mixed evergreen forests; 1317 m. Western North America

**PRIMULACEAE**

**Dodecatheon hendersonii** Gray ssp. hendersonii (13, 702) Common in dry meadows, and white oak woodlands; 1400-1500 m. Western North America

**RANUNCULACEAE**

**Aconitum columbianum** Nutt. ssp. columbianum (452) Frequently found in seeps of mixed evergreen forests; 1554 m. Boreal

**Actaea rubra** (Ait.) Willd. (175) Common in seeps of mixed evergreen forests; 1365 m. Western North America

**Anemone deltoidea** Hook. (365, 736) Common in the understory of mixed evergreen forests, and old-growth Douglas fir forests; 1450-1575 m. Western North America

**Anemone oregana** Gray (25, 48, 705A) Common in Jeffrey pine forests, understories of Douglas fir forests, and near creekbeds of mixed evergreen forests; 1400-1500 m. Western North America

**Aquilegia formosa** Fisch. ex DC. var. formosa (165, 190, 907) Common near seeps of Jeffrey pine forests, dry meadows near white oak woodlands, and near creekbeds in mixed evergreen forests; 1350-1400 m. Western North America

**Delphinium decorum** Fisch. & C.A. Mey. ssp. tracyi Ewan. (78, 105, 816) Common in depressions of dry meadows, mixed evergreen forest on serpentine substrates, white fir forests and steep talus slopes; 1400-1575 m. California Floristic Province, Endemic.
Delphinium nudicaule Torr. & Gray X Delphinium decorum Fisch. & C.A. Mey. ssp. tracyi Ewan. (106) One occurrence found in mixed evergreen forest on serpentine substrates; 1398 m. California Floristic Province (hybrid)

Delphinium nudicaule Torr. & Gray (107) Occasionally found in mixed evergreen forest on serpentine substrates; 1398 m. California Floristic Province

Delphinium trolliifolium Gray (909) Uncommon. Found near creekbeds in mixed evergreen forests; 1409 m. California Floristic Province

Ranunculus occidentalis Nutt. var. occidentalis (12, 685B, 720, 824B) Commonly found on dry meadows near white oak woodlands, huckleberry oak chaparral, and creekbeds of mixed evergreen forests; 1400-1450 m. Western North America

Ranunculus orthorhynchus Hooker var. platyphyllus Gray (411, 560, 694, 824) Common near creekbeds of mixed evergreen forests, white fir forests, and moist meadows; 1400-1500 m. Western North America

RHAMNACEAE

Ceanothus cordulatus Kell. (135, 1049) Occasionally found in mixed evergreen forests, and non-serpentine shrublands; 1275-1425 m. Western North America

Ceanothus cuneatus (Hook.) Nutt. ssp. cuneatus (30) Frequently found in Jeffrey pine forests; 1300-1500 m. Western North America

Ceanothus cuneatus X pumilus (675) One population found in Jeffrey pine forest; 1475 m. California Floristic Province. (hybrid)

Ceanothus integerrimus H. & A. (209, 276, 635) Common in mixed forests, and roadside cutbanks; 1300-1400 m. Western North America

Ceanothus pumilus Greene (118) Occasionally found in Jeffrey pine forests; 1476 m. California Floristic Province

Ceanothus velutinus Dougl. ex Hook. (215) Common in non-serpentine shrublands; 1486 m. Boreal
Frangula californica (Eschsch.) Gray ssp. californica (246) Occasionally found in non-serpentine shrubland; 1628 m. California Floristic Province

Frangula californica (Eschsch.) Gray ssp. occidentalis (T.J. Howell) Kartesz & Gandhi (354) Occasionally found in huckleberry oak chaparral, and Jeffrey pine forests; 1388 m. California Floristic Province.

Frangula purshiana (de Candolle) Cooper ssp. purshiana (822, 861) Occasionally found near creekbeds in mixed evergreen forests; 1200-1416 m. Western North America

ROSACEAE

Amelanchier alnifolia var. semiintegrifolia (Hook.) C.L. Hitchc. (709) Common in huckleberry oak chaparral, and non-serpentine shrubland; 1294 m. Western North America

Aruncus dioicus (Walt.) Fern.var. acuminatus (Rydb.) Rydb. ex Hara (515) Occasionally found in seeps of mixed evergreen forests; 1339 m. Western North America

Fragaria vesca L. (130, 899) Common in mixed evergreen forests, and dry meadows near white oak woodlands; 1250 m. Western North America

Holodiscus discolor (Pursh) Maxim. (429, 459, 623, 871) Common in huckleberry oak chaparral, and mix evergreen forests; 1400-1550 m. Western North America

Horkelia tridentata Torr. ssp. flavescens (Rydb.) Keck (43) Occasionally found in dry meadows on serpentine substrates; 1575 m. California Floristic Province

Oemleria cerasiformis (Torr. & Gray ex Hook. & Arn.) Landon (673, 721) Uncommon. Found on a rock outcrops in a dry meadow; 1225-1425 m. Western North America

Potentilla glandulosa Lindl. ssp. glandulosa (156) Occasionally found on rock outcrops in mixed evergreen forests; 1308 m. Western North America

Potentilla glandulosa Lindl. ssp. nevadensis (S. Wats.) Keck (911) Occasionally found near creekbeds of mixed evergreen forests; 1409 m. Boreal
Potentilla glandulosa Lindl. ssp. reflexa (Greene) Keck (364, 550) Common in mixed evergreen forests, and wet seeps; 1550-1600 m. Boreal

Potentilla gracilis Hook. var. fastigiata (Nutt.) S. Wats. (962) Occasionally found on edges of mixed evergreen forests on serpentine substrates; 1589 m. Western North America

Potentilla gracilis Dougl. ex Hook. var. gracilis (287, 540) Occasionally found on dry meadows near white oak woodlands, and open gaps in mixed evergreen forests; 1225-1400 m. Western North America

Prunus emarginata (Dougl. ex Hook.) Walp. var. emarginata (41, 641) Common in non-serpentine shrubland, recently logged areas, and mixed evergreen forests; 1400-1650 m. Western North America

Prunus virginiana L. var. demissa (Nutt.) Torr. (247, 731) Uncommon. Found in a dry meadow near white oak woodlands; 1400-1450 Western North America

Rosa gymnocarpa Nutt. var. gymnocarpa (213, 278, 767) Common on rock slopes, and open gaps of mixed evergreen forests; 1250-1450 m. Western North America

Rosa gymnocarpa Nutt. var. serpentina Erter & W.H. Lewis (243, 748, 751) Frequent in huckleberry oak chaparral, and Jeffrey pine forests; 1350-1450 m. California Floristic Province, Endemic

Rosa nutkana K. Presl (329, 412, 770) Common on dry meadows, thickets of mixed evergreen forests, and disturbed mixed evergreen forests; 1250-1375 m. Western North America

Rubus leucodermis Dougl. ex Torr. & Gray var. leucodermis (997, 1016) Frequent in the understory of mixed evergreen forests, and dried creekbeds of Douglas fir forests; 1400-1500 m. Western North America

Rubus parviflorus Nutt. var. parviflorus (212) Frequent in mixed evergreen forests, and dry meadows; 1434 m. Western North America

Rubus ursinus Cham. & Schidl. ssp. macropetalus (172, 761) Common in mixed evergreen forests, and roadside cutbanks; 1425-1550 m. Western North America
*Rubus ursinus* Cham. & Schlecht. ssp. *ursinus* (906, 1033) Common near creekbeds of mixed evergreen forests and understories of Douglas fir forests; 1400-1475 m. California Floristic Province

*Sorbus scopulina* Greene (267, 935) Uncommon. Found in moist canyons of old growth Douglas fir forests, and open gaps in white fir forests; 1350-1550 m. Boreal

*Spiraea douglasii* Hook. var. *douglasii* (291) Uncommon. Found near a seep in a Jeffrey pine forest; 1289 m. Western North America

**RUBIACEAE**

*Galium aparine* L. (75) Common in white oak woodlands; 1422 m. Western North America

*Galium bolanderi* Gray (352, 415, 631) Common in Jeffrey pine forests, and huckleberry oak chaparral; 1250-1425 m. Western North America

*Galium triflorum* Michx. (374, 398, 562, 954) Common on rock outcrops, and near creekbeds in mixed evergreen forests; 1425-1600 m. Western North America

*Kelloggia galioides* Torr. (375) Occasionally found in mixed evergreen forests; 1425 m. Boreal

**SALICACEAE**

*Populus trichocarpa* Torr. & A. Gray ex. Hook. (598) One population found on the edge of a pond in a mixed evergreen forest at Board Camp; 1366 m. Western North America

*Salix lasiolepis* Benth. var. *lasiolepis* (395, 409, 497, 542, 566, 655, 726, 842, 858, 996, 1042) Common on edges of old growth Douglas fir forests, moist mesic canyons of mixed evergreen forests, rocky ephemeral depressions in dry meadows, and roadside cutbanks; 1225-1500 m. Western North America

*Salix lucida* Muhl. ssp. *lasienda* (Benth.) E. Murray (1052) Uncommon. Found in an open gap of a mixed evergreen forest; 1453 m. Western North America

*Salix scouleriana* Barr. (518, 527, 938) Common in mixed evergreen forests, and roadside cutbanks in Douglas fir forests; 1275-1325 m. Western North America
SANTALACEAE

*Arceuthobium campylopodum* Engelm. (926) Host plant: *Pinus jeffreyi*. Occasionally found in Jeffrey pine forests; 1355 m. Western North America

*Arceuthobium siskiyouense* Hawksworth, Wiens & Nickrent (930) Host plant: *Pinus attenuata*. Occasionally found in Jeffrey pine forests; 1470 m. California Floristic Province, Endemic.

*Phoradendron libocedri* (Engelm.) T.J. Howell (637) Host plant: *Calocedrus decurrens*. Occasionally found in Jeffrey pine forests; 1259 m. California Floristic Province

SAPINDACEAE

*Acer glabrum* Torr. var. *torreyi* (Greene) Smiley (211, 245, 728) Common in mixed evergreen forests, and moist non-serpentine shrublands; 1434-1628 m. Boreal

*Acer macrophyllum* Pursh (31) Common in mixed evergreen forests; 1441 m. Western North America

SAXIFRAGACEAE

*Boykinia major* Gray (487) Occasionally found in understories of mixed evergreen forests; 1346 m. Western North America

*Boykinia occidentalis* T. & G. (958) Occasionally found in wet meadows of mixed evergreen forests; 1641 m. Western North America

*Heuchera micrantha* Dougl. Ex Lindl. var. *micrantha* (890) Occasionally found in mixed evergreen forests on serpentine substrates; 1407 m. Western North America

*Heuchera micrantha* var. *pacificana* (104) Uncommon. Found in mixed evergreen forests on serpentine substrates; 1398 m. Western North America

*Lithophragma campanulatum* T.J. Howell (260, 344, 760) Common in recently logged areas, understories of Douglas fir forests, and on roadside cutbanks; 1500-1575 m. California Floristic Province
**Lithophragma parviflorum** (Hook.) T. & G. var. *parviflorum* (80) Occasionally found in ephemeral depressions of dry meadows; 1392 m. Western North America

*Mitella ovalis* Greene (262) Uncommon. Found in the understory of white fir forests; 1583 m. Western North America

*Mitella trifida* Graham var. trifida (366, 739) Common in the understory of mixed evergreen forests; 1425-1575 m. Boreal

*Saxifraga aprica* Greene (784) Uncommon. Found in a seep of a dry meadow. 1462 m. Boreal

*Tellima grandiflora* (Pursh) Dougl. ex Lindl. (221) Occasionally found in the understory of mixed evergreen forests; Western North America

*Tiarella trifoliata* L. var. *unifoliata* (Hook.) Kurtz (492, 526, 841, 976, 994) Common in the understory of mixed evergreen forests, understory of old growth Douglas fir forests, and wet meadows; 1225-1600 m. Western North America

*Tolmiea menziesii* (Pursh) Torr. & Gray (378) Occasionally found near creekbeds of mixed evergreen forests; 1474 m. Western North America

**SCROPHULARIACEAE**

*Verbascum blattaria* L. (616) Uncommon. Found on a roadside cutbank; 1414 m. Not native to California

*Verbascum thapsus* L. (528) Uncommon. Found on a roadside cutbank of a Douglas fir forest; 1353 m. Not native to California

**SOLANACEAE**

*Solanum parishii* Heller (548, 722) Occasionally found in white fir forests, and mixed evergreen forests on serpentine substrates; 1400-1450 m. California Floristic Province

**VALERIANACEAE**

*Plectritis congesta* (Lindley) de Candolle ssp. *brachystemon* (Fisch. & C.A. Mey.) Morey (62, 413) Common in dry meadows, and thickets of mixed evergreen forests; 1225-1375 m. Western North America
Valeriana californica Heller (169, 359) Occasionally found in mixed evergreen forests on serpentine substrates, and Jeffrey pine forests; 1400-1475 m. Boreal

Valeriana scouleri Rydb. (73) Uncommon. Found in the understory of a mixed evergreen forest growing on a rock outcrop; 1267 m. Western North America

VERBENACEAE

Verbena lasiostachys Link. (369) Occasionally found in mixed evergreen forests; 1516 m. California Floristic Province

VIOLACEAE

Viola adunca Sm. var. adunca (167, 250) Common in mixed evergreen forests on serpentine substrates, and the understory of disturbed Douglas fir forests; 1375-1575 m. Western North America

Viola cuneata S. Wats. (108, 360, 657) Common in huckleberry oak chaparral, and Jeffrey pine forests; 1400-1460 m. Western North America

Viola glabella Nutt. (22, 36, 100) Common in mixed evergreen forests on serpentine substrates, and the understory of Douglas fir forests; 1400-1450 m. Western North America

Viola hallii Gray (3) Uncommon. Found in a dry meadow near a white oak woodland; 1410 m. California Floristic Province

Viola praemorsa Dougl. ex Lindl. ssp. praemorsa (7) Occasionally found in dry meadows near white oak woodlands; 1397 m. Western North America

Viola purpurea Kellogg ssp. purpurea (818) Occasionally found in open gaps of white fir forests; 1577 m. California Floristic Province

Viola sheltonii Torr. (34, 670, 691) Common in the understory of Douglas fir forests and mixed evergreen forests; 1450-1600 m. Western North America
MONOCOTS

CYPERACEAE

*Carex athrostachya* Olney (922, 933) Common on edges of vernal pools, and moist roadside cutbanks; 1325-1600 m. Western North America

*Carex bolanderi* Olney (913, 934) Occasionally found near creekbeds of mixed evergreen forests, and moist roadside cutbanks; 1325-1425 m. Western North America

*Carex concinnoides* Mackenzie (120, 660) Frequently found in seeps of huckleberry oak chaparral; 1450-1475 m. Western North America

*Carex fracta* Mackenzie (389, 489) Occasionally found on rocky cutbanks, and in mixed evergreen forests; 1350-1400 m. Western North America

*Carex interior* Bailey (971) Uncommon. Found in wet meadows of white fir forests; 1583 m. Boreal

*Carex laeviculmis* Meinsh. (480) Uncommon. Found growing on the edge of a pond in a Douglas fir forest; 1391 m. Boreal

*Carex mendocinensis* Olney (114, 682) Frequently found near edges of mixed evergreen forests on serpentine substrates; 1275-1300 m. California Floristic Province.

*Carex microptera* Mackenzie (878C) Uncommon. Found growing near moist creekbeds of mixed evergreen forests; 1589 m. Western North America

*Carex multicaulis* Bailey (718, 826) Common in huckleberry oak chaparral, and the understory of mixed evergreen forests; 1400-1575 m. California Floristic Province.

*Carex multicostata* Mackenzie (809) Common. Found in logged Douglas fir forests; 1401 m. Western North America

*Carex pachystachya* Cham. ex Steud.(444, 810, 878B, 1017) Common in moist depression of dry meadows, disturbed Douglas fir forests, and dried creekbeds of Douglas fir forests; 1400-1600 m. Western North America
*Carex serratodens* W. Boott (196) Occasionally found in dry meadows near white oak woodlands; 1386 m. Western North America

*Carex vesicaria* L. *major* Boott (960) Occasionally found on edges of small ponds in mixed evergreen forests; 1424 m. Western North America

*Eleocharis engelmannii* Steud. (534) Uncommon. Found in disturbed areas of Douglas fir forests; 1427 m. Western North America

*Eleocharis macrostachya* Britton (923) Uncommon. Found on the edge of a vernal pool in a mixed evergreen forest; 1569 m. Western North America

*Eleocharis quinqueflora* (F.X. Hartmann) Schwarz (925) Uncommon. Found growing on the edge of a vernal pool; 1569 m. Boreal

*Eriophorum crinigerum* (Gray) Beetle (115, 116) Common along creeks and seeps of Jeffrey pine forests; 1284 m. Boreal

*Isolepis setaceus* (L.) R. Br. (494) Occasionally found in mixed evergreen forests; 1346 m. Not native to California

**IRIDACEAE**

*Iris tenuissima* Dykes ssp. *tenuissima* (131, 162, 677) Common in the understory of mixed evergreen forests, and huckleberry oak chaparral; 1250-1325 m. California Floristic Province

**JUNCACEAE**

*Juncus covillei* Piper var. *obtusatus* C.L. Hitchc. (496, 516, 517, 912, 972) Common near creekbeds of mixed evergreen forests, and wet meadows; 1324-1600 m. Western North America

*Juncus effusus* L. (383, 574, 945) Common in wet meadows of mixed evergreen forests, dry meadows and the understory of mixed evergreen forests; 1350-1600 m. Western North America

*Juncus ensifolius* Wikstr. var. *ensifolius* (419, 936, 975, 1012) Common near creekbeds of Jeffrey pine forests, moist canyons of old growth Douglas fir forests, wet meadows, and the understory of white fir forests; 1350-1600 m. Western North America
**Juncus occidentalis** (Coville) Wiegand (924) Uncommon. Found on the edge of a vernal pool; 1569 m. Western North America

**Juncus patens** E. Mey. (878A, 896) Common in moist depressions of mixed evergreen forests; 1425-1600 m. California Floristic Province.

**Juncus tenuis** Willd. (382) Occasionally found in wet meadows of mixed evergreen forests; 1426 m. Western North America

**Luzula comosa** E. Meyer (8, 39, 109, 117, 163B, 176, 658) Common in the understory of mixed evergreen forests, in dry meadows near white oak woodlands, and Jeffrey pine forests; 1375-1650 m. Western North America

**Luzula parviflora** (Ehrh.) Desv. (258, 937) Common in recently logged areas, the understory of Douglas fir forests, and in moist canyons of old growth Douglas fir forests; 1350-1575 m. Western North America

**LILIACEAE**

**Allium acuminatum** Hook. (900) Occasionally found in dry meadows near white oak woodlands; 1257 m. Western North America

**Allium amplexens** Torr. (233, 450, 510) Common in dry meadows, and on clay balds; 1225-1600 m. California Floristic Province.

**Allium bolanderi** S. Wats. var. bolanderi (232, 433, 434, 435) Common in the understory of mixed evergreen forests, dry meadows and on clay balds; 1225-1500 m. California Floristic Province.

**Allium falcifolium** Hook. & Arn. (86, 697) Common in Jeffrey pine forests, huckleberry oak chaparral, and on talus slopes of white fir forests; 1300-1525 m. California Floristic Province

**Allium validum** S. Wats. (500) Common in wet meadows of mixed evergreen forests; 1583 m. Boreal

**Brodiaea elegans** Hoover ssp. elegans (437, 482, 844) Common in dry meadows, and near rock outcrops of prairies; 1350-1500 m. California Floristic Province
Calochortus tolmiei Hook. & Arn. (11, 347, 699) Common in dry meadows, on clay balds, non-serpentine shrubland, and talus slopes of white fir forests; 1400-1575 m. Western North America

Camassia leichtlinii (Pursh) Greene ssp. suksdorfii Gould (150, 880) Common in wet meadows; 1375-1600 m. Boreal

Chlorogalum pomeridianum (DC.) Kunth var. pomeridianum (541) Occasionally found on roadside cutbanks in mixed evergreen forests; 1302 m. California Floristic Province

Clintonia uniflora (Menzies ex J.A. & J.H. Schultes) Kunth (367, 840) Occasionally found in the understory of mixed evergreen forests, and in moist mesic canyons of old growth Douglas fir forests; 1225-1575 m. Boreal

Dichelostemma capitatum Alph. Wood ssp. capitatum (65) Common in dry meadows; 1257 m. Western North America

Dichelostemma congestum (Sm.) Kunth (392) Occasionally found on edges of white oak woodlands; 1406 m. Western North America

Dichelostemma ida-maia (Wood) Greene (274, 555) Common on roadside cutbanks, and white fir forests; 1300-1500 m. California Floristic Province, Endemic

Erythronium californicum Purdy (46, 659) Common in the understory of white fir forests, Douglas fir forests, and huckleberry oak chaparral; 1375-1475 m. California Floristic Province, Endemic.

Erythronium citrinum var. citrinum S. Wats. (26) Rare. Found in a Jeffrey pine forest; 1483 m. California Floristic Province, Endemic. CNPS List 4.3

Erythronium grandiflorum Pursh ssp. grandiflorum (38, 664) Common in understories of mixed evergreen forests, and in Jeffrey pine forests; 1575-1650 m. Boreal

Fritillaria affinis (Schultes) Sealy var. affinis (81) Occasionally found in depressions of dry meadows; 1392 m. Western North America

Fritillaria glauca Greene (698) Rare. One population found at Board Camp on a talus slopes of a white fir forest. 1509 m. California Floristic Province, Endemic. CNPS List 4.2
**Fritillaria purdyi** Eastw. (665) Uncommon. Found in a Jeffrey pine forest; 1570 m. California Floristic Province, Endemic. CNPS List 4.3

**Hastingsia serpentinicola** Becking (293) Uncommon. Found on a creekbed in a Jeffrey pine forest; 1220 m. Boreal, Endemic

**Lilium pardalinum** Kellogg ssp. pardalinum (488, 932) Common in wet meadows of mixed evergreen forests; 1325-1475 m. California Floristic Province.

**Lilium pardalinum** Kellogg ssp. vollmeri (Eastw.) Skinner (418) Rare. Found in a moist seep of a Jeffrey pine forest; 1397 m. California Floristic Province, Endemic. CNPS List 4.3

**Lilium washingtonianum** Kellogg ssp. purpurascens (Stearn) M.W. Skinner (460, 867B, 872) Occasionally found in open gaps of mixed evergreen forests, and in Jeffrey pine forests; 1250-1575 m. California Floristic Province. CNPS List 4.3

**Maianthemum racemosum** (L.) Link ssp. amplexicaule (Nutt.) LaFrankie (155, 256, 259, 874) Common in mixed evergreen forests, edges of recently logged areas, and the understory of Douglas fir forests; 1300-1600 m. Western North America

**Maianthemum stellatum** (L.) Link (134, 257) Common in the understory of mixed evergreen forests, and on edges recently logged areas; 1250-1575 m. Boreal

**Prosartes hookeri** Torrey (149, 268) Occasionally found in the understory of mixed evergreen forests, and in open gaps of mixed evergreen forests; 1330-1540 m. Western North America

**Prosartes smithii** (Hooker) Utech, Shinwari, and Kawano (252) Uncommon. Found near a creekbed of a mixed evergreen forest; 1578 m. Western North America

**Streptopus amplexifolius** (L.) DC. (251) Uncommon. Found in the understory of a mixed evergreen forest; 1578 m. Western North America

**Triantha occidentalis** (Watson) R.R. Gates ssp. occidentalis (473, 973) Common in seeps of Jeffrey pine forests, and wet meadows; 1425-1600 m. California Floristic Province
*Trillium albidum* J.D. Freeman (4, 656) Common in white oak woodlands, and in old-growth Douglas fir forests; 1400-1425 m. California Floristic Province

*Trillium ovatum* Pursh ssp. *ovatum* (164B, 178, 685) Common in mixed evergreen forests, roadside seeps, and in the understory of white fir forests; 1350-1575 m. Western North America

*Triteleia hyacinthina* (Lindl.) Greene (288, 952, 1009, 1011) Common in dry meadows near white oak woodlands, and the understory of white fir forests; 1225-1575 m. Western North America

*Triteleia laxa* Benth. (300, 853) Common in dry meadows; 1225-1400 m. California Floristic Province

*Veratrum californicum* Durand var. *caudatum* (Heller) C.L. Hitchc. (554) Common in wet meadows, and white fir forests; 1502 m. Western North America

*Veratrum insolitum* Jepson (544) Rare. Found in an opening of a mixed evergreen forest; 1423 m. Western North America. CNPS List 4.3

*Veratrum viride* Ait. var. *eschscholzianum* (Roemer & Schultes) Breitung (549) Occasionally found in seeps of mixed evergreen forests; 1547 m. Boreal

*Xerophyllum tenax* (Pursh) Nutt. (399, 711) Frequently found in Jeffrey pine forest, and huckleberry oak chaparral; 1275-1500 m. Western North America

*Zigadenus micranthus* Eastw. (66, 128, 471, 775) Common on dry meadows near white oak woodlands, huckleberry oak chaparral, and Jeffrey pine forests; 1225-1475 m. California Floristic Province

**ORCHIDACEAE**

*Calypso bulbosa* (L.) Oakes var. *occidentalis* (Holzinger) Boivin (59, 165E) Common in the understory of white fir and Douglas fir forests; 1400-1550 m. Western North America

*Cephalanthera austiniae* (Gray) Heller (372, 495, 828) Common in the understory of mixed evergreen forests and white fir forests; 1350-1550 m. Western North America

*Corallorrhiza maculata* Raf. (883) Frequently found in the understory of Douglas fir forests; 1589 m. Western North America
**Corallorrhiza mertensiana** Bong. (315, 428) Common in the understory of old growth Douglas fir, and in open gaps of mixed evergreen forests; 1425-1450 m. Western North America

**Cypripedium californicum** Gray (316) One population found near a seep in a Jeffrey pine forest; 1283 m. California Floristic Province. CNPS List 4.2

**Goodyera oblongifolia** Raf. (643, 1028) Frequent in the understory of white fir forests, and mixed evergreen forests; 1325-1550 m. Western North America

**Listera caurina** Piper (843) Uncommon. Found in the understory of an old-growth Douglas fir forest; 1224 m. Western North America

**Piperia unalascensis** (Spreng.) Rydb. (356, 834) Occasionally found in Jeffrey pine forests, and in open gaps of mixed evergreen forests on serpentine substrates; 1350-1425 m. Western North America

**Platanthera dilatata** (Pursh) Lindl. var. **leucostachys** (Lindl.) Luer (174, 559, 791, 1002) Common in the understory of mixed evergreen forests, in open gaps of white fir forests, and wet meadows of mixed evergreen forests; 1350-1600 m. Boreal

**Platanthera sparsiflora** (S. Wats.) Schlechter (493, 792) Common in mixed evergreen forests, and wet meadows; 1350-1600 m. Boreal

**Spiranthes romanzoffiana** Cham. (594) Uncommon. Found near a seep in the understory of a mixed evergreen forest; 1395 m. Western North America

**POACEAE**

**Agrostis capillaris** L. (575) Occasionally found in the understory of mixed evergreen forests; 1369 m. Not native to California

**Agrostis exarata** Trin. (556, 1005) Common in the understory of white fir forests; 1400-1500 m. Western North America

**Agrostis gigantea** Roth (522) Occasionally found in open gaps of mixed evergreen forests; 1306 m. Not native to California

**Agrostis idahoensis** Nash (586) Uncommon. Found near the edge of a white fir forest; 1583 m. Western North America
*Agrostis oregonaensis* Vasey (990) Uncommon. Found in a roadside ditch; 1589 m. Western North America

*Agrostis pallens* Trin. (500B) Occasionally found in wet meadows of mixed evergreen forests; 1583 m. Western North America

*Aira caryophyllea* L. (123) Common on clay balds of dry meadows; 1441 m. Not native to California

*Bromus carinatus* H. & A. var. *carinatus* (198, 391) Common in dry meadows near white oak woodlands, and in open gaps of mixed evergreen forests; 1375-1475 m. Western North America

*Bromus carinatus* Hooker & Arnott var. *marginatus* (Nees von Esenbeck ex Steudel) Barkworth & Anderton (965, 988) Uncommon. Found on edges of mixed evergreen forests on serpentine substrates; 1589 m. Western North America

*Bromus hordeaceus* L. ssp. *hordeaceus* (98) Uncommon. Found on a roadside cutbank; 1402 m. Not native to California

*Bromus sterilis* L. (90) Common in mixed evergreen forests on serpentine substrates; 1395 m. Not native to California

*Bromus vulgaris* (Hook.) Shear (1018) Occasionally found in dried creekbeds of Douglas fir forests; 1479 m. Western North America

*Cynosurus echinatus* L. (153) Frequently found on roadside cutbanks, dry meadows, and prairies; 1299 m. Not native to California

*Dactylis glomerata* L. (220) Occasionally found on rock outcrops of mixed evergreen forests; 1371 m. Not native to California

*Danthonia californica* Bolander (230, 330) Common on clay balds of dry meadows; 1225-1275 m. Western North America

*Danthonia unispicata* (Thurb.) Munro ex Macoun (306, 870) Common in Jeffrey pine forests; 1386-1425 m. Western North America

*Deschampsia danthonioides* (Trin.) Munro ex Benth. (305, 328, 921, 1004) Common in the understory of mixed evergreen forests, edges of vernal pools, and roadside cutbanks; 1350-1575 m. Western North America
Deschampsia elongata (Hook.) Benth. (223, 263, 292, 302, 889, 964) Common in the understory of mixed evergreen forests and white fir forests, in Jeffrey pine forests, dry meadows and on talus slopes; 1250-1600 m. Western North America

Elymus elongatus (Host) Runem. var. elongatus (519) Uncommon. Found near a spring in a mixed evergreen forest; 1283 m. Not native to California

Elymus elymoides (Raf.) Swezey ssp. elymoides (373) Occasionally found in mixed evergreen forest on serpentine substrates; 1413 m. Western North America

Elymus glaucus Buckley ssp. glaucus (277, 295, 917, 984) Common in Jeffrey pine forests, near creekbeds of mixed evergreen forests, on roadside cutbanks and recently logged areas; 1200-1575 m. Western North America

Elymus hispidus (Opiz) Meld. (387) Occasionally found in mixed evergreen forests; 1293 m. Not native to California

Elymus lanceolatus (Scribn. & J.G. Sm.) Gould ssp. lanceolatus (273, 893) Common on rock outcrops, huckleberry oak chaparral, and mixed evergreen forests on serpentine substrates; 1375-1400 m. Western North America

Elymus multisetus M.E. Jones (271, 439, 969, 968B) Common on rock outcrops, and in mixed evergreen forests on serpentine substrates; 1375-1425 m. Western North America

Festuca californica Vasey var. californica (70, 281, 901) Common in dry meadows, and mixed evergreen forests; 1250 m. Western North America

Festuca microstachys (Nutt.) Munro var. ciliata (Beal) Lonard & Gould (298) Occasionally found in prairies; 1393 m. Western North America

Festuca microstachys (Nutt.) Munro var. pauciflora (Scribn. ex Beal) Lonard & Gould (99A) Occasionally found on roadside cutbanks; 1402 m. Western North America

Festuca occidentalis Hook. (95, 227) Frequently found in understories of Douglas fir forests on serpentine substrates, and dry meadows; 1250-1400 m. Western North America

Festuca subulata Trin. (1006) Uncommon. Found near a creekbed in a mesic mixed evergreen forest; 1416 m. Western North America
Glyceria elata (Nash) M.E. Jones (904) Uncommon. Found near a creekbed in a mixed evergreen forest; 1409 m. Western North America

Glyceria striata (Lam.) A.S. Hitchc. (376, 499, 931) Common in creekbeds, wet meadows, and seeps of mixed evergreen forests; 1450-1575 m. Western North America

Hordeum marinum Huds. ssp. gussonianum (Parl.) Thellung (201) Uncommon. Found in a dry meadow on edge of a white oak woodland; 1386 m. Not native to California

Melica bulbosa Geyer ex Porter & Coult. (144) Common in dry meadows; 1510 m. Western North America

Melica geyeri Munro ex Boland var. geyeri (561) Occasionally found in open gaps of white fir forests; 1502 m. Western North America

Melica harfordii Bolander (521, 531, 581, 848) Common in mixed evergreen forests, on roadside cutbanks of Douglas fir forests, and dry meadows; 1225-1400 m. Western North America

Melica subulata (Griseb.) Scribn. (340, 345) Common in open gaps of mixed evergreen forests, and the understory of Douglas fir forests; 1475-1500 m. Western North America

Phleum pratense L. (385) Uncommon. Found on a clay bald of a mixed evergreen forest; 1426 m. Not native to California

Pleuropogon refractus (Gray) Benth. ex Vasey (905) Rare. One population found near a creekbed in a mixed evergreen forest; 1409 m. Western North America. CNPS List 4.2

Poa bolanderi Vasey (269) Occasionally found in non-serpentine shrubland; 1587 m. Western North America

Poa bulbosa L. (77) Occasionally found in dry meadows near white oak woodlands; 1398 m. Not native to California

Poa palustris L. (1007) Uncommon. Found near a creekbed of a mixed evergreen forest; 1416 m. Not native to California
*Poa pratensis* L. ssp. *pratensis* (204, 442) Common on dry meadows and in moist depressions near edges of white oak woodlands; 1375-1500 m. Not native to California

*Poa secunda* Presl ssp. *juncifolia* (Scribn.) R. Soreng (124) Uncommon. Found on clay balds near white oak woodlands; 1441 m. Western North America

*Poa secunda* Presl. ssp. *secunda* (170, 183, 189, 197, 208, 712, 813) Common in seeps and mixed evergreen forests on serpentine substrates, dry meadows, prairies, white oak woodlands; 1375-1600 m. Western North America

*Stipa lemmonii* (Vasey) Scribner var. *lemmonii* (171, 231, 348) Common in mixed evergreen forests on serpentine substrates, clay balds of dry meadows, and non-serpentine shrubland; 1225-1500 m. Western North America

*Torreyochloa pallida* (Torr.) Church var. *pauciflora* (J. Presl) J.I. Davis (478) 1391 m. Found in a moist depression of a dry meadow; Western North America

*Trisetum canescens* Buckley (443, 847) Occasionally found in dry meadows, and in moist depressions of dry meadows; 1225-1500 m. Western North America
Appendix B. Environmental variables used in quantitative analysis.

<table>
<thead>
<tr>
<th>Flora</th>
<th>Latitude midpoint</th>
<th>Longitude midpoint</th>
<th>Latitudinal difference</th>
<th>Longitudinal difference</th>
<th>Area size code</th>
<th>Distance from coast (km)</th>
<th>Elevational difference</th>
<th>Highest elevation (m)</th>
<th>Number of taxa</th>
</tr>
</thead>
<tbody>
<tr>
<td>This study</td>
<td>40.48</td>
<td>123.43</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>38.5</td>
<td>454</td>
<td>1649</td>
<td>548</td>
</tr>
<tr>
<td>Tracy (Consortium of California Herbaria)</td>
<td>40.46</td>
<td>123.41</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>42</td>
<td>702</td>
<td>1769</td>
<td>439</td>
</tr>
<tr>
<td>Smith and Wheeler (1990)</td>
<td>39.73</td>
<td>123.96</td>
<td>75</td>
<td>53</td>
<td>4</td>
<td>30</td>
<td>692</td>
<td>2269</td>
<td>820</td>
</tr>
<tr>
<td>Kraemer &amp; Butler (1972)</td>
<td>41.53</td>
<td>123.36</td>
<td>105</td>
<td>7</td>
<td>1</td>
<td>46</td>
<td>679</td>
<td>2081</td>
<td>311</td>
</tr>
<tr>
<td>Ferlatte (1974)</td>
<td>40.54</td>
<td>123.02</td>
<td>6</td>
<td>41</td>
<td>3</td>
<td>93.5</td>
<td>2012</td>
<td>2744</td>
<td>608</td>
</tr>
<tr>
<td>Ground (1972)</td>
<td>41.51</td>
<td>123.36</td>
<td>103</td>
<td>7</td>
<td>2</td>
<td>46</td>
<td>1024</td>
<td>2228</td>
<td>337</td>
</tr>
<tr>
<td>Hobart (1970)</td>
<td>42</td>
<td>123.45</td>
<td>152</td>
<td>2</td>
<td>4</td>
<td>37</td>
<td>1772</td>
<td>2150</td>
<td>961</td>
</tr>
<tr>
<td>Muth (1967)</td>
<td>41.34</td>
<td>123.09</td>
<td>86</td>
<td>34</td>
<td>1</td>
<td>80</td>
<td>479</td>
<td>2271</td>
<td>336</td>
</tr>
<tr>
<td>Gillespie (1931)</td>
<td>41.58</td>
<td>123.08</td>
<td>110</td>
<td>35</td>
<td>4</td>
<td>76.5</td>
<td>1079</td>
<td>2335</td>
<td>871</td>
</tr>
<tr>
<td>Oettinger (1975)</td>
<td>41.25</td>
<td>123.12</td>
<td>77</td>
<td>31</td>
<td>3</td>
<td>71</td>
<td>833</td>
<td>2174</td>
<td>492</td>
</tr>
<tr>
<td>Neilson &amp; McQuaid (1981)</td>
<td>38.49</td>
<td>123.46</td>
<td>199</td>
<td>3</td>
<td>4</td>
<td>72</td>
<td>378</td>
<td>1423</td>
<td>694</td>
</tr>
<tr>
<td>Stillman (1980)</td>
<td>41.6</td>
<td>123.21</td>
<td>112</td>
<td>22</td>
<td>2</td>
<td>77</td>
<td>725</td>
<td>2275</td>
<td>255</td>
</tr>
</tbody>
</table>
### Appendix B (continued).

Environmental variables used in quantitative analysis.

<table>
<thead>
<tr>
<th>Flora</th>
<th>Latitude midpoint</th>
<th>Longitude midpoint</th>
<th>Latitudinal difference</th>
<th>Longitudinal difference</th>
<th>Area size code</th>
<th>Distance from coast (km)</th>
<th>Elevation difference</th>
<th>Highest elevation (m)</th>
<th>Number of taxa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whipple (1981)</td>
<td>41.19</td>
<td>122.31</td>
<td>71</td>
<td>112</td>
<td>1</td>
<td>110</td>
<td>207</td>
<td>2751</td>
<td>391</td>
</tr>
<tr>
<td>Heckard &amp; Hickman (1985)</td>
<td>39.23</td>
<td>122.45</td>
<td>125</td>
<td>98</td>
<td>2</td>
<td>91</td>
<td>651</td>
<td>2151</td>
<td>517</td>
</tr>
<tr>
<td>Barker (1978)</td>
<td>41.85</td>
<td>123.92</td>
<td>137</td>
<td>49</td>
<td>2</td>
<td>20.6</td>
<td>808</td>
<td>930</td>
<td>404</td>
</tr>
<tr>
<td>Nelson (1979)</td>
<td>40.33</td>
<td>123.54</td>
<td>15</td>
<td>11</td>
<td>1</td>
<td>64</td>
<td>332</td>
<td>1795</td>
<td>436</td>
</tr>
<tr>
<td>Simpson (1980)</td>
<td>41.27</td>
<td>123.68</td>
<td>79</td>
<td>25</td>
<td>2</td>
<td>36</td>
<td>1402</td>
<td>1463</td>
<td>296</td>
</tr>
</tbody>
</table>
Appendix C. Sorensen’s similarity matrix for the species composition of all northwest California floras.


<table>
<thead>
<tr>
<th></th>
<th>Flora 1</th>
<th>Flora 2</th>
<th>Flora 4</th>
<th>Flora 5</th>
<th>Flora 6</th>
<th>Flora 8</th>
<th>Flora 10</th>
<th>Flora 13</th>
<th>Flora 14</th>
<th>Flora 15</th>
<th>Flora 16</th>
<th>Flora 17</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flora 1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flora 2</td>
<td>0.654</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flora 4</td>
<td>0.459</td>
<td>0.451</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flora 5</td>
<td>0.579</td>
<td>0.557</td>
<td>0.550</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flora 6</td>
<td>0.463</td>
<td>0.440</td>
<td>0.712</td>
<td>0.563</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flora 8</td>
<td>0.384</td>
<td>0.393</td>
<td>0.523</td>
<td>0.559</td>
<td>0.556</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flora 10</td>
<td>0.517</td>
<td>0.542</td>
<td>0.572</td>
<td>0.730</td>
<td>0.583</td>
<td>0.602</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flora 13</td>
<td>0.381</td>
<td>0.447</td>
<td>0.443</td>
<td>0.607</td>
<td>0.483</td>
<td>0.515</td>
<td>0.546</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flora 14</td>
<td>0.593</td>
<td>0.519</td>
<td>0.367</td>
<td>0.534</td>
<td>0.349</td>
<td>0.353</td>
<td>0.449</td>
<td>0.476</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flora 15</td>
<td>0.577</td>
<td>0.422</td>
<td>0.373</td>
<td>0.394</td>
<td>0.409</td>
<td>0.269</td>
<td>0.375</td>
<td>0.302</td>
<td>0.422</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flora 16</td>
<td>0.650</td>
<td>0.569</td>
<td>0.436</td>
<td>0.534</td>
<td>0.397</td>
<td>0.367</td>
<td>0.462</td>
<td>0.452</td>
<td>0.653</td>
<td>0.445</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Flora 17</td>
<td>0.428</td>
<td>0.410</td>
<td>0.449</td>
<td>0.469</td>
<td>0.425</td>
<td>0.434</td>
<td>0.446</td>
<td>0.413</td>
<td>0.291</td>
<td>0.408</td>
<td>0.327</td>
<td>1</td>
</tr>
</tbody>
</table>
Appendix D. Taxa found by J.P. Tracy that I did not find in the study area. Synonym follows Smith and Sawyer 2009. Locality information was used from searches within the Consortium of California Herbaria: HM = Horse Mountain, GM= Grouse Mountain, and SFM = South Fork Mountain. All taxa from Board Camp Mountain were located.

<table>
<thead>
<tr>
<th>Family</th>
<th>Scientific Name</th>
<th>HM</th>
<th>GM</th>
<th>SFM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adoxaceae</td>
<td>Sambucus racemosa</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Apiaceae</td>
<td>Lomatium dissectum var. dissectum</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Apiaceae</td>
<td>Lomatium tracyi (CNPS 4.3)</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Apiaceae</td>
<td>Osmorhiza bertolii</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Apiaceae</td>
<td>Perideridia gairdneri ssp. borealis</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Apiaceae</td>
<td>Perideridia gairdneri ssp. gairdneri</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Apiaceae</td>
<td>Yabea microcarpa</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Asteraceae</td>
<td>Ageratina occidentale</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Asteraceae</td>
<td>Agoseris retrosa</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Asteraceae</td>
<td>Brickellia greenei</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Asteraceae</td>
<td>Cirsium occidentale var. venustum</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Asteraceae</td>
<td>Crepis acuminata</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Asteraceae</td>
<td>Eucephalus tomentellus</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Asteraceae</td>
<td>Eurybia radulina</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Asteraceae</td>
<td>Hieracium bolanderi</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Asteraceae</td>
<td>Hieracium nudicaule</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Asteraceae</td>
<td>Microseris laciniata ssp. laciniata</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Asteraceae</td>
<td>Microseris nutans</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Asteraceae</td>
<td>Pseudognaphalium thermale</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Asteraceae</td>
<td>Psilocarphus brevissimus</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Asteraceae</td>
<td>Psilocarphus oregonus</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Asteraceae</td>
<td>Senecio sylvaticus</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Asteraceae</td>
<td>Symphyotrichum spathulatum</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Betulaceae</td>
<td>Alnus incana ssp. tenuifolia</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Boraginaceae</td>
<td>Cryptantha milobakeri</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Boraginaceae</td>
<td>Hackelia californica</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Boraginaceae</td>
<td>Hackelia micrantha</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Boraginaceae</td>
<td>Nemophila menziesii var. menziesii</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Brassicaceae</td>
<td>Arabis suffrutescens</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Brassicaceae</td>
<td>Cardamine nutallii var. covilleana</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Brassicaceae</td>
<td>Rorippa curvisiliqua</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Brassicaceae</td>
<td>Streptanthus tortuosus</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Brassicaceae</td>
<td>Streptanthus tortuosus var. suffrutescens</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Caprifoliaceae</td>
<td>Lonicera ciliosa</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Family</td>
<td>Scientific Name</td>
<td>HM</td>
<td>GM</td>
<td>SFM</td>
</tr>
<tr>
<td>-----------------</td>
<td>--------------------------------------</td>
<td>----</td>
<td>----</td>
<td>-----</td>
</tr>
<tr>
<td>Caprifoliaceae</td>
<td><em>Lonicera conjugialis</em></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Caryophyllaceae</td>
<td><em>Silene grayi</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caryophyllaceae</td>
<td><em>Stellaria crispa</em></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Cornaceae</td>
<td><em>Cornus sericea ssp. sericea</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crassulaceae</td>
<td><em>Sedum laxum ssp. heckeri</em></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Crassulaceae</td>
<td><em>Sedum obtusatum</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cyperaceae</td>
<td><em>Carex abrupta</em></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Cyperaceae</td>
<td><em>Carex echinata ssp. echinata</em></td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Cyperaceae</td>
<td><em>Carex geyeri</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cyperaceae</td>
<td><em>Carex harfordii</em></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Cyperaceae</td>
<td><em>Carex ovalis</em></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Cyperaceae</td>
<td><em>Carex subfusca</em></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Cyperaceae</td>
<td><em>Carex utriculata</em></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Cyperaceae</td>
<td><em>Scirpus microcarpus</em></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Droseraceae</td>
<td><em>Drosera rotundifolia</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ericaceae</td>
<td><em>Gaultheria ovatifolia</em></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Ericaceae</td>
<td><em>Orthilia secunda ssp. secunda</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ericaceae</td>
<td><em>Pleuricospora fimbriolata</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ericaceae</td>
<td><em>Sarcodes sanguinea</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ericaceae</td>
<td><em>Vaccinium caespitosum var. caespitosum</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fabaceae</td>
<td><em>Hosackia yollabolliensis</em> (CNPS 4.3)</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fabaceae</td>
<td><em>Lathyrus lanszwertii var. tracyi</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fabaceae</td>
<td><em>Lotus oblongifolius var. oblongifolius</em></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Fabaceae</td>
<td><em>Lupinus elmeri</em> (CNPS 1B.2)</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fabaceae</td>
<td><em>Lupinus lepidus var. lobbii</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fabaceae</td>
<td><em>Trifolium howellii</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fabaceae</td>
<td><em>Trifolium wildenowii</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fabaceae</td>
<td><em>Chrysoplepis sempervirens</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Garryaceae</td>
<td><em>Garrya buxifolia</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gentianaceae</td>
<td><em>Gentiana calycosa</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grossulariaceae</td>
<td><em>Ribes bracteosum</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grossulariaceae</td>
<td><em>Ribes roezlii var. roezlii</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iridaceae</td>
<td><em>Iris macrosiphon</em></td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Iridaceae</td>
<td><em>Iris purdyi</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Isoëtaceae</td>
<td><em>Isoëtes howellii</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Isoëtaceae</td>
<td><em>Isoëtes nuttalii</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juncaceae</td>
<td><em>Juncus bufonis var. occidentalis</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family</td>
<td>Scientific Name</td>
<td>HM</td>
<td>GM</td>
<td>SFM</td>
</tr>
<tr>
<td>---------------</td>
<td>------------------------------------------------------</td>
<td>----</td>
<td>----</td>
<td>-----</td>
</tr>
<tr>
<td>Juncaceae</td>
<td><em>Juncus exigus</em></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Juncaceae</td>
<td><em>Juncus laccatus</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lamiaceae</td>
<td><em>Monardella glauca</em></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Lamiaceae</td>
<td><em>Monardella odoratissima</em> ssp. pallida*</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Lamiaceae</td>
<td><em>Scutellaria californica</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lamiaceae</td>
<td><em>Stachys ajugoides var. rigida</em></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Liliaceae</td>
<td><em>Allium siskiyouense</em> (CNPS 4.3)</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liliaceae</td>
<td><em>Calochortus caeruleus</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liliaceae</td>
<td><em>Camassia quamash</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liliaceae</td>
<td><em>Erythronium grandiflorum</em> ssp. grandiflorum*</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Liliaceae</td>
<td><em>Fritillaria atropurpurea</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liliaceae</td>
<td><em>Hastingia alba</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liliaceae</td>
<td><em>Narthecium californicum</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loasaceae</td>
<td><em>Mentzelia dispersa</em></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Malvaceae</td>
<td><em>Sidalcea malviflora</em> ssp. asperella*</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Onagraceae</td>
<td><em>Epilobium halleamum</em></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Onagraceae</td>
<td><em>Epilobium oreganum</em> (CNPS 1B.2)</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Onagraceae</td>
<td><em>Gayophytum heterozygum</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Onagraceae</td>
<td><em>Gayophytum humile</em></td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Orchidaceae</td>
<td><em>Listera convallarioides</em></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Orchidaceae</td>
<td><em>Piperia elegan</em> ssp. elegans</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orobanchaceae</td>
<td><em>Boschniakia strobilacea</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orobanchaceae</td>
<td><em>Orthocarpus imbricatus</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orobanchaceae</td>
<td><em>Pedicularis racemosa</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oxalidaceae</td>
<td><em>Oxalis trilliifolia</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paeoniaceae</td>
<td><em>Paeonia brownii</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Papaveraceae</td>
<td><em>Dicentra formosa</em> ssp. oregana*</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Papaveraceae</td>
<td><em>Dicentra uniflora</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parnassiaceae</td>
<td><em>Parnassia californica</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phrymaceae</td>
<td>* Mimulus layneae*</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phrymaceae</td>
<td><em>Mimulus nanus</em> ssp. nanus*</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pinaceae</td>
<td><em>Abies x shastensis</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plantaginaceae</td>
<td><em>Collinsia torreyi</em> var. wrightii*</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plantaginaceae</td>
<td><em>Penstemon newberryi</em> ssp. berryi*</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plantaginaceae</td>
<td><em>Sairocarpus vexillo-calyculatum</em></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Poaceae</td>
<td><em>Agrostis humilis</em></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Poaceae</td>
<td><em>Agrostis variabilis</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family</td>
<td>Scientific Name</td>
<td>HM</td>
<td>GM</td>
<td>SFM</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------------------------------------------------------</td>
<td>----</td>
<td>----</td>
<td>-----</td>
</tr>
<tr>
<td>Poaceae</td>
<td><em>Bromus commutatus</em></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Poaceae</td>
<td><em>Bromus orcuttianus</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poaceae</td>
<td><em>Calamagrostis koelerioides</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poaceae</td>
<td><em>Danthonia intermedia</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poaceae</td>
<td><em>Elymus x hansenii</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poaceae</td>
<td><em>Festuca roemerii var. roemerii</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poaceae</td>
<td><em>Melica aristata</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poaceae</td>
<td><em>Melica fugax</em></td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Poaceae</td>
<td><em>Muhlenbergia filiformis</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poaceae</td>
<td><em>Phleum alpinum ssp. alpinum</em></td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Poaceae</td>
<td><em>Stipa californica</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poaceae</td>
<td><em>Trisetum cernum</em></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Polemoniaceae</td>
<td><em>Ipomopsis aggregata ssp. formosisima</em></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Polemoniaceae</td>
<td><em>Leptosiphon harknessii</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polemoniaceae</td>
<td><em>Navarretia divaricata ssp. vividior</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polemoniaceae</td>
<td><em>Navarretia sinistra ssp. sinistra</em></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Polemoniaceae</td>
<td><em>Navarretia squarrosa</em></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Polemoniaceae</td>
<td><em>Phlox adscurgens</em></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Polemoniaceae</td>
<td><em>Phlox rigida</em></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Polygonaceae</td>
<td><em>Polygonum bistortoides</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polygonaceae</td>
<td><em>Polygonum davisiæ</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Portulacaceae</td>
<td><em>Calytridium umbellatum</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Portulacaceae</td>
<td><em>Lewisia pygmaea ssp. pygmaea</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primulaceae</td>
<td><em>Dodecatheon alpinum ssp. majus</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ranunculaceae</td>
<td><em>Caltha leptosepala</em></td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Ranunculaceae</td>
<td><em>Delphinium andersonii</em></td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Ranunculaceae</td>
<td><em>Ranunculus orthorhynchus</em> var. orthorhynchus*</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Rosaceae</td>
<td><em>Rosa pisocarpa</em></td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Rosaceae</td>
<td><em>Rubus lasiococcus</em></td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Rosaceae</td>
<td><em>Spiraea splendens var. splendens</em></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rubiaceae</td>
<td><em>Galium bifolium</em></td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Salicaceae</td>
<td><em>Salix jepsonii</em></td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Saxifragaceae</td>
<td><em>Darmera peltata</em></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Saxifragaceae</td>
<td><em>Mitella diversifolia</em></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Violaceae</td>
<td><em>Viola lobata</em></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Violaceae</td>
<td><em>Viola macloskeyi</em></td>
<td></td>
<td></td>
<td>x</td>
</tr>
</tbody>
</table>