

**California Rangeland Monitoring and Mapping:  
Focusing upon Great Valley and Carrizo Plain Grassland Habitats**



**Final Report Submitted to**

**Natural Resources Conservation District  
California Conservation Innovation Grant**

**Prepared By**

**Jennifer Buck-Diaz, Jaime Ratchford and Julie Evens**



**2707 K Street, Suite 1  
Sacramento CA, 95816**

**2013**



## TABLE OF CONTENTS

Section	Page
<b>Figures</b> .....	<b>iii</b>
<b>Tables</b> .....	<b>iv</b>
<b>Executive Summary</b> .....	<b>v</b>
<b>Acknowledgements</b> .....	<b>vi</b>
<b>Introduction</b> .....	<b>1</b>
<b>Methods</b> .....	<b>2</b>
Study area .....	2
Field Sampling and Classification .....	2
Stand Tables .....	5
Environmental Data and Analysis .....	7
Grazing Management Interviews .....	8
<b>Results</b> .....	<b>9</b>
Basic Species Data.....	9
Revisit Analyses .....	11
Vegetation Classification Analysis .....	14
Environmental Data and Analysis .....	21
Field Assessment and Vegetation Map Quality Control.....	27
Site Summaries from 2011–2012.....	31
AGUA FRIA RANCH .....	31
BITTER CREEK NATIONAL WILDLIFE REFUGE .....	32
CARRIZO PLAIN.....	33
DEER CREEK HILLS.....	34
DUTCHMAN CREEK .....	36
FLYING M RANCH.....	37
LOKERN PRESERVE .....	38
MADERA RANCH .....	39
ROMINGER BROTHER FARMS .....	40
SEMITROPIC RIDGE PRESERVE.....	41
TEJON RANCH.....	41
VIERA RANCH.....	42
WIND WOLVES PRESERVE.....	43
Rangeland Management.....	45
Rangeland Monitoring Workshop.....	49
<b>Discussion</b> .....	<b>50</b>
<b>References</b> .....	<b>54</b>
<b>Appendix A. CNPS Field Sampling Protocol and Field Forms</b> .....	<b>57</b>
<b>Appendix B. Species list of scientific and common names for all taxa identified in the 2011–2012 vegetation surveys</b> .....	<b>66</b>

<b>Appendix C. Table of ranked invasive species identified in the study area with references for additional information. Moderate and high ranked species are highlighted in grey .....</b>	<b>79</b>
<b>Appendix D. Oral history interviews.....</b>	<b>82</b>
<b>Appendix E. Field Key to grassland vegetation types in the San Joaquin Valley and Carrizo Plain.....</b>	<b>86</b>
<b>Appendix F. Alliance descriptions.....</b>	<b>100</b>
<i>Amsinckia (menziesii, tessellata)</i> Alliance .....	100
<i>Avena (barbata, fatua)</i> Semi-Natural Stands.....	106
<i>Bromus (diandrus, hordeaceus)–Brachypodium distachyon</i> Semi-Natural Stands.....	108
<i>Bromus carinatus</i> Provisional Alliance .....	115
<i>Bromus rubens–Schismus (arabicus, barbatus)</i> Semi-natural Stands.....	117
<i>Centaurea (melitensis, solstitialis)</i> Semi-natural Stands.....	121
<i>Centromadia (pungens)</i> Alliance .....	123
<i>Distichlis spicata</i> Alliance.....	125
<i>Elymus elymoides</i> Provisional Alliance .....	129
<i>Eriogonum (elongatum, nudum)</i> Alliance .....	131
<i>Eschscholzia (californica)</i> Alliance .....	133
<i>Frankenia salina</i> Alliance .....	137
<i>Isocoma acradenia</i> Alliance .....	141
<i>Juncus arcticus (var. balticus, mexicanus)</i> Alliance.....	144
<i>Lasthenia californica–Plantago erecta–Vulpia microstachys</i> Alliance.....	146
<i>Lasthenia fremontii–Distichlis spicata</i> Alliance .....	159
<i>Lasthenia fremontii–Downingia (bicornuta)</i> Alliance.....	164
<i>Layia fremontii–Achyrrachaena mollis</i> Alliance .....	166
<i>Leymus cinereus</i> Alliance .....	169
<i>Leymus triticoides</i> Alliance.....	171
<i>Lupinus benthamii–Chorizanthe membranacea</i> Provisional Alliance.....	174
<i>Madia elegans</i> Alliance .....	177
<i>Monolopia (lanceolata)–Leptosyne (calliopsidea)</i> Alliance .....	179
<i>Nassella cernua</i> Alliance.....	183
<i>Nassella pulchra</i> Alliance .....	185
<i>Plagiobothrys nothofulvus</i> Alliance.....	187
<i>Poa secunda</i> Alliance .....	191
<i>Salvia carduacea</i> Provisional Alliance.....	196
<i>Sporobolus airoides</i> Alliance.....	198
<i>Trifolium variegatum</i> Alliance .....	202

**FIGURES**

Page

**Figure 1.** Grassland survey locations and focus regions for project in California. This includes NRCS-funded surveys from 2010–2012 as well as compiled grassland surveys that were used in comprehensive floristic classification analysis. .... 3

**Figure 2.** Grassland site names and NRCS-funded survey locations..... 4

**Figure 3.** Average values for species richness and abundance of native and non-native species sampled within spring and summer across one year. Significant differences ( $p < 0.05$ ) are denoted by a \* .....11

**Figure 4.** Average values for species richness and abundance of native and non-native species sampled in nine locations across three years in the Carrizo Plain. ....12

**Figure 5.** Average change in species richness and abundance sampled between five different years and 2012. Values represent the difference over time within re-sampled plots.....13

**Figure 6.** NMS ordination joint plot diagram with an overlay of Vegetation Group Code by number/symbol for 555 surveys. The angles / lengths of the vectors indicate direction and strength of the correlation with the ordination axes. ....22

**Figure 7.** NMS ordination diagrams showing the vegetation groups with an environmental variable overlay and depicting annual precipitation. The size of the survey point symbolizes the value for annual precipitation (larger = more rainfall).....24

**Figure 8.** NMS ordination diagrams showing the vegetation groups with an environmental variable overlay. Four plant species are highlighted and the size of the survey point is proportional to the abundance value for that species (larger = species present at higher cover). .....25

**Figure 9.** NMS ordination diagram and joint plot depicting the relationship between surveys and significant species. The angles / lengths of the vectors indicate the direction and strength of the correlation with the ordination axes. Species codes refer to *Aira caryophyllea* (AICA), *Bromus hordeaceus* (BRHO2), *Bromus rubens* (BRMA3), *Erodium botrys* (ERBO), *Erodium cicutarium* (ERCI6), *Juncus bufonius* (JUBO), *Hypochaeris glabra* (HYGL2) and Moss (2MOSS). ....26

**Figure 10.** Pilot mapping area with field survey point locations.....29

**Figure 11.** Vegetation delineation and legend in mapping area. ....30

## TABLES

	Page
<b>Table 1.</b> Environmental variables tested for correlations with vegetation survey data. Data types contain both quantitative (Q) and categorical (C) variables. ....	7
<b>Table 2.</b> Vegetation samples conducted in 2011–2012 at rangeland sites. ....	9
<b>Table 3.</b> Plant communities containing listed, sensitive plant species with the number of occurrences denoted per association. Codes for site names are: CARR (Carrizo Plain National Monument), CHAN (Chance Ranch), CYRL (Cyril Smith Trust), LOKE (Lokern), ROMI (Rominger Ranch), SEMI (Semitropic Ridge). ....	10
<b>Table 4.</b> Bakersfield weather station rainfall by water year and the “norm” or average precipitation level based on data from 1889–present. Also displayed is the average species richness per 100 m <sup>2</sup> plot and the average relative percent cover of native species. An * indicates a significant difference ( $p < 0.05$ ) between a given value and the norm. ....	14
<b>Table 5.</b> Herbaceous Vegetation Classification with alliances and associations hierarchically nested per the National Vegetation Classification System (NVCS). An * denotes a new type not previously published in <i>A Manual of California Vegetation</i> (Sawyer et al. 2009). ....	16
<b>Table 6.</b> List of sites with seasonal and/or annual revisits, including the alliance type(s) that were classified per site and the number of times the survey location(s) were visited (2–5). ....	19
<b>Table 7.</b> Coefficients of determination for the correlations between NMS ordination distances and distances in the original n-dimensional space. ....	21
<b>Table 8.</b> Pearson and Kendall Correlations for environmental variables of three NMS Ordination Axes. Significant correlations for each axis are highlighted in bold. ....	21
<b>Table 9.</b> Vegetation classification Group names and codes used in the ordination diagrams. ....	23
<b>Table 10.</b> Layers and tables in the ArcGIS geodatabase for the grassland pilot map. ....	28
<b>Table 11.</b> A comparison of vegetation type and acreage between the CNPS fine scale vegetation map and a 1998 GAP mapping effort. ....	28

## **EXECUTIVE SUMMARY**

California Native Plant Society (CNPS) has completed a project with funding from both Natural Resources Conservation Service (NRCS) and CNPS to assess grassland vegetation types and invasive plants on grazing lands in the Great Valley and the Carrizo Plain National Monument of California across a three-year timeframe. Field survey data were compiled and analyzed statistically to develop a vegetation classification and to assess intra- and inter-annual changes of grassland communities across an environmental gradient. More than 200 new vegetation samples from 2011–2012 were classified at the alliance and association levels. Along with these samples, hundreds of existing grassland surveys from related vegetation projects were compiled and analyzed to categorize a large array of data in the region. A floristic key and descriptions were developed for 60 herbaceous associations nested within 30 alliances. Repeat sampling within and across years revealed that the stability of species composition and abundance varied regionally; the most fluctuation was noted in the semi-desert regions of the San Joaquin Valley and Carrizo Plain. By sampling across a north-south gradient with variation in precipitation and temperature, and monitoring across three years, we gained insight into differences in plant community composition both by location and season, and by annual climatic variation. Non-native and invasive plant species were analyzed from each site visited within the study area, and control measures and management recommendations are presented for high-risk invasive species. Additionally, we have compiled detailed site summaries, conducted extensive oral-history grazing interviews, assembled management recommendations for invasive species within areas visited across 2011–2012, and assessed a pilot fine-scale vegetation mapping effort across 10,000 acres in the Carrizo Plain National Monument.

## **ACKNOWLEDGEMENTS**

### **Funding**

National Resources Conservation Service – CA Office, Conservation Innovation Grant (CIG)  
California Native Plant Society – Matching in-kind and cash donations for the CIG project

### **Field Staff**

Jennifer Buck-Diaz in 2010–2012, Rebecca Crowe in 2011–2012, Betsy Harbert in 2010,  
Suzanne Harmon in 2010, California Native Plant Society

### **Donated Grassland Datasets Provided By**

California Department of Fish and Wildlife – San Joaquin Valley and southern Sierra foothills  
surveys from 2008

California Native Plant Society Chapter Surveys – El Dorado and Red Bud Chapters  
Independent Consultant and Botanist, Carol Witham

The Nature Conservancy, Dr. Sasha Gennet – Mt. Hamilton Range

University of California, Berkeley Range Ecology Lab – CA State Parks Grassland Assessment

University of California, Davis, Dr. M.G. Barbour – Vernal Pool Upland Relevés

## INTRODUCTION

The Natural Resources Conservation Service (NRCS) awarded a Conservation Innovation Grant to the California Native Plant Society (CNPS) in 2010 to continue work on a project to (1) establish baseline knowledge about natural grasslands and invasive plants on grazing lands in California, and (2) apply monitoring tools to evaluate inter-annual changes of grassland communities across an environmental gradient. This grant builds upon a pilot project completed under a previous Conservation Innovation Grant awarded in 2009. Our field study from 2010 to 2012 has focused on the Great Valley and Carrizo Plain, which encompass a wide range of herbaceous communities from productive annual and perennial grasslands to sparse alkali flats.

Herbaceous vegetation in the Great Valley and Carrizo Plain was targeted for a number of reasons: 1) grassland habitats support a high diversity of plant and animal species, 2) intact rangelands are threatened by conversion to high intensity agriculture and residential housing development, and 3) the remaining grassland habitats within the Great Valley and adjacent areas are poorly described in the literature and research. CNPS has worked closely with partners, including the California Rangeland Trust, Center for Natural Lands Management and NRCS, to locate high quality, privately-held ranchlands which are currently or were previously grazed and had little to no existing survey data available.

The primary objective of this study was to establish baseline knowledge of natural grasslands, associated plant communities, and invasive plant threats on grazing lands in California. CNPS is developing and applying new tools to monitor, categorize, and map grassland resources on rangelands, which can be used by land managers for resource management and habitat protection. In producing a rangeland vegetation classification and assessing a pilot vegetation map, CNPS has focused the following tasks: 1) coordinated with land managers to access lands, 2) conducted field surveys and monitoring, including summer and inter-annual revisits, to confirm vegetation types, 3) compiled and classified data to define vegetation alliances and associations, 4) analyzed patterns within and between seasons across 3 years and 4) field-verified the digitized vegetation/habitat features within a fine-scale map.

In classifying vegetation data, we have categorized the grassland types at the alliance and association levels, which are the two finest levels of the National Vegetation Classification hierarchy (FGDC 2008, Jennings et al. 2009) and *A Manual of California Vegetation* (Sawyer et al. 2009). These classification levels are floristically and environmentally defined, and are used to denote plant community types that occur within the major ecological regions of the nation. The NVC supports the development and use of a consistent national vegetation classification to produce uniform statistics about vegetation resources across the nation, based on vegetation data gathered at local, regional or national levels (FGDC 2008). This classification and floristic description of vegetation types can also be useful in updating and expanding the NRCS ecological site descriptions for the Great Valley and Carrizo Plain.

We chose to map in detail a portion of the Carrizo Plain National Monument because several sensitive and listed species occur there and are dependent on the grassland and shrubland communities. The map assessment included ground truthing of floristic vegetation type, total cover, shrub cover, herb cover and site impacts (including any changes in habitat noted between 2010 and 2011). Revisits confirmed the accuracy and stability of certain mapped vegetation types, while others shifted composition over time. An accurate vegetation map provides a baseline, floristic dataset for this region and will allow for detailed assessment, modeling, and management of plant species, vegetation, and wildlife habitat resources.

## **METHODS**

### **Study area**

The study area is located within the California Rangeland Conservation Coalition focus area and includes both the Great Valley Ecoregion (USDA) as well as the Carrizo Plain – a region covering more than 12 million acres of California (Figure 1).

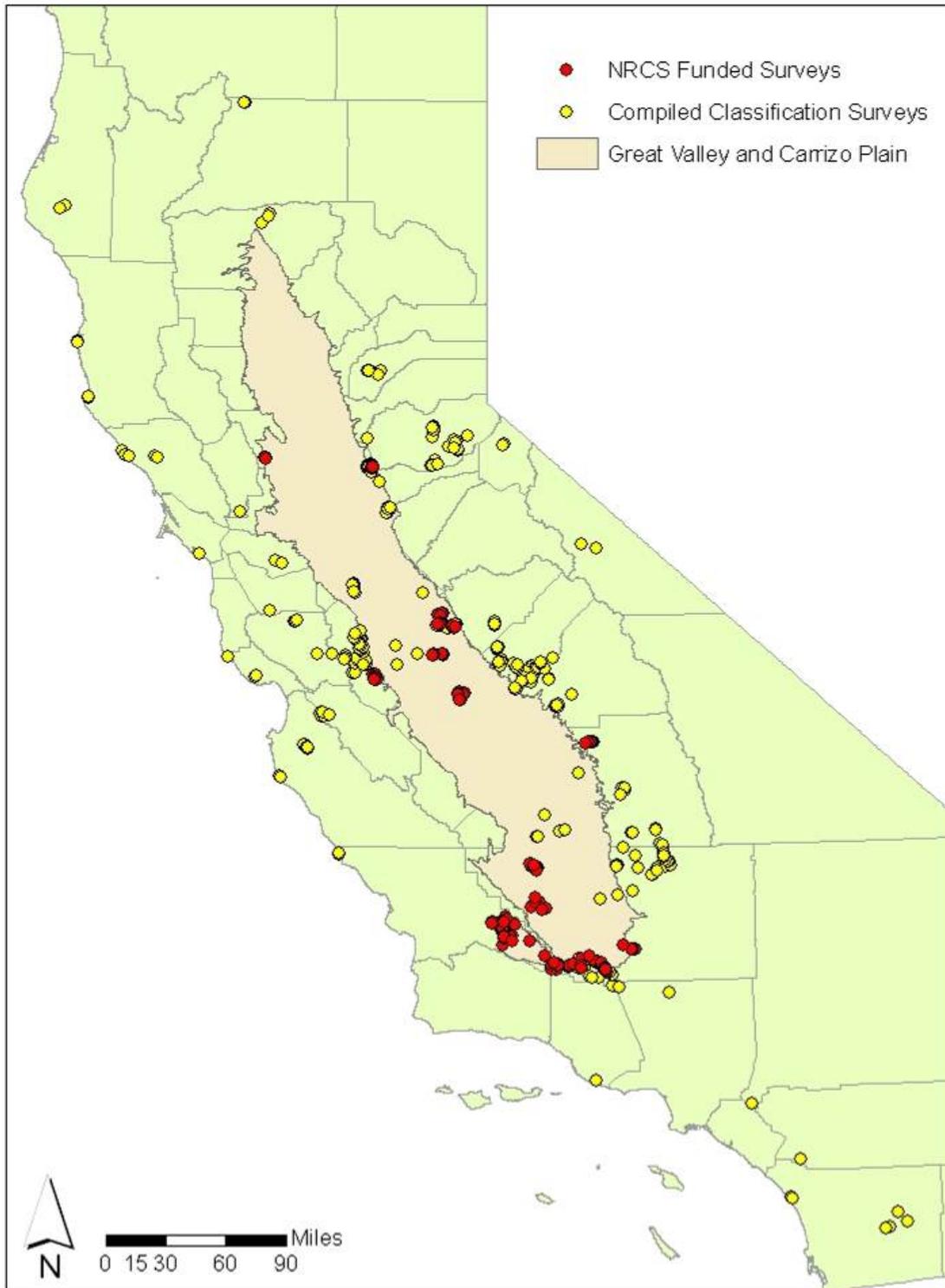
Sites were generally selected for sampling to capture the range and variation in grassland vegetation types within this vast study area. In addition to surveys collected in 2011–12 through the current NRCS CIG project, CNPS staff also compiled grassland data from other sources including the Great Valley, the Carrizo Plain National Monument and surrounding regions of the state. Site access was granted through our partners, and thirteen different sites in 2011–12 were visited and/or revisited (Figure 2).

### **Field Sampling and Classification**

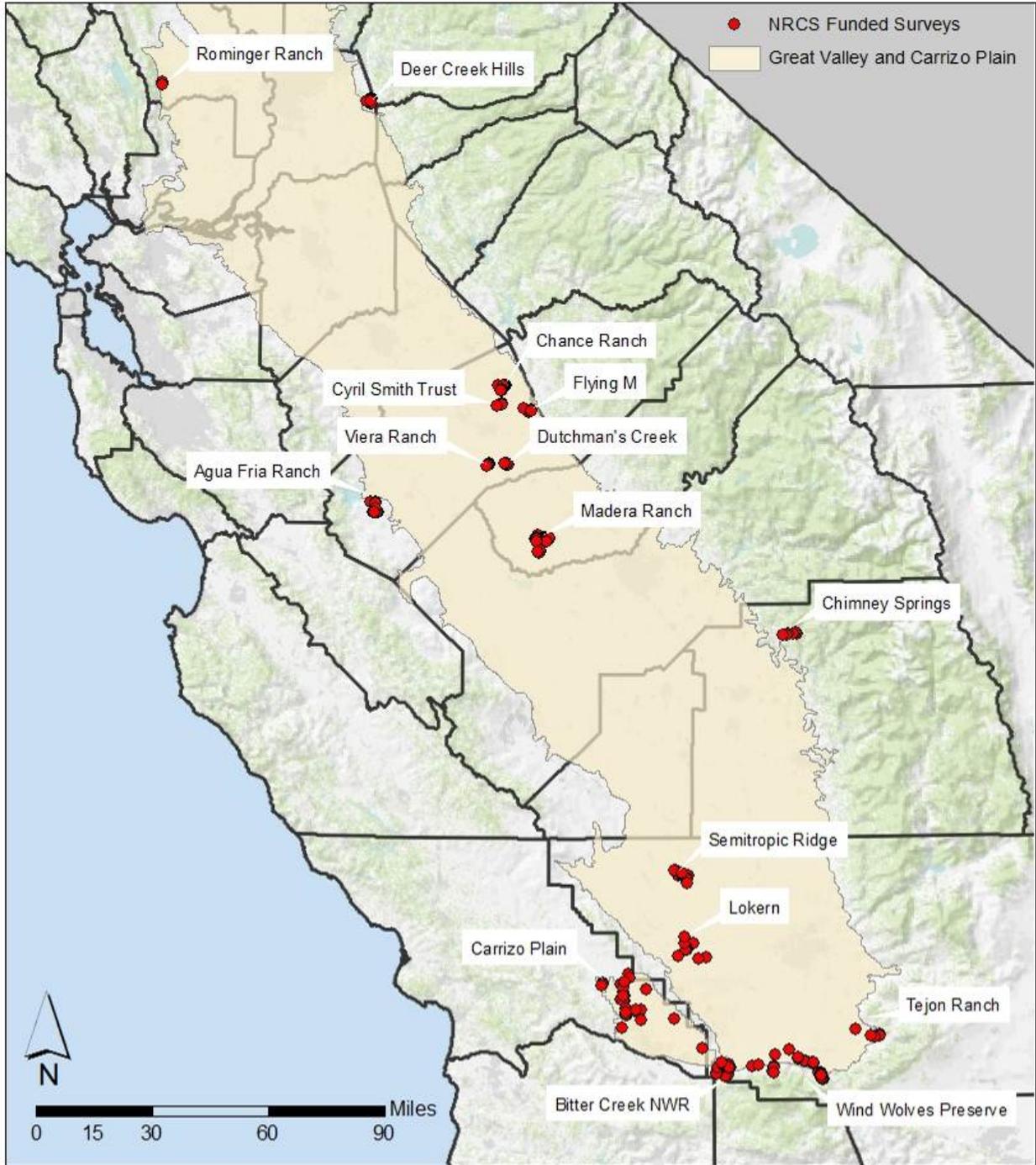
The CNPS vegetation relevé protocol and field form was used for conducting field surveys from 2010–12 (Appendix A), plus separate estimates were made for relative percent cover of forbs and graminoids. The relevé method is plot-based and can be used for both classifying and mapping of vegetation at a fine-scale. This protocol uses vegetation stands as the basic sampling and mapping unit. A stand is defined as an area of vegetation that has both compositional and structural integrity and represents a relatively homogeneous vegetation type that repeats across the landscape. A representative plot is selected within a homogeneous stand and field forms are completed to record both vegetation and environmental data.

A stratified approach was used to determine site locations; initial areas were pre-selected using soils, geology and hydrology variables known to correlate with vegetation patterns. CNPS ecologists then subjectively placed plots within different zones to represent homogeneous stands of the different grassland vegetation types observed at each of the sites visited. Plots were 100 m<sup>2</sup> in size. Field data included recording the date of sampling, GPS location, environmental characteristics (microtopography, substrate, soil texture, slope, aspect, ground surface characteristics, disturbance type and intensity), vegetation structure (cover and height of the tree, shrub and herb layers, plus total vegetation cover), plant species composition and cover, site history, and field-assessed alliance and association names. Additionally, four digital photos were taken in cardinal directions at the southwest corner of each plot, and one photo was taken diagonally across the plot. Soil samples were collected from the A horizon and are stored in bags labeled with the plot ID for future analyses. Unknown plant specimens collected during the field season were identified using the Jepson Manual and other currently accepted taxonomic keys. Specimens will be submitted to the University of California, Davis Herbarium for accession. The vegetation data were then entered into a custom MS Access database and field photos were digitally archived.

To evaluate variation within communities, a subsample of existing field surveys were re-visited both within years (spring and summer) and between years. Surveys were prioritized first by number of inter or intra-annual revisits; plots with more than one survey had a higher priority. Further prioritization was done in stratifying plots by vegetation type and by unique biophysical units (BPU) defined through an existing gradient-directed analysis to ensure a range of ecological variation.



**Figure 1.** Grassland survey locations and focus regions for project in California. This includes NRCS-funded surveys from 2010–2012 as well as compiled grassland surveys that were used in comprehensive floristic classification analysis.



**Figure 2.** Grassland site names and NRCS-funded survey locations.

The PC-ORD software suite of classification and ordination tools was used to generate multivariate analyses such as Cluster Analysis and Indicator Species Analysis (McCune and Mefford 1997). These analyses were employed to order vegetation surveys into groups related by their species composition and abundance, so that a formalized classification of community types could be created. The final analysis used Sorensen distance and flexible beta linkage method at -0.25 (McCune and Grace 2002). This cluster analysis technique was based on abundance (cover) values translated to seven different classes using the following modified Braun-Blanquet (1932) cover categories: 1=<1%, 2=1–5%, 3=>5–15%, 4=>15–25%, 5=>25–50%, 6=>50–75%, 7=>75%.

The resulting floristic classification of alliances and associations follows the hierarchical National Vegetation Classification System (Jennings et al. 2009) and Manual of California (Sawyer et al. 2009). Data compiled in the Great Valley and Carrizo Plain region were principally used to define the association composition and membership rules; however, pre-existing classifications and floras were consulted to locate analogous classifications or descriptions of vegetation, including the recent Great Valley Ecoregion vegetation classification (Buck-Diaz et al. 2012).

An association is defined by a group of samples that have similar dominant and characteristic species in the overstory and other important or indicator species, whereby these species are distinctive for a particular environmental setting. A set of similar associations is grouped hierarchically to the next higher level in the classification, the alliance level. These are grouped subsequently into the NVC hierarchy levels of Group, MacroGroup, Division, on upwards to Formation, Sub-class and Class.

## Stand Tables

Following the development of a classification and key, association-level stand tables were generated. They were based on field data and available literature. Scientific and common names of plants follow Baldwin et al. (2012) and USDA-NRCS (2013).

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

1. **Cover:** The primary metric used to quantify the importance/abundance of a particular species or a particular vegetation layer within a survey. It was measured by estimating the aerial extent of the living plants, or the "bird's-eye view" looking from above for each category. In this vegetation classification project, cover is assessed using the concept of "porosity" or foliar cover rather than "opaque" or crown cover. Thus, field crews were trained to estimate the amount of shade produced by the canopy of a plant or a stratum by taking into account the amount of shade it casts, whereby the cover estimates exclude the openings it may have in the interstitial spaces (e.g., between leaves or branches). This is assumed to provide a more realistic estimate of the actual amount of cover cast by the individual or stratum, which, in turn relates to the actual amount of light available to individual species or strata beneath it.
2. **Relative cover:** Refers to the amount of the surface of the plot or stand sampled that is covered by one species (or physiognomic group) as compared to (relative to) the amount of surface of the plot or stand covered by all species (in that group). Thus, 50 percent relative cover means that half of the total cover of all species or physiognomic groups is composed of the single species or group in question. Relative cover values are proportional numbers and, if added, total 100 percent for each stand (sample).
3. **Absolute cover:** Refers to the actual percentage of the ground (surface of the plot or stand) that is covered by a species or group of species. For example, *Eschscholzia californica* covers between 5 percent and 10 percent of the stand. Absolute cover of all species or groups if added

in a stand or plot may total greater or less than 100 percent because it is not a proportional number.

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

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

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

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

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

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

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

10. **Shrub:** Is normally a multi-stemmed woody plant that generally has several erect, spreading, or prostrate stems and that is usually between 0.2 meters and 5 meters tall, giving it a bushy appearance. Definitions are blurred at the low and the high ends of the height scales. At the tall end, shrubs may approach trees based on disturbance frequencies (e.g., old-growth re-sprouting chaparral species such as *Cercocarpus betuloides*, *Heteromeles arbutifolia*, *Prunus ilicifolia*, *Sambucus mexicana (nigra)* etc., may frequently attain “tree size”). At the low end, woody perennial herbs or sub-shrubs of various species are often difficult to categorize into a consistent life-form; usually sub-shrubs (per USDA-NRCS 2013) were categorized in the “shrub” category.

11. **Herbaceous plant:** Is any vascular plant species that has no main woody stem-development, and includes grasses, forbs, and perennial species that die-back seasonally.

12. **Cryptogam:** Is a nonvascular plant or plant-like organism without specialized water or fluid conductive tissue (xylem and phloem). Includes mosses, lichens, liverworts, hornworts, and algae.

13. **Con, Avg, Min, Max, C, D, cD:** A species table is provided at the end of each association (or alliance) description. The “Con” column provides the overall constancy value for each species within all rapid assessments and relevés classified as that vegetation type. The constancy values are between 0 and 100. Species that occurred with greater than 20% constancy and at least 0.1% average cover are listed in the table. The “Avg” column provides the average cover value for each species, as calculated across all samples in that vegetation type. The “Min” and “Max” values denote the minimum and maximum values for estimated cover of species listed in the table. The other coded columns refer to whether each taxon is Characteristic (C), Dominant (D), and Co-dominant (cD) in the association with these terms defined above.

## Environmental Data and Analysis

A number of environmental variables were compiled and analyzed (Table 1). Two data types are represented in this table: quantitative variables (Q) are numerical measurements that can be ranked or arranged in a meaningful linear sequence, while categorical variables (C) can provide qualitative statements about group membership (McCune and Mefford 1997). For example, categorical variables represent assigned classification names such as Group and MacroGroup while species richness represents a quantitative measurement. Categorical variables were used as an overlay on ordination diagrams to visually assess patterns, while quantitative variables were used to interpret correlations along ordination axes.

Some environmental variables were collected in the field (e.g. UTM's) along with species composition and cover data, while other variables were obtained by intersecting GPS coordinates with GIS layers. Shapefiles used in the generation of environmental variables include a fire perimeter layer capturing known fires between 1878 and 2010, accessed through the California Department of Forestry and Fire Protection's Fire and Resource Assessment Program (FRAP), climate data averaged from 1971 to 2000 available through the PRISM Climate Group at Oregon State University, and digital elevations extracted from a statewide DEM layer.

A variety of analyses were performed to test for significant correlations between species cover/constancy and environmental factors. Analysis tools from the PC-ORD software suite (McCune and Mefford 1997) were used, including the Mantel test and Non-metric Multidimensional Scaling (NMS). No transformations of environmental variables were used in these analyses.

**Table 1.** Environmental variables tested for correlations with vegetation survey data. Data types contain both quantitative (Q) and categorical (C) variables.

Data Type	Variable Name	Metadata
C	DbaseID	Key identifier Database number
C	GroupCode	Final Group Level Code (NVCS)
C	MacroCode	Final MacroGroup Level Code (NVCS)
Q	UTME	Final GPS Easting coordinates in UTM, field reading
Q	UTMN	Final GPS Northing coordinates in UTM, field reading
Q	N_spp	Species Richness (count of species in plot)
Q	Elev_DEM	Elevation value in meters - extracted from DEM layer
Q	Richness	Species Richness calculated from analysis plant list
Q	YrSinceFire	Number of years since last fire (per FRAP fire perimeters)
Q	MinTemp	PRISM data - Minimum annual temperature
Q	MaxTemp	PRISM data - Maximum annual temperature
Q	AnnPrec	PRISM data - Average annual precipitation
Q	Rel%Native	Percent relative cover of native plant species

## **Grazing Management Interviews**

Oral-history interviews were conducted to record the specific management strategies used by ranchers on all sites visited. The questionnaire used was originally developed by Carol Witham for the Sacramento Valley Conservancy (Witham, 2004) with some modifications specific to this project. See below for a list of interview questions regarding current grazing practices.

- Are you aware of the NRCS Environmental Quality Incentives Program? If so, are you currently eligible to participate in this program?
- How many acres is the parcel?
- What type of livestock operation do you run? If cattle; cow/calf or stockers?
- What are the typical dates when you bring your cows onto the parcel and then when do you take them off?
- What is your typical stocking rate?
- Do you practice any kind of rest or rotation grazing? Please describe.
- Do you provide supplemental feed when they are on winter pasture? What kind of supplemental feed do you use?
- Do you do any physical measurements of residual dry matter (RDMs) or use other estimates of remaining forage?
- Have you ever used the parcel in question as year round pasture?
- Do you currently, or have you ever, use fertilizer, pesticides, rodenticides, or herbicides on this parcel? Please describe.
- Have you noticed any major changes over the years in the quality or quantity of forage or the rangeland in general?
- Are there other weeds you have a problem with? How do you combat them?
- Have you ever planted or seeded the parcel in question in an attempt to improve forage? What was planted and what kind of success/failure did you have?

## RESULTS

### Basic Species Data

Field sampling efforts in the spring seasons of 2011–2012 resulted in 149 plot-based surveys collected in the Great Valley and Carrizo Plain region. Surveys were completed during peak spring bloom, between mid-March and May. Additionally, 52 surveys were visited and/or re-sampled in mid-June to capture seasonal variation in plant species, for a total of 201 surveys. The sampling for this project was conducted at thirteen different sites within the priority region (Table 2).

**Table 2.** Vegetation samples conducted in 2011–2012 at rangeland sites.

Site Name	Number of Spring Samples	Number of Summer Samples	Total
Agua Fria Ranch	12	0	12
Bitter Creek NWR	15	7	22
Carrizo Plain	34	25	59
Deer Creek Hills	11	2	13
Dutchman's Creek	6	0	6
Flying M Ranch	4	0	4
Lokern Preserve	6	0	6
Madera Ranch	20	0	20
Rominger Ranch	4	0	4
Semitropic Ridge	10	0	10
Tejon Ranch	2	0	2
Vieira Ranch	5	0	5
Wind Wolves	20	18	38
<b>TOTAL</b>	<b>149</b>	<b>52</b>	<b>201</b>

The 2011–2012 NRCS-funded surveys detected 448 taxa, which were typically identified to the species level. Generic names were used when vascular plant species were not identified to species and for non-vascular taxa (i.e., Cryptogamic crust, Moss, Lichen, and Liverwort). Appendix B provides a complete list of scientific and common names for all taxa identified in the 2011–2012 vegetation surveys and also reports the sites in which each species was found. Five sensitive plant species were identified, and are listed in Table 3 along with the plant communities in which they occurred (CNPS 2013).

Out of the 448 species identified, 100 species were identified as non-native to California. Of these 100 species, 11 are ranked as limited, 16 are ranked as moderate and 5 are ranked as high per the California Invasive Plant Council's Invasive Plant Inventory. This ranking system takes into account a species ecological impact, invasive potential and ecological distribution. Some of the ranked species identified within this study have the potential to become highly invasive and if left uncontrolled can alter the ecology of native habitats by displacing native species, reducing species diversity, and displacing native wildlife.

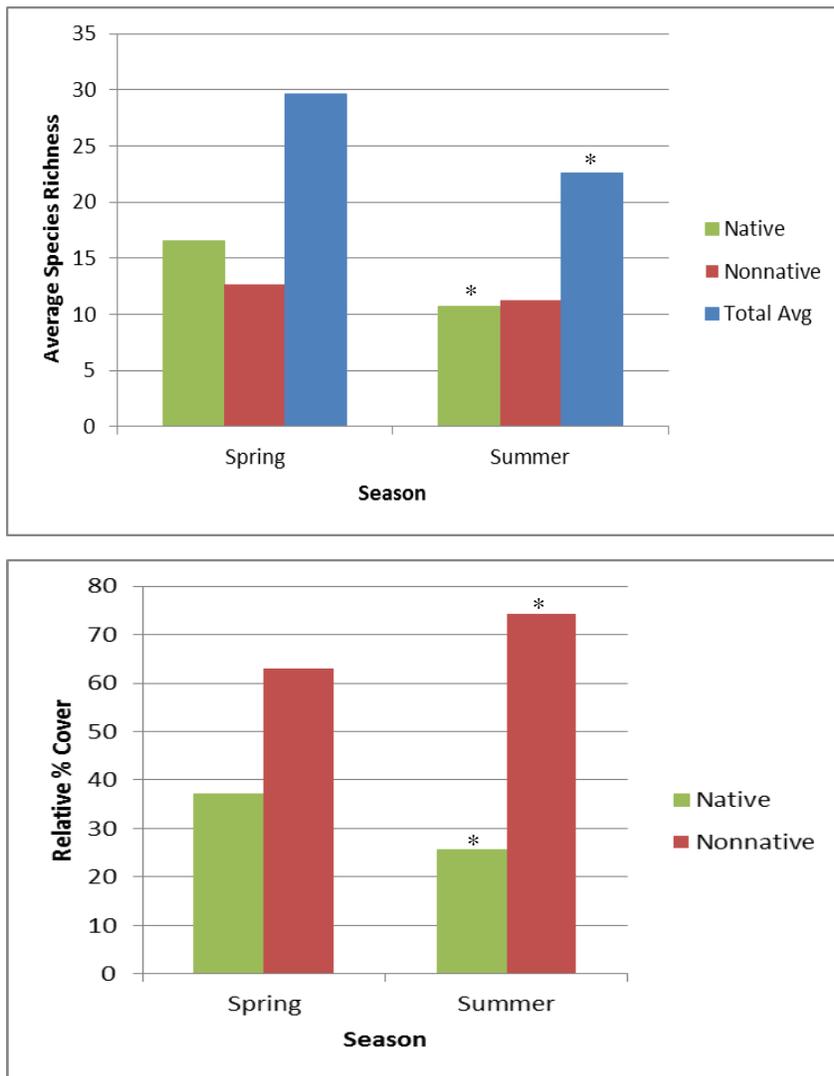
10 **Table 3.** Plant communities containing listed, sensitive plant species with the number of occurrences denoted per association. Codes for site names are: CARR (Carrizo Plain National Monument), CHAN (Chance Ranch), CYRL (Cyril Smith Trust), LOKE (Lokern), ROMI (Rominger Ranch), SEMI (Semitropic Ridge).

Scientific Name	Alliance	Association	n-Sp	n-Assoc	Site
<i>Atriplex vallicola</i>	<i>Lasthenia californica–Distichlis spicata</i>	<i>Atriplex vallicola–Lasthenia ferrisiae–Lepidium jaredii</i>	2	3	CARR
<i>Delphinium recurvatum</i>	<i>Centromadia (pungens)</i>	<i>Centromadia pungens–Lepidium dictyotum</i>	1	29	SEMI
	<i>Distichlis spicata</i>	<i>Distichlis spicata–Annual grasses</i>	1	4	CARR
<i>Eremalche parryi</i> ssp. <i>kernensis</i>	<i>Lasthenia californica–Plantago erecta–Vulpia microstachys</i>	<i>Layia pentachaeta–Plagiobothrys (canescens)</i>	1	6	LOKE
<i>Hesperervax caulescens</i>	<i>Bromus (diandrus, hordeaceus)–Brachypodium distachyon</i>	<i>Hypochaeris glabra–Vulpia bromoides</i>	1	22	ROMI
	<i>Lasthenia californica–Plantago erecta–Vulpia microstachys</i>	<i>Lasthenia californica–Plagiobothrys acanthocarpa–Medicago polymorpha</i> Provisional	4	11	CHAN
	<i>Lasthenia fremontii–Downingia (bicornuta)</i>	<i>Eryngium (vaseyi, castrense)</i>	1	7	CYRL
<i>Layia munzii</i>	<i>Distichlis spicata</i>	<i>Distichlis spicata</i>	1	13	CARR
	<i>Distichlis spicata</i>	<i>Distichlis spicata–Annual grasses</i>	1	4	CARR
	<i>Lasthenia californica–Plantago erecta–Vulpia microstachys</i>	<i>Lasthenia (californica, gracilis)</i>	1	8	CARR
	<i>Poa secunda</i>	<i>Monolopia stricta–Poa secunda</i>	3	7	CARR

Appendix C is a list of all the Cal-IPC ranked invasive species occurring within our 2011–2012 surveys. Information is also provided on reference sources leading to control and management of these species.

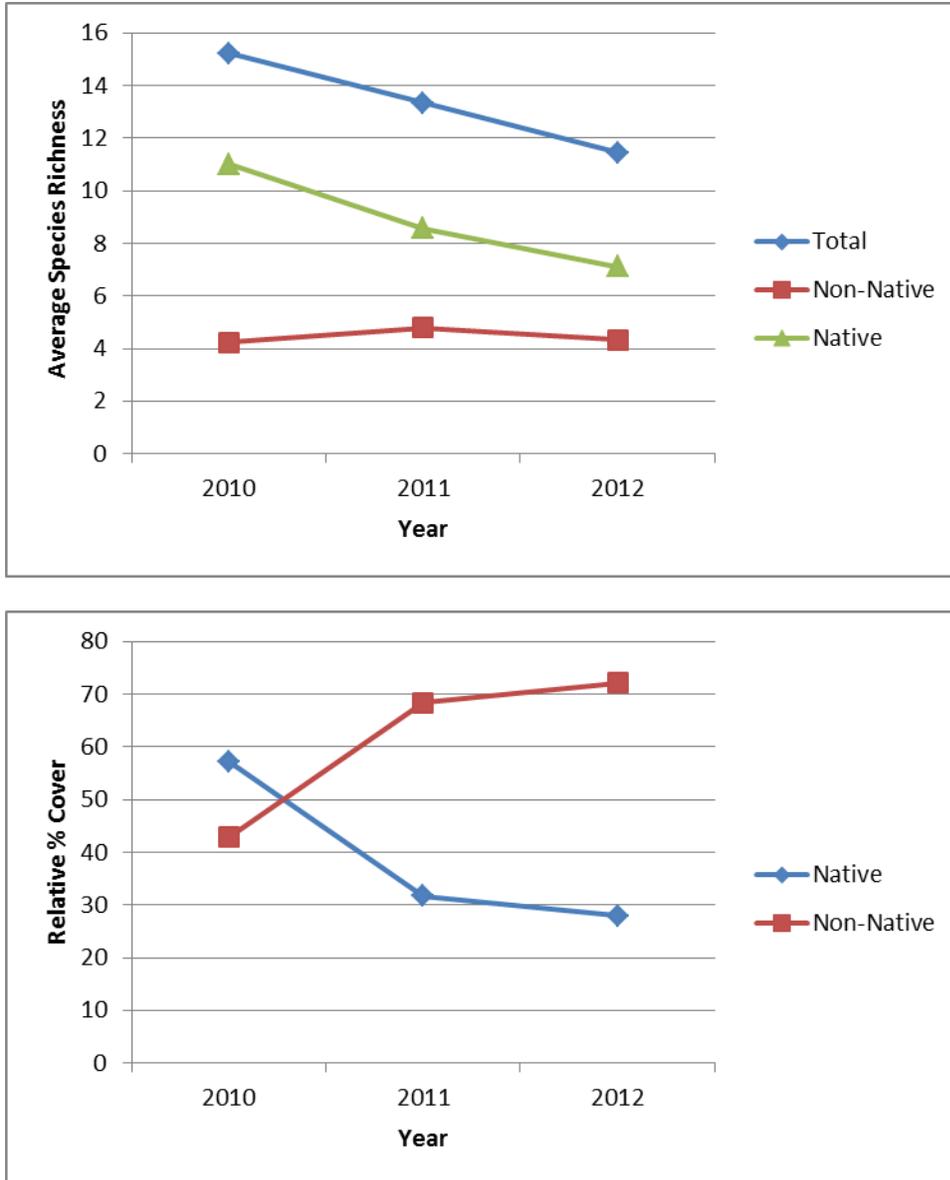
### Revisit Analyses

Across 6 sites, a total of 48 surveys were visited both in the spring and in the summer of one year. As displayed in Figure 3, seasonal analyses reveal that summer surveys detected significantly fewer native species as well as fewer overall species ( $p < 0.05$ ) than spring surveys in the 100 m<sup>2</sup> plots. The richness of non-native species did not change significantly in the two seasons. Summer surveys also captured significantly less relative abundance of native plants ( $p = 0.012$ ) than in spring surveys.



**Figure 3.** Average values for species richness and abundance of native and non-native species sampled within spring and summer across one year. Significant differences ( $p < 0.05$ ) are denoted by a \*.

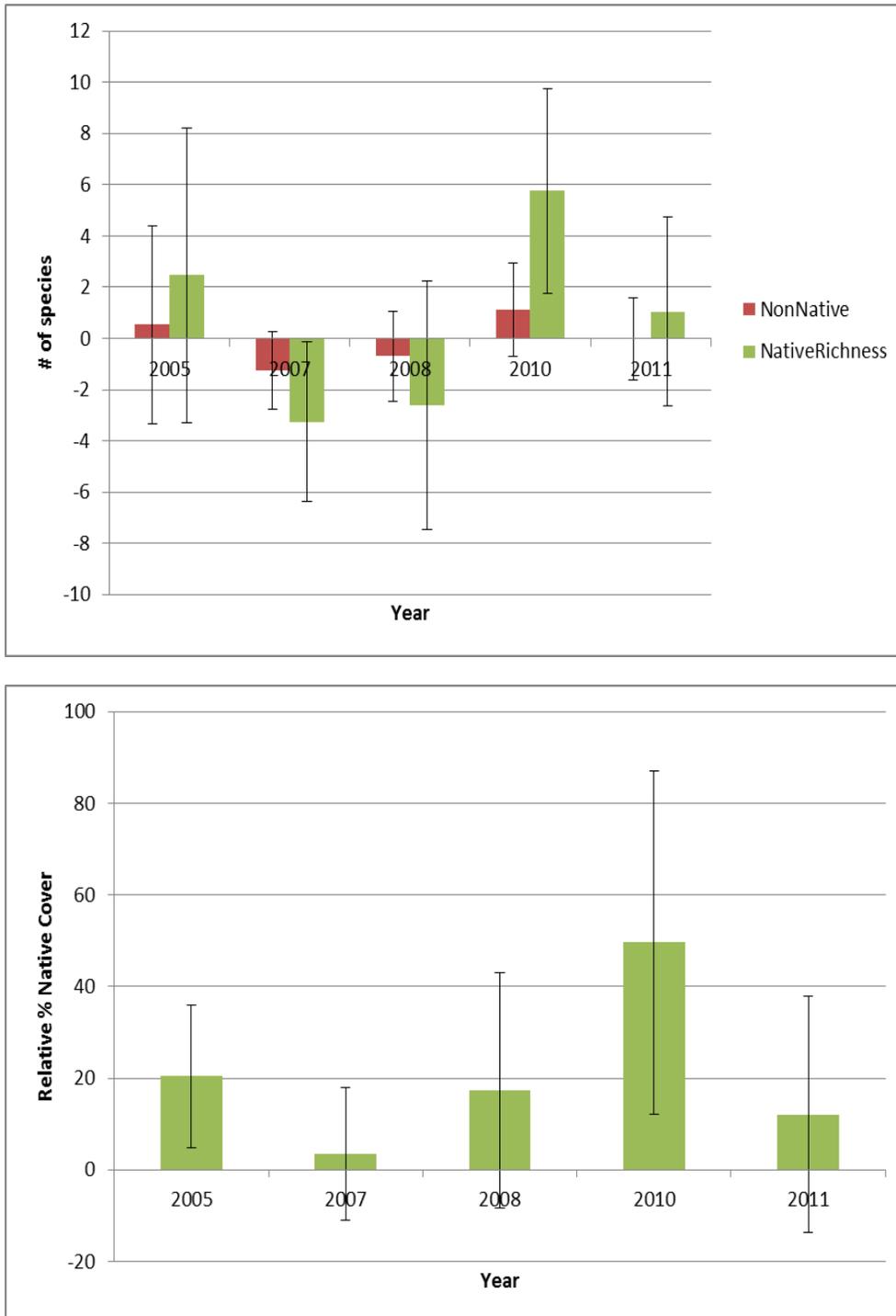
In addition, we analyzed annual variation within grassland vegetation. We noted a decrease in the average species richness of native plants across 3 years in the Carrizo Plain while the non-native species richness remained fairly steady (n=9 surveys). The average relative percent cover of native species was high in 2010 but decreased across 2011 and 2012 (Figure 4).



**Figure 4.** Average values for species richness and abundance of native and non-native species sampled in nine locations across three years in the Carrizo Plain.

In analyzing additional surveys sampled across different years, we compared the species richness and cover between a given year and 2012. The average number of native species detected in 2005, 2010 and 2011 was higher when compared to the number of natives detected in the same plots sampled in 2012, and the average number of natives was lower in 2007 and

2008 when compared to the number in 2012. However, the relative percent cover of native species was higher across all five other years when compared to cover recorded in 2012, with 2010 showing the highest relative percent cover across all years (Figure 5).



**Figure 5.** Average change in species richness and abundance sampled between five different years and 2012. Values represent the difference over time within re-sampled plots.

Next, we calculated the average species richness and the average relative percent cover of native species by water year in order to correlate the influence of precipitation on these factors (Table 4). Surveys collected in the spring and summer of 2012 exhibited a significantly lower relative percent of native species cover ( $p$ -value = 0.00025) when rainfall was 80% of normal levels. The spring of 2010 was notable for wildflower displays and the average plot had significantly higher species richness than the norm ( $p$  = 0.01) when rainfall was just slightly over normal levels. While precipitation levels were more than one and a half times more than normal for the water year of 2010–2011, there was not a corresponding jump in species richness or a significant increase in relative cover of native species.

**Table 4.** Bakersfield weather station rainfall by water year and the “norm” or average precipitation level based on data from 1889–present. Also displayed is the average species richness per 100 m<sup>2</sup> plot and the average relative percent cover of native species. An \* indicates a significant difference ( $p < 0.05$ ) between a given value and the norm.

Water Year	Rainfall Total	% of Avg Rainfall	Avg Richness	Avg Rel % Native
2009-10	7.1	110	22.0*	45.1
2010-11	10.33	160	18.0	44.5
2011-12	4.93	80	17.9	28.4*
<b>Norm</b>	<b>6.49</b>	<b>100</b>	<b>19.2</b>	<b>40.3</b>

### Vegetation Classification Analysis

More than 830 surveys were compiled by CNPS staff from a number of sources to develop an eco-regionally based grassland classification of the Great Valley and Carrizo Plain region. The compiled surveys include 201 from the current NRCS-CIG effort (2011–2012), 104 from the previous NRCS-CIG project (2009–2010), 69 from the San Joaquin Valley (2008), 203 from the southern Sierra Nevada foothills (2008–2010), 76 from the northern Sierra Nevada foothills (2005), 59 from the Mt. Hamilton Range (2008), 45 from UC Berkeley Range Ecology Lab (2008), 12 from the Barbour vernal pool team (2001–2003), and 69 from CNPS Chapter efforts (2007–2012).

All surveys were classified to the alliance and association level, building upon previous analyses funded by NRCS-CIG (2009–10) as well as other vegetation classification projects in this region, including the recent vegetation classifications from the Great Valley (Buck-Diaz et al. 2012) and the Carrizo Plain National Monument (Buck-Diaz and Evens 2011). This report focuses on vegetation types funded through NRCS and includes 30 herbaceous alliances, within which 60 associations were identified. This classification defines eight new herbaceous alliances and 37 new herbaceous associations not previously published in the *Manual of California Vegetation* (Sawyer et al. 2009). Four alliances and fifteen herbaceous associations are represented with less than ten samples and therefore are considered provisional. These are indicated by “Provisional” following the community type name.

Table 5 contains a summary of the classification and illustrates the habitat diversity occurring within the Great Valley and Carrizo Plain region. This table includes newly documented alliances and associations, including annual types with *Lupinus benthamii*–*Chorizanthe membranacea*, *Madia elegans*, *Monolopia (lanceolata)*–*Leptosyne (calliopsidea)*, and *Salvia carduacea* and perennial types with *Isocoma acradenia*, *Bromus carinatus*, *Eriogonum (elongatum, nudum)*, and *Elymus elymoides*. It also shows a high degree of variation in some alliances, including 10 associations of the *Lasthenia californica*–*Plantago erecta*–*Vulpia microstachys* Alliance and 6 associations of the *Bromus (diandrus, hordeaceus)*–*Brachypodium distachyon* Alliance.

While some vegetation types have been defined with a limited number of surveys, they are listed here to establish names for these types and to allow comparisons to other locations where the plant community may occur. By providing as much information as possible in this classification, future efforts will be able to build upon this knowledge of vegetation within rangeland habitats. A diagnostic key to the alliances and associations and their respective alliance descriptions and summary stand tables are provided in Appendix E and F.

We separately analyzed and classified 240 seasonal and annual revisit surveys; the resulting stability in classification names varied by site and details are available in the respective site summaries of the different properties sampled. Additionally, we have summarized the revisits per site and per alliance sampled (See Table 6). This reveals that some alliances were relatively stable across one or more revisit(s) and that some sites varied more than others in alliance type when resampling occurred. For example, more than half of the revisits at Lokern varied between *Lasthenia californica*–*Plantago erecta*–*Vulpia microstachys* and *Bromus rubens*–*Schismus (arabicus, barbatus)* upon resampling. However, in the Carrizo Plain the *Lasthenia californica*–*Plantago erecta*–*Vulpia microstachys* Alliance appeared more stable between revisits with seven survey locations remaining stable and two changing in classification type upon resampling.

**Table 5.** Herbaceous Vegetation Classification with alliances and associations hierarchically nested per the National Vegetation Classification System (NVCS). An \* denotes a new type not previously published in *A Manual of California Vegetation* (Sawyer et al. 2009).

<b>1. MacroGroup, 2. Group, and 3. Alliance</b>	
<b>4. Association</b>	<b>N-plots</b>
<b>California Annual &amp; Perennial Grassland</b>	
California Annual Grassland	
<i>Amsinckia (menziesii, tessellata)</i>	
<i>Amsinckia (intermedia, menziesii)*</i>	22
<i>Amsinckia tessellata</i> – <i>Erodium cicutarium</i> *	4
<i>Phacelia ciliata</i> Provisional*	2
<i>Phacelia tanacetifolia</i> Provisional*	1
<i>Eschscholzia (californica)</i>	
<i>Eschscholzia californica</i>	11
<i>Lupinus bicolor</i> Provisional*	6
<i>Lasthenia californica</i> – <i>Plantago erecta</i> – <i>Vulpia microstachys</i>	
<i>Erodium cicutarium</i> – <i>Vulpia microstachys</i> *	2
<i>Lasthenia (californica, gracilis)</i>	8
<i>Lasthenia californica</i> – <i>Plagiobothrys acanthocarpa</i> – <i>Medicago polymorpha</i> Provisional*	11
<i>Lasthenia minor</i> Provisional*	2
<i>Layia pentachaeta</i> – <i>Plagiobothrys (canescens)</i> Provisional*	6
<i>Layia platyglossa</i> Provisional*	5
<i>Lepidium nitidum</i> – <i>Trifolium gracilentum</i> – <i>Vulpia microstachys</i> *	6
<i>Pectocarya (linearis, penicillata)*</i>	3
<i>Vulpia microstachys</i> – <i>Lasthenia californica</i> – <i>Sedella pumila</i>	13
<i>Vulpia microstachys</i> – <i>Plantago erecta</i>	16
<i>Lupinus benthamii</i> – <i>Chorizanthe membranacea</i> Provisional*	
<i>Lupinus benthamii</i> – <i>Chorizanthe membranacea</i> Provisional*	9
<i>Madia elegans</i> *	
<i>Madia elegans</i> *	13
<i>Monolopia (lanceolata)</i> – <i>Leptosyne (calliopsidea)*</i>	
<i>Leptosyne calliopsidea</i> – <i>Mentzelia pectinata</i> *	1
<i>Monolopia lanceolata</i> *	4
<i>Plagiobothrys nothofulvus</i>	
<i>Plagiobothrys nothofulvus</i> – <i>Castilleja exserta</i> – <i>Lupinus nanus</i> Provisional*	7
<i>Plagiobothrys nothofulvus</i> – <i>Daucus pusillus</i> – <i>Trifolium microcephalum</i> *	42
<i>Salvia carduacea</i> Provisional*	
<i>Salvia carduacea</i> *	4
<b>California Native Bunchgrass (and Perennial) Grassland</b>	
<i>Eriogonum (elongatum, nudum)*</i>	
<i>Eriogonum nudum</i> Provisional*	4
<i>Isocoma acradenia</i> *	
<i>Isocoma acradenia</i> *	2
<i>Nassella cernua</i>	
<i>Nassella cernua</i> *	14
<i>Nassella pulchra</i>	
<i>Nassella pulchra</i>	9

<b>1. MacroGroup, 2. Group, and 3. Alliance</b>	
<b>4. Association</b>	<b>N-plots</b>
<b>California Semi-natural Grassland &amp; Meadow</b>	
California Semi-natural Grassland & Forb Meadow	
<i>Avena (barbata, fatua)</i>	
<i>Avena barbata</i>	11
<i>Bromus (diandrus, hordeaceus)–Brachypodium distachyon</i>	
<i>Bromus diandrus</i>	15
<i>Bromus hordeaceus–Taeniatherum caput-medusae</i>	6
<i>Bromus hordeaceus–Erodium (botrys)–Plagiobothrys fulvus</i>	28
<i>Bromus hordeaceus–Hordeum spp.–Medicago polymorpha*</i>	13
<i>Bromus hordeaceus–Leontodon taraxacoides*</i>	19
<i>Hypochaeris glabra–Vulpia bromoides</i> Provisional*	22
<i>Bromus rubens–Schismus (arabicus, barbatus)</i>	
<i>Bromus rubens</i>	9
<i>Schismus barbatus</i>	8
<i>Centaurea (melitensis, solstitialis)</i>	
<i>Centaurea melitensis</i> Provisional*	3
<b>Northern Rocky Mountain-Vancouverian Montane &amp; Foothill Grassland &amp; Shrubland</b>	
Northern Rocky Mountain Lower Montane, Foothill & Valley Grassland	
<i>Bromus carinatus</i> Provisional*	
<i>Bromus carinatus</i> Provisional*	4
<i>Leymus cinereus</i>	
<i>Leymus cinereus</i> Provisional*	10
<i>Elymus elymoides</i> Provisional*	
<i>Elymus elymoides</i> Provisional*	6
<i>Poa secunda</i>	
<i>Monolopia stricta–Poa secunda*</i>	7
<i>Poa secunda–(Elymus sp.)–Clarkia cylindrica*</i>	22
<i>Poa secunda–Bromus rubens*</i>	10
<b>Cool (and Warm) Semi-Desert Alkaline–Saline Wetland</b>	
Intermountain Basins Alkaline–Saline Herb Wet Flat	
<i>Distichlis spicata</i>	
<i>Distichlis spicata</i>	13
<i>Distichlis spicata–Annual grasses</i>	4
<i>Leymus triticoides</i>	
<i>Leymus triticoides</i>	8
<i>Leymus triticoides–Bromus spp.–Avena spp.</i>	8
<i>Sporobolus airoides</i>	
<i>Sporobolus airoides</i>	5
<i>Sporobolus airoides/Allenrolfea occidentalis</i>	1
Intermountain Basins Alkaline–Saline Shrub Wetland	
<i>Frankenia salina</i>	
<i>Frankenia salina</i>	2
<i>Frankenia salina–Distichlis spicata</i>	2
<b>Western North American Vernal Pool</b>	
California Vernal Pool	
<i>Centromadia (pungens)</i>	

<b>1. MacroGroup, 2. Group, and 3. Alliance</b>	
<b>4. Association</b>	<b>N-plots</b>
<i>Centromadia pungens</i> – <i>Lepidium dictyotum</i> *	29
<i>Lasthenia fremontii</i> – <i>Distichlis spicata</i>	
<i>Atriplex vallicola</i> – <i>Lasthenia ferrisiae</i> – <i>Lepidium jaredii</i> *	3
<i>Distichlis spicata</i> – <i>Eryngium castrense</i> Provisional*	3
<i>Hordeum (depressum, leporinum)</i>	7
<i>Lasthenia fremontii</i> – <i>Downingia (bicornuta)</i>	
<i>Eryngium (vaseyi, castrense)</i>	7
<i>Layia fremontii</i> – <i>Achyrrachaena mollis</i>	
<i>Layia fremontii</i> – <i>Achyrrachaena mollis</i>	10
<i>Trifolium variegatum</i>	
( <i>Trifolium variegatum</i> – <i>Vulpia bromoides</i> )– <i>Hypochaeris glabra</i> – <i>Leontodon taraxacoides</i> *	4
<i>Trifolium variegatum</i> – <i>Juncus bufonius</i> *	22
<b>Western North American Temperate Lowland Wet Shrubland, Wet Meadow &amp; Marsh</b>	
Western North American Maritime Lowland Wet Meadow & Herbaceous Seep	
<i>Juncus arcticus</i> (var. <i>balticus</i> , <i>mexicanus</i> )	
<i>Juncus arcticus</i> var. <i>balticus</i>	7

**Table 6.** List of sites with seasonal and/or annual revisits, including the alliance type(s) that were classified per site and the number of times the survey location(s) were visited (2–5).

Site	Alliance (First)	Survey Count for Alliance	Type Varied	Alliance (Second)	2	3	4	5
Bitter Creek NWR	<i>Eschscholzia (californica)</i>	2	No		2			
Carrizo Plain NM	<i>Amsinckia (menziesii, tessellata)</i>	1	No		1			
	<i>Amsinckia (menziesii, tessellata)</i>	2	Yes	<i>Bromus rubens–Schismus (arabicus, barbatus)</i>	2			
	<i>Distichlis spicata</i>	1	No		1			
	<i>Elymus triticoides</i>	1	No					
	<i>Centaurea (melitensis, solstitialis)</i>	1	No		1			
	<i>Eschscholzia (californica)</i>	1	No		1			
	<i>Lasthenia fremontii–Distichlis spicata</i>	1	No		1			
	<i>Lasthenia californica–Plantago erecta–Vulpia microstachys</i>	7	No		1	5		1
	<i>Lasthenia californica–Plantago erecta–Vulpia microstachys</i>	2	Yes	<i>Bromus rubens–Schismus (arabicus, barbatus)</i>	2			
	<i>Salvia carduacea</i> Provisional	1	No		1			
	<i>Stipa cernua</i>	1	No					
	<i>Poa secunda</i>	6	No		5	1		
	<i>Poa secunda</i> (1 visit)	1	Yes	<i>Monolopia (lanceolata)–Leptosyne (calliopsidea)</i> (2 visits)		1		
	<i>Poa secunda</i> (2 visits)	1	Yes	<i>Lasthenia californica–Plantago erecta–Vulpia microstachys</i> (1 visit)		1		
Chance Ranch	<i>Bromus (diandrus, hordeaceus)–Brachypodium distachyon</i>	5	No		5			
	<i>Lasthenia californica–Plantago erecta–Vulpia microstachys</i>	6	No		6			
	<i>Trifolium variegatum</i>	2	No		2			
	<i>Plagiobothrys nothofulvus</i>	1	Yes	<i>Bromus (diandrus, hordeaceus)–Brachypodium distachyon</i>	1			
Deer Creek Hills	<i>Bromus (diandrus, hordeaceus)–Brachypodium distachyon</i>	5	No		2	2	1	
Deer Creek Hills	<i>Layia fremontii–Achyrrachaena mollis</i>	1	No		1			

Site	Alliance (First)	Survey Count for Alliance	Type Varied	Alliance (Second)	2	3	4	5
	<i>Layia fremontii</i> – <i>Achyrrachaena mollis</i> (2 visits)	2	Yes	<i>Bromus (diandrus, hordeaceus)</i> – <i>Brachypodium distachyon</i> (1 visit)		2		
	<i>Plagiobothrys nothofulvus</i>	4	No		2	2		
	<i>Trifolium variegatum</i>	2	No		1	1		
	<i>Trifolium variegatum</i> (1 visit for 2 surveys; 2 visits for 1 survey)	3	Yes	<i>Bromus (diandrus, hordeaceus)</i> – <i>Brachypodium distachyon</i> (1 visit for 2 surveys; 2 visits for 1 survey)	2		1	
Dutchman's Creek	<i>Bromus (diandrus, hordeaceus)</i> – <i>Brachypodium distachyon</i>	2	No		2			
	<i>Amsinckia (menziesii, tessellata)</i>	1	No		1			
	<i>Lasthenia fremontii</i> – <i>Distichlis spicata</i>	1	No		1			
	<i>Centromadia (pungens)</i>	2	No		1	1		
	<i>Sporobolus airoides</i>	1	No		1			
Flying M Ranch	<i>Avena (barbata, fatua)</i>	1	No		1			
	<i>Bromus (diandrus, hordeaceus)</i> – <i>Brachypodium distachyon</i>	1	No		1			
	<i>Layia fremontii</i> – <i>Achyrrachaena mollis</i>	1	No		1			
Lokern	<i>Bromus rubens</i> – <i>Schismus (arabicus, barbatus)</i>	2	No		2			
	<i>Lasthenia californica</i> – <i>Plantago erecta</i> – <i>Vulpia microstachys</i>	3	Yes	<i>Bromus (diandrus, hordeaceus)</i> – <i>Brachypodium distachyon</i>	3			
Semitropic Ridge	<i>Amsinckia (menziesii, tessellata)</i>	1	Yes	<i>Frankenia salina</i>	1			
	<i>Centromadia (pungens)</i>	2	No		2			
	<i>Centromadia (pungens)</i>	2	Yes	<i>Lasthenia californica</i> – <i>Plantago erecta</i> – <i>Vulpia microstachys</i>	2			
	<i>Centromadia (pungens)</i>	1	Yes	<i>Bromus rubens</i> – <i>Schismus (arabicus, barbatus)</i>	1			
	<i>Distichlis spicata</i>	2	No		2			
	<i>Sporobolus airoides</i>	1	No		1			
Tejon Ranch	<i>Plagiobothrys nothofulvus</i>	1	No		1			
Wind Wolves	<i>Eschscholzia (californica)</i>	1	No			1		
	<i>Poa secunda</i>	3	No		3			
	<i>Elymus cinereus</i>	1	No		1			

## Environmental Data and Analysis

The analyses presented here are based on 555 surveys that were selected from the entire compiled dataset because they fit into the 30 alliances and 60 associations documented by this NRCS-CIG project. Analysis tools available in PC-ORD (McCune and Mefford 1997) were used to test significant correlations between species cover/constancy and environmental variables (9 quantitative variables and 2 categorical variables). A significant ( $p=0.002$ ) Mantel Test using Sorensen distances for the species matrix and Euclidean distances for the environmental variable matrix indicated a correspondence between the species patterns and all variables ( $r=0.33$ ).

To detect the significance of individual environmental factors, we interpreted a three-dimensional NMS solution using 555 samples with a final stress of 20.55. The proportion of variance explained along axis 1 of the NMS ordination was 22%, while axis 2 represented an additional 23%. Three axes cumulatively represented 67% of the variance within the dataset (Table 7). R-squared values indicate the strength of ordination axes, and higher values indicate a more significant axis. Environmental variables are correlated with axes and higher  $r$  values indicate a stronger correlation while the sign (positive or negative) indicates the direction of the correlation. The correlation coefficients ( $r$ ) are listed below for each variable (Table 8). Of the 9 quantitative variables analyzed, 5 factors had significant correlations with at least one of the three axes in the NMS ordination analysis ( $r^2>0.20$ ).

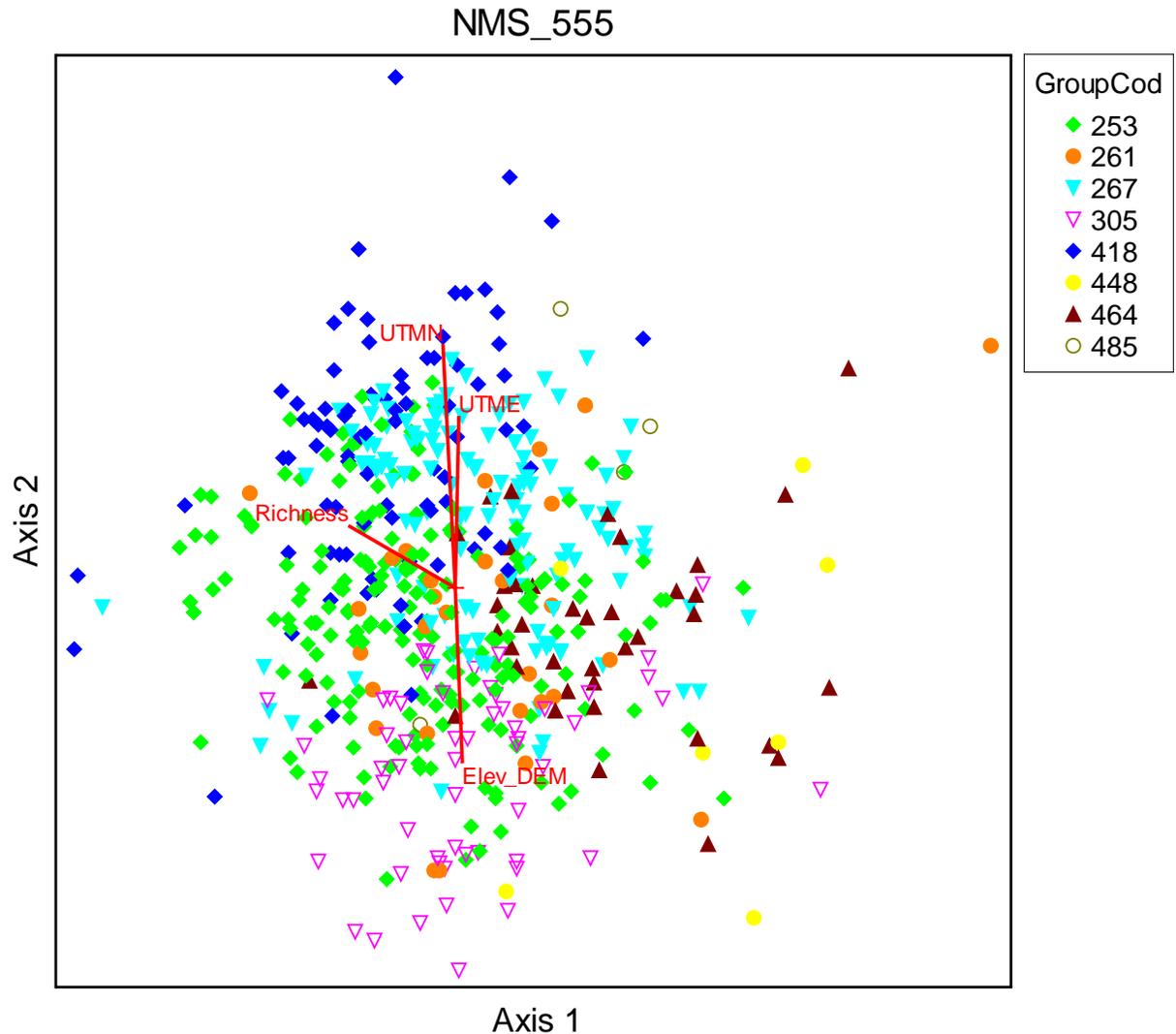
**Table 7.** Coefficients of determination for the correlations between NMS ordination distances and distances in the original n-dimensional space.

Axis	R Squared	
	Increment	Cumulative
1	0.215	0.215
2	0.231	0.446
3	0.228	0.674

**Table 8.** Pearson and Kendall Correlations for environmental variables of three NMS Ordination Axes. Significant correlations for each axis are highlighted in bold.

Axis:	1			2			3		
	r	r-sq	tau	r	r-sq	tau	r	r-sq	tau
YrSinceFire	0.11	0.01	0.09	-0.05	0.00	-0.04	-0.12	0.01	-0.13
<b>AnnPrec</b>	-0.14	0.02	-0.09	0.35	0.13	0.31	<b>0.69</b>	0.47	0.56
MaxTemp	-0.17	0.03	-0.07	0.19	0.04	0.08	-0.33	0.11	-0.22
MinTemp	-0.09	0.01	-0.03	0.41	0.17	0.20	0.09	0.01	0.01
RelNativ	0.00	0.00	-0.08	-0.31	0.10	-0.22	-0.18	0.03	-0.12
<b>Richness</b>	<b>-0.48</b>	0.23	-0.40	0.36	0.13	0.27	0.34	0.11	0.25
<b>Elev_DEM</b>	0.13	0.02	0.06	<b>-0.62</b>	0.38	-0.41	-0.03	0.00	-0.01
<b>UTME</b>	0.10	0.01	0.09	<b>0.61</b>	0.37	0.35	0.36	0.13	0.26
<b>UTMN</b>	-0.17	0.03	-0.11	<b>0.73</b>	0.53	0.58	<b>0.52</b>	0.27	0.30

The ordination diagram was rigidly rotated to align UTM northing along Axis 2 for display purposes (Figure 6). The categorical variable for Vegetation Group is used as a color-coded overlay on the ordination diagram to explore patterns of the classification as it relates to significant quantitative variables; see Table 9 for an index of the Group Codes and Names.



**Figure 6.** NMS ordination joint plot diagram with an overlay of Vegetation Group Code by number/symbol for 555 surveys. The angles / lengths of the vectors indicate direction and strength of the correlation with the ordination axes.

A visual interpretation of the ordination diagram displays clusters of surveys within Groups of the classification (Figure 6). Surveys typed to the Northern Rocky Mountain Lower Montane, Foothill & Valley Grassland Group (305, hollow pink triangles) notably occur together in the lower portion of the diagram which corresponds to the higher elevation grasslands in the southwest region of the San Joaquin Valley, while surveys of the California Vernal Pool Group (418, solid blue diamonds) mostly occurred near the top of the diagram and were mainly collected in the northeast. The California Annual Grassland Group (253, green diamonds) is a

type that is widespread throughout the study area and this is reflected on the scattered pattern throughout the diagram.

**Table 9.** Vegetation classification Group names and codes used in the ordination diagrams.

Group Code	Vegetation Group Name
253	California Annual Grassland
261	California Native Bunchgrass (and Perennial) Grassland
267	California Semi-natural Grassland & Forb Meadow
305	Northern Rocky Mountain Lower Montane, Foothill & Valley Grassland
418	California Vernal Pool
448	Western North American Maritime Lowland Wet Meadow & Herbaceous Seep
464	Intermountain Basins Alkaline–Saline Herb Wet Flat
485	Intermountain Basins Alkaline–Saline Shrub Wetland

Richness (count of plant taxa detected within a stand) was significantly correlated along Axis 1; the most species-rich stands are within the California Vernal Pool Group (418, blue diamonds) and the California Annual Grassland Group (253, green diamonds), and the more depauperate stands are within the Intermountain Basins Alkaline–Saline Herb Wet Flat Group (464, red triangles). Annual precipitation had a significant correlation along Axis 3 ( $r = 0.69$ ); stands of California Annual Grassland Group, California Vernal Pool Group, and California Semi-natural Grassland & Forb Meadow (267, blue triangles) correspond with higher annual precipitation (Figure 7). More detailed patterns of the effects of annual precipitation on these groups are revealed by looking closely at the placement of key species within ordination space.

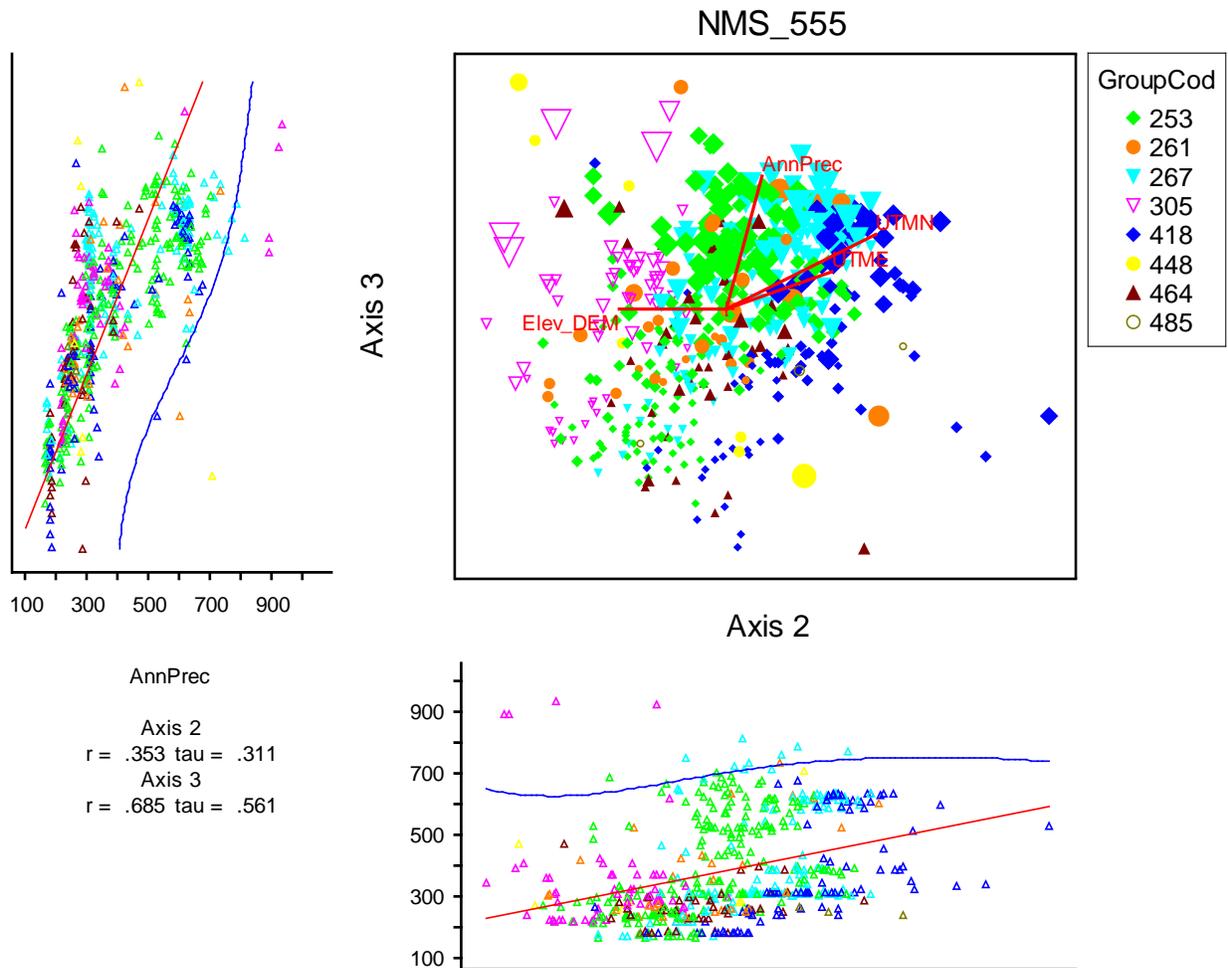
Both native and non-native species follow patterns significantly influenced by annual rainfall, elevation, and position (UTM) within the Great Valley and Carrizo Plain (Figure 8).

*Taeniatherum caput-medusae* was strongly present in the California Semi-natural Grassland & Forb Meadow Group; this species was correlated with lower elevation and higher levels of annual precipitation and was sampled in the northeast section of the study area. Conversely, *Schismus (arabicus, barbatus)* was strongly present in the California Annual Grassland Group and correlates with low levels of annual precipitation; it occurred most frequently in the southwest section of the study area.

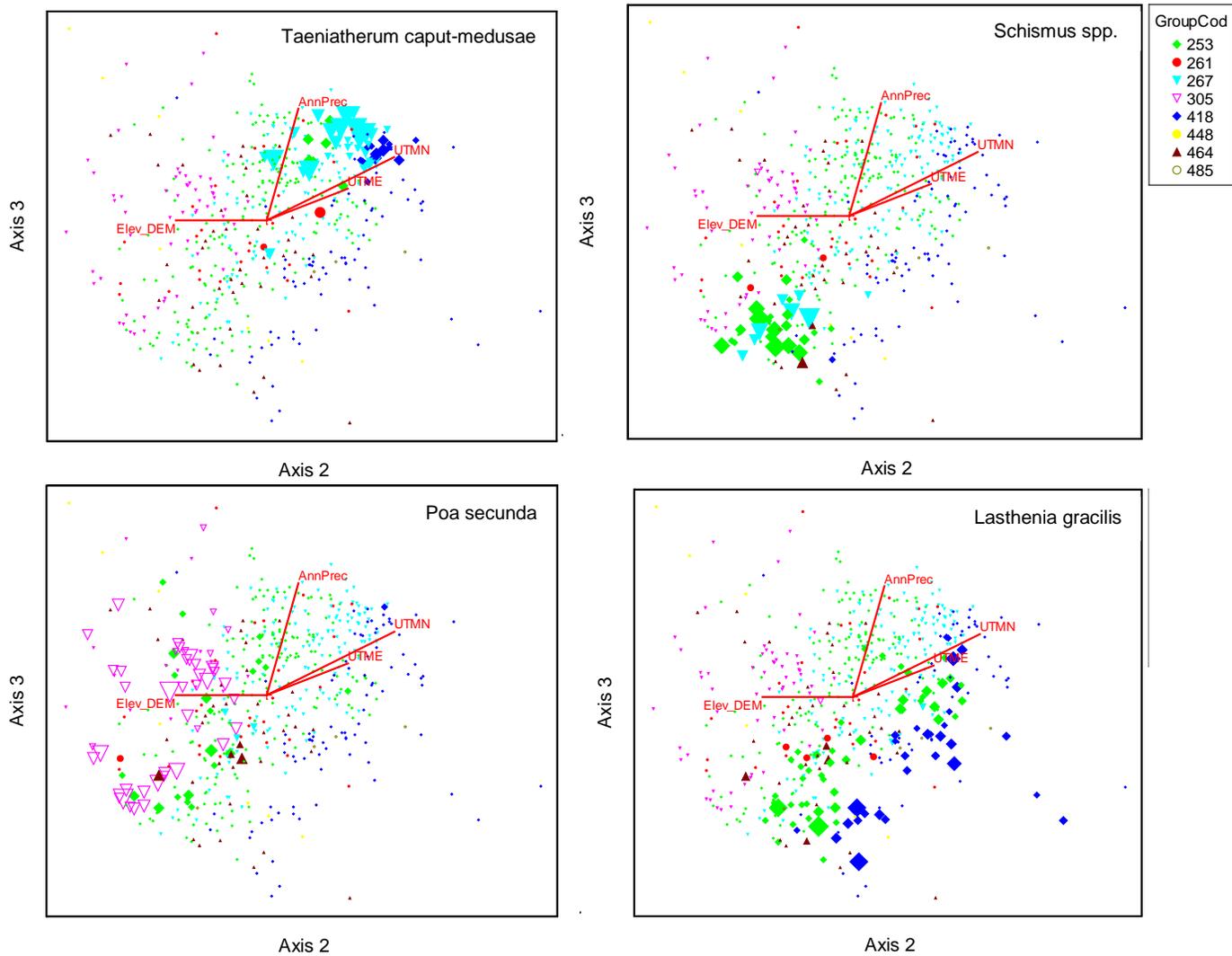
*Poa secunda* was strongly present in the Northern Rocky Mountain Lower Montane, Foothill & Valley Grassland Group (305, hollow pink triangles); this species mainly occurred in the southwest section of the study area and was correlated with higher elevation. *Lasthenia (californica, gracilis)* was representative in both the California Annual Grassland Group and the California Vernal Pool Group. This species was correlated with lower annual precipitation levels and ranged across the north-south gradient.

To further explore patterns of individual species, species were depicted as an overlay on an ordination joint plot diagram (Figure 9). Eight species were significantly correlated with Axis 2 and/or 3 ( $r^2 > 0.20$ ). This includes *Aira caryophyllea*, *Bromus hordeaceus*, *Erodium botrys*, and *Hypochaeris glabra* that are correlated positively with Axis 2, while *Bromus rubens* and *Erodium cicutarium* are correlated negatively with Axis 2. This highlights a pattern of some non-native

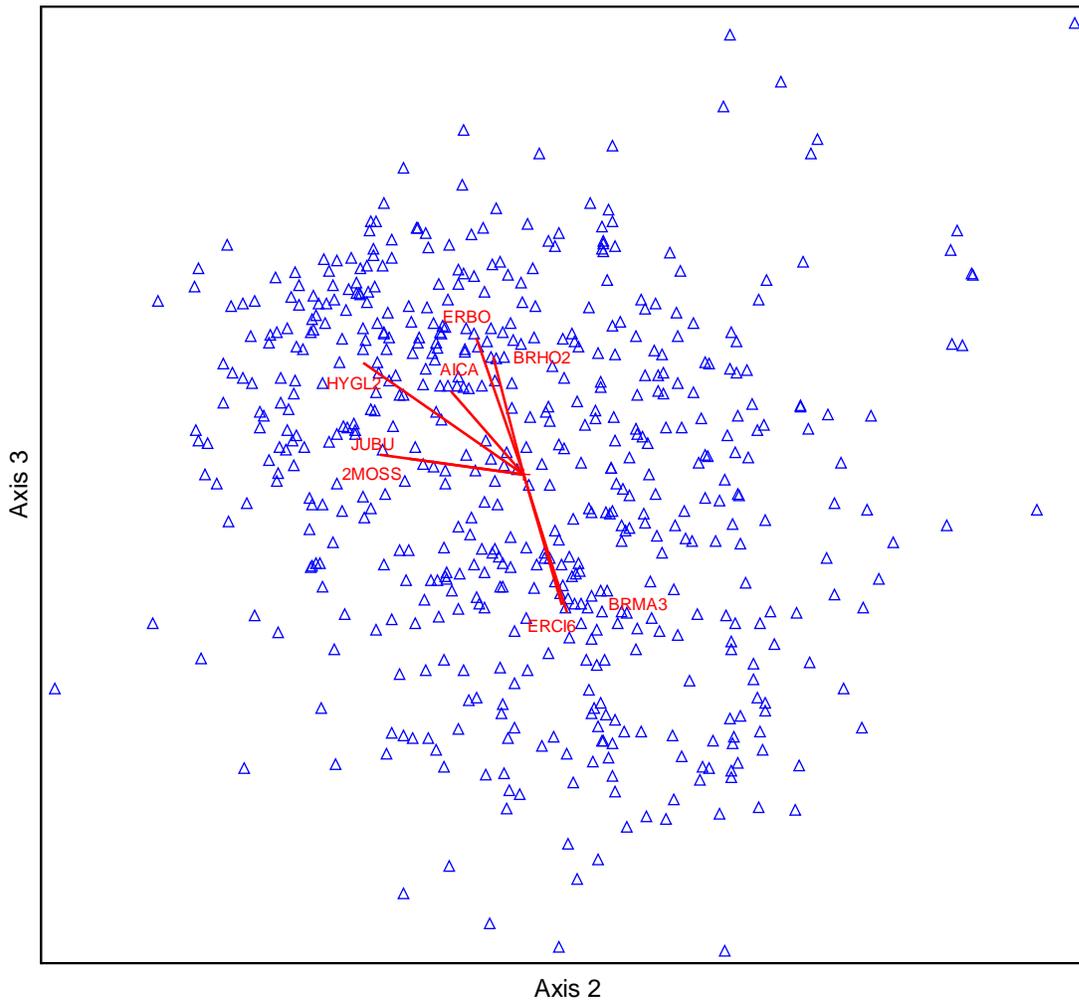
species being correlated with higher annual precipitation in the top portion of the diagram versus lower levels of rainfall along the bottom. This pattern is similar to research done by Janes (1969) who found the dominance of non-native grasses was based on rainfall totals (including *B. rubens* at < 20 cm, *B. diandrus* and *B. hordeaceus* together at 20–80 cm, and *B. hordeaceus* at > 80 cm).



**Figure 7.** NMS ordination diagrams showing the vegetation groups with an environmental variable overlay and depicting annual precipitation. The size of the survey point symbolizes the value for annual precipitation (larger = more rainfall).



**Figure 8.** NMS ordination diagrams showing the vegetation groups with an environmental variable overlay. Four plant species are highlighted and the size of the survey point is proportional to the abundance value for that species (larger = species present at higher cover).



**Figure 9.** NMS ordination diagram and joint plot depicting the relationship between surveys and significant species. The angles / lengths of the vectors indicate the direction and strength of the correlation with the ordination axes. Species codes refer to *Aira caryophylla* (AICA), *Bromus hordeaceus* (BRHO2), *Bromus rubens* (BRMA3), *Erodium botrys* (ERBO), *Erodium cicutarium* (ERCI6), *Juncus bufonius* (JUBO), *Hypochaeris glabra* (HYGL2) and Moss (2MOSS).

## Field Assessment and Vegetation Map Quality Control

A draft vegetation map was delineated across approximately 10,000 acres of the Carrizo Plain under an NRCS Conservation Innovation Grant awarded in 2009 (see Buck-Diaz et al. 2011 for methods). The map files are archived in an ArcGIS 10.0 geodatabase with Table 10 listing the available point and polygon files with metadata for the vegetation map and survey data. The final map includes eleven fine-scale map units, which are mainly at the alliance level (Table 11). A total of 432 polygons were delineated at an average size of 23 acres (9 hectares) per polygon.

After the completion of the draft map in 2010, 48 field verification surveys were collected in spring/summer of 2012. Additionally, 137 field observations or surveys within the map area were previously documented. Overall, 106 of the 432 polygons (25%) were verified in the field covering 68% of the mapped area (Figure 10).

The fine-scale map is displayed in Figure 11. The mapped area includes three native shrub alliances; spiny salt bush (*Atriplex spinifera*), common salt bush (*Atriplex polycarpa*), and iodine bush (*Allenrolfea occidentalis*), which cover about a third of the mapped area. Another third of this region is covered by alkali playa and herbaceous vegetation in the newly defined vernal pool association, *Atriplex vallicola* – *Lasthenia ferrisiae* – *Lepidium jaredii*, which occurs in a system of shallow basins with characteristic white salt deposits harboring numerous rare species. The remaining third of the mapped area includes four native annual and perennial dominated herbaceous communities such as the *Amsinckia (menziesii, tessellata)* Herbaceous Alliance and the *Poa secunda* Herbaceous Alliance. A small invasive stand of tamarisk was also detected.

In addition to vegetation type, the map polygons include attributes for percent vegetation cover by strata (shrub and/or herb) as well as other attributes for different types of disturbances. Some polygons of the same vegetation type are adjacent to each other, and vary in one of these other attributes. This detailed and quantitative site information is useful for habitat monitoring, land management, conservation, and wildlife protection in the Carrizo Plain National Monument.

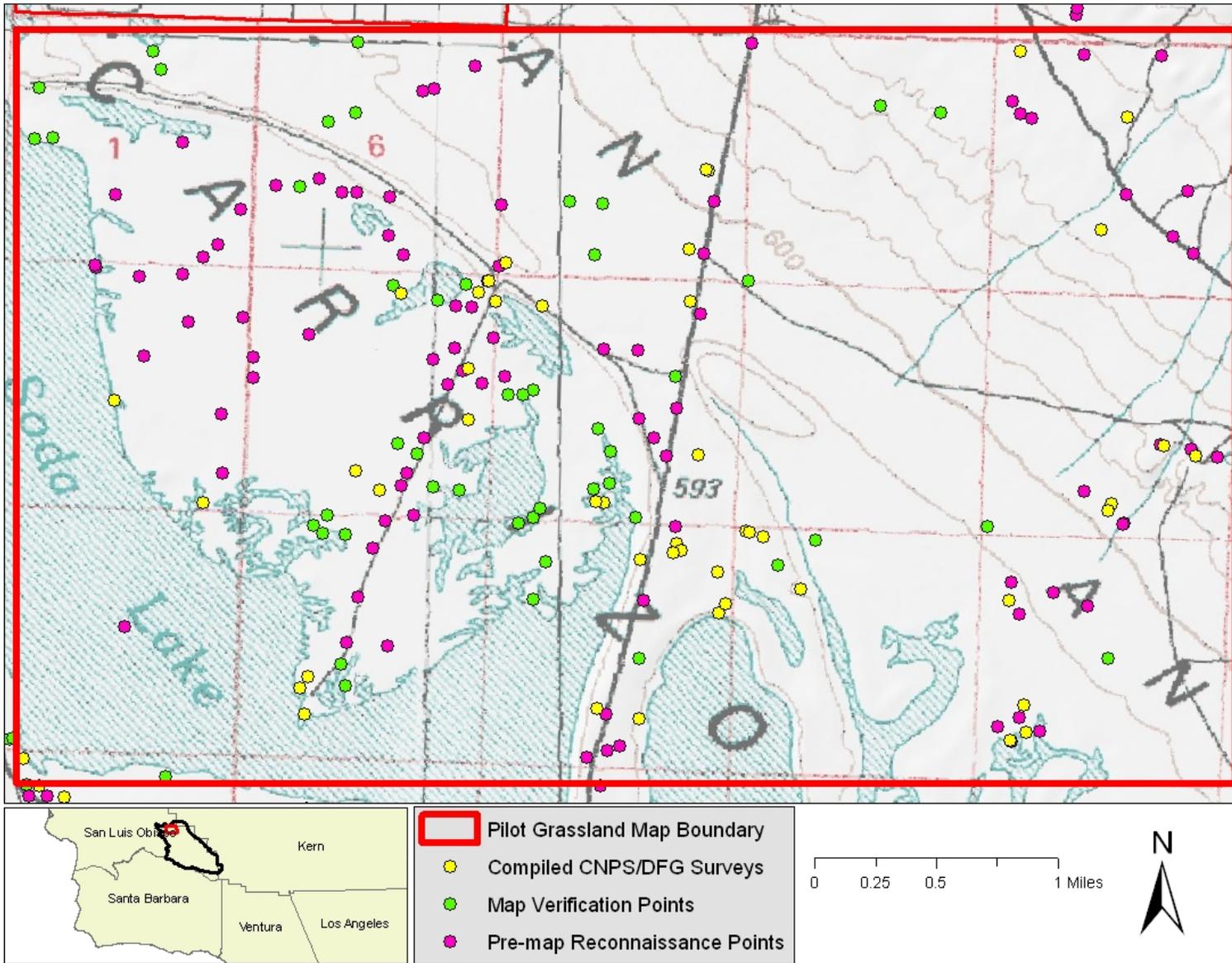
In comparing the current map with a previous 1998 GAP vegetation map for this area, the older GAP map delineated over 1,300 acres of cultivated ground and more than 2,100 acres of non-native annual grassland. The new 2010 map had no cultivated area and only 500 acres were attributed to the broad California Annual and Perennial Grassland Macrogroup, mainly because a variety of native herbaceous types were mappable in areas where the imagery afforded reliable signature recognition (Table 11). Some of the differences between the maps can be attributed to the new map having a more detailed classification with more focus on native annual grassland types, and previously cultivated areas may have now changed to a more natural state.

**Table 10.** Layers and tables in the ArcGIS geodatabase for the grassland pilot map.

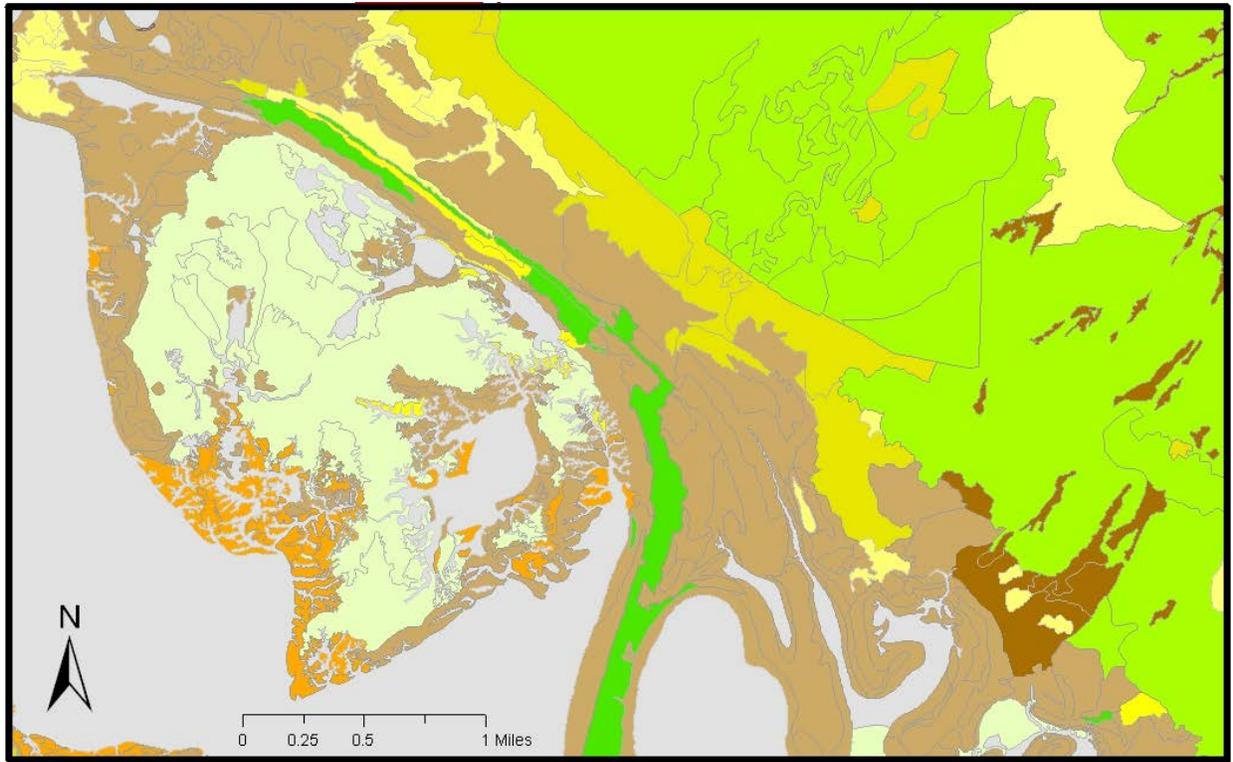
Layer Name	Description
CarrizoNM_FieldVerif_Pts	A point layer of locations of field verification surveys from 2012, which were used to assess the accuracy of the mapping.
CarrizoNM_Final_Obs	A point layer of locations of field observations from 2010/11, which were used to help inform mapping delineation.
CarrizoNM_Final_Plots	A point layer of locations of relevés and rapid assessments collected between 2008 and 2011.
Vegetation_Polygons	A polygon layer of vegetation stands, which were delineated using 1 ft. true color imagery from 2007 as a primary source.

**Table 11.** A comparison of vegetation type and acreage between the CNPS fine scale vegetation map and a 1998 GAP mapping effort.

MAP UNIT	2010 CNPS fine-scale vegetation map Vegetation Type	Acres	1998 GAP map Vegetation Type	Acres
	n/a	0	Cultivated	1,312
2411	<i>Atriplex polycarpa</i> Alliance	217	Interior Coast Range Saltbush Scrub	7
4311	<i>Allenrolfea occidentalis</i> Alliance	250	Valley Sink Scrub	1,245
4312	<i>Atriplex spinifera</i> Alliance	2,229	Valley Saltbush Scrub	2,159
5100	California Annual and Perennial Grassland MacroGroup	534	Non-native grasses	2,108
5111	<i>Amsinckia (menziesii, tessellata)</i> Alliance	2,655	n/a	
5114	<i>Lasthenia californica</i> – <i>Plantago erecta</i> – <i>Vulpia microstachys</i> Alliance	482	n/a	
5115	<i>Monolopia (lanceolata)</i> – <i>Leptosyne</i> <i>(calliopsidea)</i> Alliance	56	n/a	
5122	<i>Poa secunda</i> Alliance	195	n/a	
6313	<i>Atriplex vallicola</i> – <i>Lasthenia ferrisiae</i> – <i>Lepidium jaredii</i> Association	1,055	n/a	
9115	Playa	2,302	Lake	3,145
9141	<i>Tamarix</i> Alliance	0.4	n/a	0
<b>TOTAL ACRES</b>		<b>9,976</b>		<b>9,976</b>



8 Figure 10. Pilot mapping area with field survey point locations.



### Vegetation Type

- Atriplex polycarpa*
- Allenrolfea occidentalis*
- Atriplex spinifera*
- California Annual and Perennial Grassland Macrogroup
- Amsinckia* (*menziesii*, *tessellata*)
- Lasthenia californica* - *Plantago erecta* - *Vulpia microstachys*
- Monolopia* (*lanceolata*)-*Coreopsis* (*calliopsidea*)
- Poa secunda*
- Atriplex vallicola* - *Lasthenia ferrisiae* - *Lepidium jaredii* Association
- Playa
- Tamarix*

**Figure 11.** Vegetation delineation and legend in mapping area.

## Site Summaries from 2011–2012

The thirteen sites selected and sampled in 2011–2012 under this NRCS-CIG project cover a range of climatic, geologic and land-use histories including diverse grazing regimes and management intensities. Grassland resources are summarized by site with detailed information about location, number and types of surveys, as well as information about management and invasive species per the California Invasive Plant Council (Cal-IPC) and other sources.

### AGUA FRIA RANCH

The Agua Fria Ranch is located on the western edge of Merced County and covers just over 3,200 acres of rangeland. Two vegetation ecologists sampled grasslands at this site on April 30–May 1, 2012. We collected twelve grassland surveys ranging from early to late bloom for herbaceous plant species. Eleven of the twelve surveys were taken in dry upland grasslands, generally on moderately steep hillsides. One survey was collected in a vernal swale. We identified 58 plant species (29 native, 29 non-native) with an average richness of 15 species per 100 m<sup>2</sup> plot.

The average absolute cover of native plants within our surveys was 9%, with a range of 1% to 40%. The relative cover of native plants across our surveys averaged 23%, though native species had extremely patchy distributions. Notable native grass species that occurred at low cover include oniongrass (*Melica* sp.), nodding needle grass (*Stipa cernua*), Nevada blue grass (*Poa secunda*), saltgrass (*Distichlis spicata*), and small fescue (*Vulpia microstachys*). Notable native forbs include: blow wives (*Achyrachaena mollis*), wooly milkweed (*Asclepias vestita*), and adobe popcorn flower (*Plagiobothrys acanthocarpus*).

Stands were classified into 9 different herbaceous associations under 9 alliances. More data collection in this region will be helpful to fully define three provisional associations.

Alliance	Association	Survey Count
<i>Avena (barbata, fatua)</i>	<i>Avena barbata</i>	3
<i>Bromus (diandrus, hordeaceus)– Brachypodium distachyon</i>	<i>Bromus hordeaceus–Hordeum spp.–Medicago polymorpha</i>	1
<i>Bromus rubens–Schismus (arabicus, barbatus)</i>	<i>Bromus rubens</i>	1
<i>Centaurea (melitensis, solstitialis)</i>	<i>Centaurea melitensis</i> Provisional	1
<i>Distichlis spicata</i>	<i>Distichlis spicata</i> –Annual grasses	2
<i>Frankenia salina</i>	<i>Frankenia salina–Distichlis spicata</i>	1
<i>Lasthenia californica–Plantago erecta–Vulpia microstachys</i>	<i>Lasthenia californica–Plagiobothrys acanthocarpa–Medicago polymorpha</i> Provisional	1
<i>Lasthenia fremontii–Distichlis spicata</i>	<i>Distichlis spicata–Eryngium castrense</i> Provisional	1
<i>Nassella cernua</i>	<i>Nassella cernua</i>	1
	<b>Total</b>	<b>12</b>

We identified thirteen invasive species during the surveys, including *Avena barbata*, *Bromus diandrus*, *B. hordeaceus*, *B. rubens*, *Centaurea melitensis*, *Erodium cicutarium*, *Hordeum marinum*, *Hypochaeris glabra*, *Lolium perenne*, *Medicago polymorpha*, *Sisymbrium* sp., *Taeniatherum caput-medusae*, and *Vulpia myuros*. While these plants have limited, moderate or high rankings by the California Invasive Plant Council (Cal-IPC), they are very typical plants that occur across the Inner South Coast Ranges and Central Valley.

## BITTER CREEK NATIONAL WILDLIFE REFUGE

The Bitter Creek National Wildlife Refuge, located in the southwest corner of Kern County, is a 14,097-acre refuge managed by the U.S. Fish and Wildlife. The refuge was historically grazed by cattle but is currently ungrazed. Two vegetation ecologists sampled grasslands at this site on April 23–24 and June 10–11, 2011. CNPS collected a total of 22 grassland relevés, two of which were summer revisits of spring surveys. We identified 91 plant species (69 native, 22 non-native), with an average richness of 15 species per 100 m<sup>2</sup> plot. The average relative cover of native plants within our surveys was 23%, with a range of absent to 91%.

Surveys within Bitter Creek were classified into 13 different herbaceous associations under 11 alliances. More data collection in this region will be helpful to fully define four provisional associations and two provisional alliances. Spring and summer plots were treated separately in the classification analysis, however each sample clustered together in the final grouping, thus the two plots maintained the same association name when sampled later in the season. *Claytonia perfoliata* was detected in a spring survey but not in the summer; conversely, new species were noted in the summer revisit, including *Eriogonum* spp., *Croton setigerus*, and *Lactuca serriola*. This site is notable for the diversity and extent of perennial bunchgrass stands.

Alliance	Association	Survey Count
<i>Amsinckia (menziesii, tessellata)</i>	<i>Amsinckia tessellata</i> – <i>Erodium cicutarium</i>	1
<i>Bromus carinatus</i> Provisional	<i>Bromus carinatus</i> Provisional	1
<i>Elymus elymoides</i> Provisional	<i>Elymus elymoides</i> Provisional	1
<i>Eschscholzia (californica)</i>	<i>Eschscholzia californica</i>	5
	<i>Lupinus bicolor</i> Provisional	2
<i>Juncus arcticus</i> (var. <i>balticus</i> , <i>mexicanus</i> )	<i>Juncus arcticus</i> var. <i>balticus</i>	1
<i>Lasthenia californica</i> – <i>Plantago erecta</i> – <i>Vulpia microstachys</i>	<i>Lasthenia (californica, gracilis)</i>	1
<i>Leymus cinereus</i>	<i>Leymus cinereus</i> Provisional	1
<i>Leymus triticoides</i>	<i>Leymus triticoides</i>	1
	<i>Leymus triticoides</i> – <i>Bromus</i> spp.– <i>Avena</i> spp.	1
<i>Monolopia (lanceolata)</i> – <i>Leptosyne (calliopsidea)</i>	<i>Monolopia lanceolata</i>	2
<i>Nassella cernua</i>	<i>Nassella cernua</i>	1
<i>Poa secunda</i>	<i>Poa secunda</i> –( <i>Elymus</i> sp.)– <i>Clarkia cylindrica</i>	4
	<b>Total</b>	<b>22</b>

Of the 22 non-native species detected in our surveys, Bitter Creek NWR had six moderate and two high ranked invasive species. These include *Avena fatua*, *A. barbata*, *Bromus diandrus*, *B. tectorum*, *B. rubens*, *Hirschfeldia incana*, *Hordeum murinum*, and *Vulpia myuros*.

## CARRIZO PLAIN

The Carrizo Plain, located mainly in San Luis Obispo County, is a 240,000 acre National Monument currently managed by the Bureau of Land Management. Some areas within the Carrizo Plain are now closed to livestock grazing; however, a portion of this region has been grazed for the purpose of vegetation management and has been monitored with plots from a cattle grazing study (Christian et al. in prep). Two CNPS vegetation ecologists sampled grasslands at this site on April 4–7 and June 11–13, 2011 and April 2–21 and June 13–14, 2012. CNPS collected 59 grassland relevés across a range of soil types and aspects. These surveys display a great deal of native diversity; we identified 165 plant species (131 native, 34 non-native), with an average richness of 15 species per 100 m<sup>2</sup> plot. The average relative cover of native plants within our surveys was 48%, with a range of 22% to 90%.

Surveys within the Carrizo Plain were classified into 25 different herbaceous associations under 12 alliances. More data collection in the region will be helpful to fully define four provisional associations and one provisional alliance in this area. Seven surveys were classified to a more generic group level. Spring, summer, and annual revisit plots were treated separately in the classification analysis. Many samples clustered together in the final grouping and more than half the plots maintained the same association name when sampled later in the season or in subsequent years. The classification name of some samples varied over time due to indicator species blinking in and out. Future analyses on a larger dataset could calculate temporal persistence in order to focus the classification on more stable indicator species for this region.

Alliance	Association	Survey Count
<i>Amsinckia (menziesii, tessellata)</i>	<i>Amsinckia tessellata</i> – <i>Erodium cicutarium</i>	3
	<i>Phacelia ciliata</i>	2
<i>Bromus rubens</i> – <i>Schismus (arabicus, barbatus)</i>	<i>Bromus rubens</i>	5
	<i>Schismus barbatus</i>	1
California annual grassland group	California annual grassland group	7
<i>Centaurea (melitensis, solstitialis)</i>	<i>Centaurea melitensis</i> Provisional	2
<i>Distichlis spicata</i>	<i>Distichlis spicata</i>	3
	<i>Distichlis spicata</i> –Annual grasses	2
<i>Eschscholzia (californica)</i>	<i>Eschscholzia californica</i>	2
<i>Lasthenia californica</i> – <i>Plantago erecta</i> – <i>Vulpia microstachys</i>	<i>Erodium cicutarium</i> – <i>Vulpia microstachys</i>	2
	<i>Vulpia microstachys</i> – <i>Plantago erecta</i>	8
	<i>Lasthenia (californica, gracilis)</i>	2
	<i>Lasthenia minor</i> Provisional	2
<i>Lasthenia californica</i> – <i>Plantago erecta</i> – <i>Vulpia microstachys</i>	<i>Layia pentachaeta</i> – <i>Plagiobothrys (canescens)</i> Provisional	1

Alliance	Association	Survey Count
	<i>Layia platyglossa</i> Provisional	5
	<i>Lepidium nitidum</i> – <i>Trifolium gracilentum</i> – <i>Vulpia microstachys</i>	2
	<i>Pectocarya (linearis, penicillata)</i>	3
<i>Lasthenia fremontii</i> – <i>Distichlis spicata</i>	<i>Atriplex vallicola</i> – <i>Lasthenia ferrisiae</i> – <i>Lepidium jaredii</i>	3
<i>Leymus triticoides</i>	<i>Leymus triticoides</i>	1
	<i>Leymus triticoides</i> – <i>Bromus</i> spp.– <i>Avena</i> spp.	2
<i>Monolopia (lanceolata)</i> – <i>Leptosyne (calliopsidea)</i>	<i>Monolopia lanceolata</i>	2
<i>Poa secunda</i>	<i>Monolopia stricta</i> – <i>Poa secunda</i>	7
	<i>Poa secunda</i> –( <i>Elymus</i> sp.)– <i>Clarkia cylindrica</i>	2
	<i>Poa secunda</i> – <i>Bromus rubens</i>	7
<i>Salvia carduacea</i> Provisional	<i>Salvia carduacea</i>	3
<i>Nassella cernua</i>	<i>Nassella cernua</i>	3
	<b>Total</b>	<b>59</b>

Of the 34 non-native species detected in our surveys, the Carrizo Plain had eight moderate and two high ranked invasive species. These include *Avena barbata*, *A. fatua*, *Bromus diandrus*, *B. rubens*, *B. tectorum*, *Centaurea melitensis*, *Hirschfeldia incana*, *Hordeum murinum*, *Sisymbrium irio*, and *Vulpia myuros*.

*Bromus rubens* is not tolerant to shade, thus it has a competitive disadvantage in undisturbed areas. Burning and over-grazing tend to encourage the spread of *B. rubens* by creating bare areas and disturbing soil, making the land open to colonization. In the Carrizo Plain, red brome often co-occurs with a diversity of native herbs, so any control method should avoid disturbance to established native plant populations. Well planned early season grazing, preferably with sheep, while the plant is still palatable (Bossard et al. 2000) may be an optional control method for *B. rubens*. Results from a Carrizo cattle grazing study do not support the general hypothesis that livestock grazing is beneficial for native plant communities; specifically, it did not appear to enhance native annual plants, nor decrease exotic ones (Christian et. al., in prep.)

## DEER CREEK HILLS

Deer Creek Hills, located in Sacramento County, is a 4,000 acre privately held cattle ranch owned by the Sacramento Valley Conservancy. Two vegetation ecologists sampled grasslands at this site on May 3<sup>rd</sup>, May 10<sup>th</sup> and again on July 25<sup>th</sup>, 2012. CNPS staff and volunteers also collected data at this site in the spring and summer of 2005 for a total of 89 surveys compiled at this site. In 2012, we collected eleven grassland surveys at peak flowering for herbaceous plant species then returned in July to revisit two surveys, to understand the seasonal variation of plant species in this region. We identified 94 plant species (52 native, 42 non-native), with an average richness across both seasons of 32 species per 100 m<sup>2</sup> plot. The average relative cover of native plants within our surveys was 12%, with a range of 2% to 20%.

The initial spring surveys proved to be more species rich, reflected in an average richness of 33 species per 100 m<sup>2</sup> plot, while summer surveys averaged 27.5 species per 100 m<sup>2</sup> plot. Twenty-

three surveys from this ranch contained 35 or more plants species, many of the richest plots surveyed in this project.

Stands were classified into 6 herbaceous associations under three alliances. Spring, summer, and annual revisit plots were treated separately in the classification analysis. Many samples clustered together in the final grouping and half the plots maintained the same association name when sampled later in the season or in subsequent years. The classification name of some samples varied over time due to indicator species blinking in and out. Future analyses could calculate temporal persistence in order to focus classification on more stable indicator species for this region.

Alliance	Association	Survey Count
<i>Bromus (diandrus, hordeaceus)</i> – <i>Brachypodium distachyon</i>	<i>Bromus hordeaceus</i> – <i>Elymus caput-medusae</i>	2
	<i>Bromus hordeaceus</i> – <i>Erodium (botrys)</i> – <i>Plagiobothrys fulvus</i>	2
	<i>Bromus hordeaceus</i> – <i>Leontodon taraxacoides</i>	5
	<i>Hypochaeris glabra</i> – <i>Vulpia bromoides</i>	1
<i>Plagiobothrys nothofulvus</i>	<i>Plagiobothrys nothofulvus</i> – <i>Daucus pusillus</i> – <i>Trifolium microcephalum</i>	2
<i>Trifolium variegatum</i>	( <i>Trifolium variegatum</i> – <i>Vulpia bromoides</i> )– <i>Hypochaeris glabra</i> – <i>Leontodon taraxacoides</i>	1
	<b>Total</b>	<b>13</b>

Of the 42 non-native species detected in our surveys, Deer Creek Preserve had seven moderate and four high ranked invasive species. These include *Aegilops triuncialis*, *Avena barbata*, *Brachypodium distachyon*, *Bromus diandrus*, *Bromus rubens*, *Carduus pycnocephalus*, *Centaurea solstitialis*, *Hordeum marinum*, *Hypericum perforatum*, *Lolium perenne*, and *Taeniatherum caput-medusae*.

Barbed goatgrass, *Aegilops triuncialis*, is a winter annual closely related to cultivated wheat (*Triticum aestivum*). Unlike winter wheat, goatgrass seeds adhere to the plant and are difficult to separate, though they ultimately break apart into joints. The disarticulated joint ends are sharp and can injure livestock. Unfortunately, goatgrass tolerates hard, shallow, dry and gravelly soils and is continuing to expand its range in California (Encycloweedia 2004). *A. triuncialis* was found in 18 out of the 89 plots in Deer Creek Hills, with a range in cover from 0.2–50%. With scattered occurrences but some areas of dense cover, this species will likely continue to spread. Further monitoring should be conducted to explore the full extent of this species on-site.

The seeds of *A. triuncialis* are dispersed by livestock, human activities, water (as the joints float), and wind. Heavy grazing throughout the growing season and/or high intensity/short duration grazing periodically during the growing season appear to increase plant density. Grazing animals should ideally be removed from the infested areas before plants mature. Where known infestations exist, animal trails in the area should be monitored for goatgrass spread. Supplemental feeding to livestock using contaminated wheat straw may increase the spread of goatgrass. Barbed goatgrass generally matures later in the season than most rangeland annual grasses, providing a window for controlling goatgrass seed production through prescribed burning without compromising desirable annual grass seed production (Encycloweedia 2004).

Medusahead, *Taeniatherum caput-medusae*, is a noxious winter annual that invades rangeland communities, displaces native vegetation and lowers the livestock carrying capacity. This species contains high levels of silica, making it unpalatable to livestock except during its early growth stages. The stiff awns and hard florets can injure grazing animals and the senesced plants form a dense layer of thatch that decomposes slowly, changing the temperature and moisture dynamics of the soil and reducing seed germination of other species. Medusahead thrives on clay soils or soils with well-developed subsurface clay horizons and is expanding its range in California (Encycloweedia 2004). *T. caput-medusae* was found in 55 out of the 89 plots, with a range in cover from 0.2–40%. With numerous occurrences and areas of dense cover, this species is well established onsite.

Controlled burning in late spring has been shown to eliminate medusahead for several years in northern California. Heavy spring grazing by sheep during the green stage of medusahead has also been reported to assist in its control. Atrazine can help to control medusahead, but this herbicide also eradicates some native grasses (TNC 2009).

Italian thistle, *Carduus pycnocephalus*, is an annual thistle introduced from the Mediterranean with occurrence reports as early as 1912 (Bossard et al. 2000). This species is considered less invasive than many other thistle species but once established can dominate a site. *C. pycnocephalus* was found in 9 out of the 89 plots, with a range in cover from 0.2–2%. With scattered occurrences and low percent cover this species may be in the process of establishing itself or current management may already be halting its spread. Further monitoring should be conducted to explore the full extent of this species on-site.

Control may center on identifying areas with the heaviest infestation. The literature indicates that mechanical control in the form of hand pulling and grazing are the most effective control mechanisms. Hand pulling is only effective when the root is removed at least 10 cm below the surface. Treatment requires persistence over a period of several years (Bossard et al. 2000). Early spring is the time to release grazers, specifically goats or sheep, who will eat the thistles (Weed Workers Handbook 2004). Various chemicals have been found to be effective at exterminating this species when applied at different growing stages, including glyphosate, Picloram, and 2,4-D ester (Bossard et al. 2000). However, the negative impacts of the herbicides on surrounding native plants should be considered.

## **DUTCHMAN CREEK**

The Dutchman Creek property, located in Merced County, is a 500-acre ranch owned by Westervelt Ecological Services and currently grazed by cattle. Two vegetation ecologists sampled grasslands on this site on April 14<sup>th</sup> and July 19<sup>th</sup>, 2010; then selected plots were revisited again on April 11<sup>th</sup>, 2012. In 2012, we surveyed six plots at peak flowering for herbaceous plant species, one of which is a permanently marked long-term monitoring plot, for a total of 19 surveys at this site.

CNPS staff identified 76 plant species (43 native, 33 non-native), with an average richness of 19 species across all 100 m<sup>2</sup> plots. Spring surveys were more species rich, with an average richness of 20 species per 100 m<sup>2</sup> plot, while summer surveys averaged 16 species per 100 m<sup>2</sup> plot. The average relative cover of native plants within our surveys was 35%, with a range of absent to 83%.

Stands were classified into 6 different herbaceous associations under 5 alliances. Spring, summer, and annual revisit plots were treated separately in the classification analysis, however each sample clustered together in the final grouping, thus all plots maintained the same association name when sampled later in the season, and even when sampled two years later.

Alliance	Association	Survey Count
<i>Amsinckia (menziesii, tessellata)</i>	<i>Amsinckia (intermedia, menziesii)</i>	3
<i>Bromus (diandrus, hordeaceus)</i> – <i>Brachypodium distachyon</i>	<i>Bromus diandrus</i>	3
	<i>Bromus hordeaceus</i> – <i>Hordeum</i> spp.– <i>Medicago polymorpha</i>	3
<i>Centromadia (pungens)</i>	<i>Centromadia pungens</i> – <i>Lepidium dictyotum</i>	5
<i>Lasthenia fremontii</i> – <i>Distichlis spicata</i>	<i>Hordeum (depressum, leporinum)</i>	3
<i>Sporobolus airoides</i>	<i>Sporobolus airoides</i>	2
	<b>Total</b>	<b>19</b>

Of the 33 non-native species detected, we identified six moderate and one high ranked invasive species within sampled plots of Dutchman Creek. These include *Avena fatua*, *Brassica nigra*, *Bromus diandrus*, *B. rubens*, *Hordeum marinum*, *Lolium perenne*, and *Vulpia myuros*.

The north-east area of Dutchman Creek was heavily invaded by non-native grasses including ripgut brome, *Bromus diandrus*. A fence line separates this weedier north-east section from the rest of the property, and the difference in vegetation across the fence line is visible and dramatic. Grazing inside this area may reduce the ripgut brome population. Other control mechanisms include prescribed fire before seeds set or mowing soon after the plant flowers (DiTomaso 2007, Weed Workers Handbook 2004).

Black mustard, *Brassica nigra*, was detected on Dutchman Creek in one plot with a cover of 0.2%. *Brassica nigra* is an annual herb with extremely long seed viability. Under the right conditions, seeds can survive for more than fifty years in the seed bank (DiTomaso 2007). Control measures for black mustard are most effective when the population size is small and it is imperative to prevent the establishment of a large seed bank. Pulling or hoeing is proven effective for removing black mustard populations (Elkhorn Slough 2000), though this technique should be implemented while the ground is soft and before the seeds mature. Persistence is required and revisits are necessary where the seed bank is well established (DiTomaso 2007). Fire has been shown to increase black mustard populations, which should be taken into consideration if burning is selected to control invasive grasses populations inside this property.

## FLYING M RANCH

The Flying M Ranch, located north of the town of Planada in eastern Merced County, covers more than 10,000 acres and is currently grazed by cattle. Vegetation ecologists sampled grasslands on this site on April 11<sup>th</sup>, 2010 and re-visited the site on April 13, 2012. CNPS chapter members donated data collected at this site on April 14<sup>th</sup>, 2007 for a total of 38 surveys compiled at this site. We identified 85 plant species (53 native, 32 non-native), with an average

richness of 27 species per 100 m<sup>2</sup> plot. The average relative cover of native plants within our surveys was 24%, with a range of 4% to 65%.

Stands were classified into 10 different herbaceous associations under 6 alliances. Annual revisit plots were treated separately in the classification analysis and three out of the four maintained the same association name when sampled five years later. One survey was classified as *Holocarpha virgata* in 2007 but lacked this indicator species when revisited in 2012 and thus was placed under *Bromus hordeaceus–Hordeum* spp.–*Medicago polymorpha* stand types.

Alliance	Association	Survey Count
<i>Avena (barbata, fatua)</i>	<i>Avena barbata</i>	3
<i>Bromus (diandrus, hordeaceus)–Brachypodium distachyon</i>	<i>Bromus hordeaceus(–Vicia villosa–Lolium perenne)–Trifolium hirtum</i>	1
	<i>Bromus hordeaceus–Erodium (botrys)–Plagiobothrys fulvus</i>	12
	<i>Bromus hordeaceus–Hordeum</i> spp.– <i>Medicago polymorpha</i>	3
	<i>Hypochaeris glabra–Vulpia bromoides</i>	12
<i>Holocarpha (heermannii, virgata)</i>	<i>Holocarpha virgata</i>	1
<i>Lasthenia californica–Plantago erecta–Vulpia microstachys</i>	<i>Vulpia microstachys–Lasthenia californica–Sedella pumila</i>	1
	<i>Vulpia microstachys–Plantago erecta</i>	2
<i>Layia fremontii–Achyrrachaena mollis</i>	<i>Layia fremontii–Achyrrachaena mollis</i>	2
<i>Plagiobothrys nothofulvus</i>	<i>Plagiobothrys nothofulvus–Daucus pusillus–Trifolium microcephalum</i>	1
	<b>Total</b>	<b>38</b>

Of the 32 non-native species detected in our surveys, we identified seven moderate and one high ranked invasive species on Flying M Ranch. These include *Avena barbata*, *Bromus diandrus*, *B. rubens*, *Erodium cicutarium*, *Hordeum marinum*, *Hypochaeris radicata*, *Lolium perenne*, and *Vulpia myuros*.

## LOKERN PRESERVE

The Lokern Preserve, owned by the Center for Natural Lands Management, is almost 4,000 acres and is located approximately 30 miles west of Bakersfield, in Kern County. This preserve consists of several disjunct parcels along both sides of the California Aqueduct between Elk Hills Road and 7th Standard Road. The Lokern Preserve is part of the Lokern Natural Area (LNA) which includes over 40,000 acres of high-quality habitat for various wildlife and plant species of the San Joaquin Valley. This area is currently grazed by sheep. Two vegetation ecologists sampled grasslands on this site on March 27<sup>th</sup>, 2010 and again on March 27<sup>th</sup>, 2012. Additionally, two surveys were collected on this preserve by CNPS staff on April 23<sup>rd</sup>, 2008 and a total of sixteen surveys were compiled for analysis. We identified 47 plant species (34 native, 17 non-native), with an average richness of 12 species per 100 m<sup>2</sup> plot. The average relative cover of native plants within our surveys was 48%, with a range of 3% to 97%.

Stands were classified into 5 different herbaceous associations under 4 alliances. More data collection in the region will be helpful to fully define one provisional association and one provisional alliance found in this area. A strong shift in the composition of annual vegetation was noted in surveys on this site. Seven samples from 2010, a year with average rainfall, were highly species rich and classified in the *Lasthenia californica–Plantago erecta–Vulpia microstachys* Herbaceous Alliance. In 2008 and 2012, when rainfall levels were below average, the same stands were classified to the *Schismus barbatus* stand type. In one stand, the relative cover of native plants shifted from 94% to a mere 4%.

Alliance	Association	Survey Count
<i>Amsinckia (menziesii, tessellata)</i>	<i>Phacelia tanacetifolia</i> Provisional	1
<i>Bromus rubens–Schismus (arabicus, barbatus)</i>	<i>Schismus barbatus</i>	7
<i>Lasthenia californica–Plantago erecta–Vulpia microstachys</i>	<i>Layia pentachaeta–Plagiobothrys (canescens)</i> Provisional	5
	<i>Lepidium nitidum–Trifolium gracilentum–Vulpia microstachys</i>	2
<i>Salvia carduacea</i> Provisional	<i>Salvia carduacea</i>	1
	<b>Total</b>	<b>16</b>

Of the 17 non-native species detected in our surveys, we identified three moderate and one high ranked invasive species at Lokern Preserve. These include *Bromus rubens*, *Hordeum murinum*, *Sisymbrium irio*, and *Vulpia myuros*.

*Sisymbrium irio* occurred in two plots with cover of 0.2% in each plot. Control measures should focus on preventing the establishment of a large seed bank on this property. Manual removal of spot occurrences may prove effective in controlling this species (DiTomaso 2007).

## MADERA RANCH

The Madera Ranch, located in southwest Madera County approximately four miles southwest of the city of Madera, covers more than 11,000 acres. This ranch is currently grazed by cattle. Vegetation ecologists sampled grasslands on this site on May 2<sup>nd</sup>, 2011. We completed a total of 20 surveys at this site; most were sampled at a late phenological stage. We identified 90 plant species (70 native, 20 non-native), with an average richness of 24 species per 100 m<sup>2</sup> plot. The average relative cover of native plants within our surveys was 37%, with a range of 5% to 100%.

Stands were classified into 9 different herbaceous associations under 9 alliances.

Alliance	Association	Survey Count
<i>Centromadia (pungens)</i>	<i>Centromadia pungens–Lepidium dictyotum</i>	8
<i>Frankenia salina</i>	<i>Frankenia salina–Distichlis spicata</i>	1
<i>Isocoma acradenia</i>	<i>Isocoma acradenia</i>	2

Alliance	Association	Survey Count
<i>Lasthenia californica</i> – <i>Plantago erecta</i> – <i>Vulpia microstachys</i>	<i>Lepidium nitidum</i> – <i>Trifolium gracilentum</i> – <i>Vulpia microstachys</i>	1
<i>Lasthenia fremontii</i> – <i>Distichlis spicata</i>	<i>Hordeum (depressum, leporinum)</i>	3
<i>Lasthenia fremontii</i> – <i>Downingia (bicornuta)</i>	<i>Eryngium (vaseyi, castrense)</i>	1
<i>Leymus triticoides</i>	<i>Leymus triticoides</i> – <i>Bromus spp.</i> – <i>Avena spp.</i>	2
<i>Sporobolus airoides</i>	<i>Sporobolus airoides/Allenrolfea occidentalis</i>	1
<i>Nassella pulchra</i>	<i>Nassella pulchra</i>	1
	<b>Total</b>	<b>20</b>

Of the 20 non-native species detected in our surveys, we identified four moderate and one high ranked invasive species at Madera Ranch. These include *Bromus diandrus*, *B. rubens*, *Centaurea melitensis*, *Hordeum marinum*, and *Vulpia myuros*.

### ROMINGER BROTHER FARMS

The Rominger Brother Farms, located in Colusa County, includes more than 1000 acres of untilled oak woodland and grasslands. This farm is currently grazed by cattle. A vegetation ecologist sampled grasslands on this site on April 19<sup>th</sup>, 2012. We completed a total of 4 surveys at this site. We identified 65 plant species (24 native, 41 non-native), with an average richness of 27 species per 100 m<sup>2</sup> plot. The average relative cover of native plants within our surveys was 39%, with a range of 13% to 75%. Stands were classified into 4 different herbaceous associations under 4 alliances.

Alliance	Association	Survey Count
<i>Amsinckia (menziesii, tessellata)</i>	<i>Amsinckia (intermedia, menziesii)</i>	1
<i>Bromus (diandrus, hordeaceus)</i> – <i>Brachypodium distachyon</i>	<i>Hypochaeris glabra</i> – <i>Vulpia bromoides</i>	1
<i>Layia fremontii</i> – <i>Achyrrachaena mollis</i>	<i>Layia fremontii</i> – <i>Achyrrachaena mollis</i>	1
<i>Nassella pulchra</i>	<i>Nassella pulchra</i>	1
	<b>Total</b>	<b>4</b>

Of the 41 non-native species detected in our surveys, we identified seven moderate and three high ranked invasive species at Rominger Brother Farms. These include *Avena barbata*, *A. fatua*, *Bromus diandrus*, *B. rubens*, *Carduus pycnocephalus*, *Centaurea solstitialis*, *Hordeum murinum*, *Lolium perenne*, *Taeniatherum caput-medusae*, and *Vulpia myuros*.

## SEMITROPIC RIDGE PRESERVE

The Semitropic Ridge Preserve encompasses approximately 3,700 acres and is located 15 miles northwest of Wasco, in Kern County. Semitropic Ridge Preserve, together with adjacent natural lands, forms one of the largest remaining natural habitats of the San Joaquin Valley. The western border of the preserve is contiguous with the Northern Semitropic Ridge Ecological Reserve, owned by the California Department of Fish and Game. This ranch is currently grazed by sheep. Two vegetation ecologists sampled grasslands on this site on March 24–25, 2010 and again on March 26 & 28, 2012. In 2012, we collected ten grassland surveys at early flowering for herbaceous plant species. Twelve surveys were collected by CNPS and CDFW staff on April 23–24, 2008 and a total of 32 surveys were compiled for analysis. We identified 70 plant species (53 native, 17 non-native), with an average richness of 14 species per 100 m<sup>2</sup> plot. The average relative cover of native plants within our surveys was 63%, with a range of absent to 99%.

Stands were classified into 11 different herbaceous associations under 11 alliances. Annual revisit plots were treated separately in the classification analysis and half of the ten revisited surveys maintained the same association name when sampled two years later.

Alliance	Association	Survey Count
<i>Allenrolfea occidentalis</i>	<i>Allenrolfea occidentalis</i> – <i>Suaeda nigra</i>	1
<i>Amsinckia (menziesii, tessellata)</i>	<i>Amsinckia (intermedia, menziesii)</i>	1
<i>Bromus rubens</i> – <i>Schismus (arabicus, barbatus)</i>	<i>Bromus rubens</i>	1
<i>Centromadia (pungens)</i>	<i>Centromadia pungens</i> – <i>Lepidium dictyotum</i>	14
<i>Distichlis spicata</i>	<i>Distichlis spicata</i>	4
<i>Frankenia salina</i>	<i>Frankenia salina</i>	1
<i>Isocoma acradenia</i>	<i>Isocoma acradenia</i> – <i>Suaeda nigra</i> Provisional	1
<i>Lasthenia californica</i> – <i>Plantago erecta</i> – <i>Vulpia microstachys</i>	<i>Lasthenia (californica, gracilis)</i>	1
	<i>Lepidium nitidum</i> – <i>Trifolium gracilentum</i> – <i>Vulpia microstachys</i>	1
<i>Sesuvium verrucosum</i>	Alliance level only	1
<i>Sporobolus airoides</i>	<i>Sporobolus airoides</i>	2
<i>Suaeda nigra</i>	<i>Suaeda nigra</i> / <i>Lepidium dictyotum</i>	4
	<b>Total</b>	<b>32</b>

Of the 17 non-native species detected in our surveys, four moderate and one high ranked invasive species were identified on Semitropic Ridge. These include *Brachypodium distachyon*, *Bromus rubens*, *Hordeum murinum*, *Sisymbrium irio*, and *Vulpia myuros*.

## TEJON RANCH

The Tejon Ranch, located mainly in Kern County, is a 270,000 acre privately owned ranch which straddles the Tehachapi Mountains. Two vegetation ecologists sampled grasslands on

the San Joaquin Valley side of this site on March 26, 2010 and again on March 23–24, 2011. In 2011, we collected two grassland surveys at peak flowering for herbaceous plant species, for a total of 8 surveys compiled at this site. We identified 51 plant species (34 native, 17 non-native), with an average richness of 20 species per 100 m<sup>2</sup> plot. The average relative cover of native plants within our surveys was 39%, with a range of 5% to 62%.

Stands were classified into 4 herbaceous associations under 3 alliances. More data collection in the region will be helpful to fully define one provisional association.

Alliance	Association	Survey Count
<i>Amsinckia (menziesii, tessellata)</i>	<i>Amsinckia (intermedia, menziesii)</i>	1
<i>Bromus rubens–Schismus (arabicus, barbatus)</i>	<i>Bromus rubens</i>	1
<i>Plagiobothrys nothofulvus</i>	<i>Plagiobothrys nothofulvus–Castilleja exserta–Lupinus nanus</i> Provisional	5
	<i>Plagiobothrys nothofulvus–Daucus pusillus–Trifolium microcephalum</i>	1
	<b>Total</b>	<b>8</b>

Of the 17 non-native species detected in our surveys, we identified four moderate and one high ranked invasive species on Tejon Ranch. These include *Avena barbata*, *Bromus diandrus*, *B. rubens*, *Hordeum murinum*, and *Vulpia myuros*. *B. rubens*, which is rated highly invasive by Cal-IPC, occurred in all eight of the plots sampled, with an average percent cover of 4% (ranging from 0.2% to 10%). *B. diandrus* had the highest average percent cover of all the invasive species with 11% and occurred in four out of six of the plots. Fire has been shown to be an effective tool in the management of many invasive annual grasses including *B. diandrus* (DiTomaso 2007). However, the timing and frequency of fires is important, as *B. rubens* growth is often encouraged by fire (DiTomaso 2007). The high native forb diversity and cover may indicate a successful grazing regime which is keeping invasive grass populations in check.

## VIERA RANCH

The Viera Ranch, located in Merced County, is a 333-acre grassland and vernal pool property currently grazed by cattle. Two vegetation ecologists sampled grasslands on this site on April 12<sup>th</sup>, 2012. We surveyed five plots early in the season for herbaceous plant species.

CNPS staff identified 38 plant species (27 native, 11 non-native), with an average richness of 17 species across all 100 m<sup>2</sup> plots. The average relative cover of native plants within our surveys was 51%, with a range of 20% to 96%.

Stands were classified into 3 different herbaceous associations under 2 alliances. More data collection in the region will be helpful to fully define one provisional association in this area.

Alliance	Association	Survey Count
<i>Centromadia (pungens)</i>	<i>Centromadia pungens</i> – <i>Lepidium dictyotum</i>	2
<i>Lasthenia fremontii</i> – <i>Distichlis spicata</i>	<i>Distichlis spicata</i> – <i>Eryngium castrense</i> Provisional	2
	<i>Hordeum (depressum, leporinum)</i>	1
	<b>Total</b>	<b>5</b>

Of the 11 non-native species detected in our surveys, we identified two moderate ranked invasive species on Vieira Ranch. These include *Hordeum marinum* and *Vulpia myuros*.

### WIND WOLVES PRESERVE

The Wind Wolves Preserve, located mainly in Kern County, is a 95,000 acre privately owned ranch located where the Transverse Ranges, Coast Ranges, Sierra Nevada, western Mojave Desert and San Joaquin Valley converge. Two vegetation ecologists sampled grasslands on this site on April 20–25, and June 8–10, 2011; selected surveys were sampled and/or resampled during June 11–12, 2012. Additional surveys, collected by CNPS staff in June of 2008, were compiled for a total of 60 herbaceous surveys. We identified 144 plant species (117 native, 27 non-native), with an average richness of 21 species per 100 m<sup>2</sup> plot. The average relative cover of native plants within our surveys was 50%, with a range of 14% to 94%.

Stands were classified into 17 herbaceous associations under 17 alliances. Seven surveys were classified to the more generic group level of California annual grassland. More data collection in the region will be helpful to fully define these surveys as well as four provisional associations and one provisional alliance in this area. Spring, summer, and annual revisit plots were treated separately in the classification analysis, however each sample clustered together in the final grouping, thus all plots maintained the same association name when sampled later in the season, and even when sampled years later.

Alliance	Association	Survey Count
<i>Anemopsis californica</i>	<i>Anemopsis californica</i> Provisional	1
<i>Artemisia dracunculus</i>	<i>Artemisia dracunculus</i>	1
<i>Bromus tectorum</i>	<i>Bromus tectorum</i>	1
California annual grassland group	California annual grassland group	7
<i>Distichlis spicata</i>	<i>Distichlis spicata</i>	1
<i>Elymus elymoides</i> Provisional	<i>Elymus elymoides</i> Provisional	1
<i>Eriogonum (elongatum, nudum)</i>	<i>Eriogonum nudum</i> Provisional	1
<i>Eschscholzia (californica)</i>	<i>Eschscholzia californica</i>	4
<i>Hordeum brachyantherum</i>	Alliance level only	1
<i>Juncus arcticus (var. balticus, mexicanus)</i>	<i>Juncus arcticus</i> var. <i>balticus</i>	2
<i>Lasthenia californica</i> – <i>Plantago erecta</i> – <i>Vulpia microstachys</i>	<i>Lasthenia (californica, gracilis)</i>	2
<i>Leymus cinereus</i>	<i>Leymus cinereus</i> Provisional	7
<i>Leymus triticoides</i>	<i>Leymus triticoides</i>	5
	<i>Leymus triticoides</i> – <i>Bromus</i> spp.– <i>Avena</i> spp.	2

Alliance	Association	Survey Count
<i>Monolopia (lanceolata)–Leptosyne (calliopsidea)</i>	<i>Leptosyne calliopsidea–Mentzelia pectinata</i>	1
<i>Nassella cernua</i>	<i>Nassella cernua</i>	4
<i>Poa secunda</i>	<i>Poa secunda–(Elymus sp.)–Clarkia cylindrica</i>	16
<i>Schoenoplectus americanus</i>	<i>Schoenoplectus americanus</i>	1
<i>Typha (angustifolia, domingensis, latifolia)</i>	<i>Typha domingensis</i>	1
	<b>Total</b>	<b>60</b>

Of the 27 non-native species detected in our surveys, we identified seven moderate and two high ranked invasive species on Wind Wolves Preserve. These include *Avena barbata*, *A. fatua*, *Bromus diandrus*, *B. rubens*, *B. tectorum*, *Centaurea melitensis*, *Cirsium vulgare*, *Hordeum marinum*, and *Vulpia myuros*.

Bull thistle, *Cirsium vulgare*, was introduced to California from Eurasia and is a tap-rooted biennial that can also grow as an annual or perennial. Overgrazing and other disturbances which cause bare ground contribute to successful invasion by this species (Encyclopededia 2004). Providing supplemental feed after an area has been heavily grazed often compounds the problem by bringing new invasive weed seeds onto the site.

Chemical treatments have been successful in the control of bull thistle using 2,4-D, dicamba, picloram, or glyphosate (Elkhorn Slough 2000, Bossard et al. 2000). Mechanical removal by cutting/mowing the stems or pulling the plant has also shown to be effective (Bossard et al. 2000). It is imperative to pull this species before flowering, or to remove the flowering heads from the area, as flowers can continue to mature into viable seed after the plant has been uprooted (Elkhorn Slough 2000). Revisiting the infested site is also required as a small percentage of cut bull thistle will re-sprout from the root, making sporadic mowing/cutting unsuccessful in the extermination of a population (Bossard et al. 2000, Encyclopededia 2004).

A management plan for this property should include an integrated approach to invasive species control including grazing and mechanical removal. Heavy grazing should be avoided as the disturbance and bare soil will encourage the continued colonization of invasive species.

## Rangeland Management

### Grazing Management Interviews

Phone interviews were conducted with willing local ranchers and livestock operators to better understand the current grazing practices within the sites visited. The purpose of these interviews was to record specific management strategies which may correlate with vegetation patterns sampled on the ground and to inform management strategies for these or other sites. This questionnaire emphasized the timing of grazing, stocking rates, weed encroachment, and other important management factors. See Appendix D for a summary of the responses from sites sampled in 2011–2012.

### Management Tools

#### FIRE

Research suggests that non-native annual grass populations can be reduced by infrequent early spring burning, though burning during this time period may negatively affect native annual populations (Keeley 2001). However, one study in Santa Cruz County showed that fire increased native plant survivorship, cover, and species richness (McGraw, 2002). Alternatively, frequent fires, which may regularly create bare ground for invasion, increased invasive plant populations in Coastal Sage Scrub (Giessow 1996). The spread of *Bromus rubens* has been shown to be encouraged by fire, in which case control may revolve around the prevention of human caused fires. Also, by exposing bare ground, fires can leave habitats open to reinvasion (DiTomaso 2007). It is important to determine the relative frequency and diversity of natives within invaded areas and to monitor fire effects on individual parcels in order to determine the benefits of this technique.

#### GRAZING

In some regions of California, it has been shown that grazing encourages native forb species, though the effect on native perennial species is not as clear. Overgrazing may encourage the spread and persistence of invasive annual grasses and other non-native species. In most instances, intensive grazing should be avoided as it not only disturbs the soil but may also decrease native plant populations. The timing and duration of grazing and the grazers themselves (species differ in forage preference and grazing patterns) can be manipulated to target desired species; for instance, cattle prefer grasses over forbs and grazing a site early in the season when invasive grasses are most palatable may decrease populations (Huntsinger et al. 2007). The management objectives and the historical native species of the area may dictate whether grazing will be an effective management tool.

#### MECHANICAL REMOVAL

Where populations are small and there is adequate man-power available, pulling or hoeing is an option for the control of some invasive species. Mowing and tilling have also been successful in limiting certain species of invasive annual grasses (DiTomaso 2007, Elkhorn Slough 2000). Timing of treatment and subsequent treatments are important to these methods' success. Mowing can be used as a substitute for grazing where grazing is not an option (Huntsinger et al. 2007).

### Invasive annual grasses

Because invasive annual grasses occurred within many plots sampled in this project, we have included a comprehensive summary of specific management strategies. These grasses include *Avena* spp., *Hordeum marinum*, *H. murinum*, *Lolium perenne*, *Bromus* spp., *Brachypodium distachyon*, and *Vulpia myuros*. General abundance of invasive annual grasses can vary year to year based on climatic factors and these species will often co-occur with a diversity of native forbs. Monitoring the success of a restoration program should occur over a period of many years to account for seasonal variation. An approach that integrates control methods and monitoring will have the most success.

The following species are invasive annual grasses that were ubiquitous throughout the NRCS-CIG project sites. Six species/genera are described and management options for each are provided.

#### ***Avena barbata*, *Avena fatua*, wild oats**

Cal-IPC Rated Moderate

Wild oats are common annual grasses that became established in California by the late 1700s. This species is most successful establishing after soil disturbance. *Avena* is likely spread by agricultural equipment or as a grain contaminant as their seed design does not lend itself to long distance dispersal. At least one species of *Avena* occurred in nine out of thirteen sites sampled. The percent cover of these species ranged from absent to 20% with the highest cover occurring at Agua Fria Ranch.

Mulching and solarization are suggested ways to suppress wild oats and avoiding disturbance on the landscape can halt or slow their spread (DiTomaso 2007, Elkhorn Slough 2000). Populations with low cover or limited distribution may be controlled by pulling, hoeing, or digging. The ideal time for these actions is before plant maturity and before seed set, as mature seeds can be viable for up to ten years in the soil (Elkhorn Slough 2000).

#### ***Bromus rubens*, red brome**

Cal-IPC Rated High

*Bromus rubens* is an annual grass that competes well against other native annuals. Its presence often promotes more frequent fires within habitats, which in turn allows it to further colonize sites. Overgrazing has also been shown to promote red brome establishment. In general, *B. rubens* is an effective disturbance follower and not as effective at establishing itself into intact habitats, therefore, it is important to avoid creating open, disturbed areas (Bossard et al. 2000). *Bromus rubens* occurred on all sites sampled except the Viera Ranch. The percent cover of *B. rubens* ranged from absent to 55% with the highest covers occurring at Carrizo Plain.

In areas where *Bromus rubens* populations are limited, hand pulling or hoeing is effective (Bossard et al 2000, TNC 2009). For larger areas of infestation, mowing can be used and should take place soon after flower production (DiTomaso 2007). Mowing may be more effective at controlling red brome since many grazing animals find *Bromus rubens* unpalatable. Effective grazers for the species are sheep who will eat the young shoots in early winter though not later in the season (Bossard et al. 2000, TNC 2009). Fire has been successful at reducing red brome

populations, though only in early spring before the seeds have set. Fire is ineffective at reducing seed bank populations, thus, late season fires only serve as a disturbance that opens habitat for reinvasion (Bossard et al. 2000). The effect of control methods on native plant populations and diversity is an important consideration before implementation. Many sites within this project maintain high native plant species diversity and/or abundance regardless of the presence of red brome.

### ***Bromus diandrus*, ripgut brome**

Cal-IPC Rated Moderate

*Bromus diandrus* was introduced to California from Europe. Disturbances from overgrazing, cultivation, fire, and construction have encouraged the spread of this species (Cal-IPC Assessment form, DiTomaso 2007). The presence of ripgut brome, as dry and flammable biomass, makes many areas susceptible to fire. After fire, this species can further establish itself as bare soil is exposed. In our surveys, we noted *B. diandrus* on ten of the thirteen sites. The percent cover of this species ranged from absent to 85% with the highest cover occurring at Dutchman Creek.

Fire has been successful as a management tool for this species though only when applied before the spikelets shatter (DiTomaso 2007). *B. diandrus* reproduces exclusively through seed and the seeds are short lived in the seed bank (DiTomaso 2007). Therefore, management should focus on the prevention of seed production (Elkhorn Slough 2000). Hand pulling and mowing are mechanical methods of control that have been successful with *B. diandrus*. Both techniques should occur before seeds ripen, or soon after plants flower (DiTomaso 2007). Mowing is most effective when the bolting crown is removed; this can be achieved by cutting grass at a height of two inches above the ground (Weed Workers Handbook 2004).

### ***Hordeum marinum*, *H. murinum*, barley**

Cal IPC Rated Moderate

Introduced from Europe, *Hordeum* spp. are annuals that begin growth after the first large autumn rainfall. In California's Mediterranean climate, these species are extremely successful grassland invaders (TNC 2009). Barley was found on all sampled sites of this NRCS CIG project. The percent cover of these species ranged from absent to 35% with the highest covers occurring at Carrizo Plain, Rominger Ranch and Madera Ranch.

Mowing barley just after seed heads have turned color has been successful in Australia; however, research in California suggests that mowing is not enough to significantly reduce barley populations (Elkhorn Slough 2000, TNC 2009). *Hordeum* spp. are very susceptible to fire and fire has significantly reduced barley cover in some California grasslands for up to three years (TNC 2009). Continuous and intensive grazing will encourage barley growth, as noted in heavy cattle use areas of certain properties.

### ***Lolium perenne*, annual ryegrass**

Cal-IPC Rated Moderate

*Lolium perenne* is typically an annual herb but can also be biennial or perennial under certain circumstances. This species is often found in seed mixes planted to revegetate sites for erosion

control. Annual ryegrass not only successfully establishes disturbed areas; it also crowds out native plants and has the ability to invade surrounding undisturbed areas (Cal-IPC). *L. perenne* is most successful in nutrient rich, wet areas and therefore is considered a threat to wetland habitats such as vernal pools (Cal-IPC, DiTomaso 2007). *L. perenne* was found at five of the thirteen sites surveyed. Populations should be closely monitored at vernal pool sites including the Dutchman Creek, Flying M Ranch, Madera Ranch, and Viera Ranch. Percent cover of this species ranged from absent to 20% with the highest cover occurring at Rominger Ranch.

As with many invasive annual grasses, overgrazing may encourage the spread of *L. perenne*; one study shows that it may actually promote rye grass seed germination (Deregibus 1994). Control of ryegrass has been successful through mowing before seed maturity (Weed Workers Handbook 2004). Mowing should ideally occur after the existing native forbs have set seed, thus limiting the negative impact mowing may have on native forb populations. Grazing with goats or cattle may also be effective (Weed Workers Handbook 2004). Since annual ryegrass reproduces mainly by seed and its seeds are relatively short lived in the seed bank, treatment should center on reducing seed development in plants.

### ***Vulpia myuros*, rat-tail fescue**

Cal-IPC Rated Moderate

*Vulpia myuros* reproduces by seed and will germinate after the first significant autumn rainfall. This species prefers disturbed sites but is also found in undisturbed areas (per the Cal-IPC Plant assessment form). The success of rat-tail fescue is due in part to the production of allelopathic compounds which inhibit the growth of surrounding plants (Cal-IPC assessment form). *V. myuros* was found on all sites except Deer Creek Hills and occurred frequently in most plots. The percent cover of *V. myuros* ranged from 0.1% to 50% with the highest covers occurring at Madera Ranch and Wind Wolves Preserve. Though overgrazing may encourage the growth of *V. myuros*, careful timing of heavy grazing, specifically for a few weeks in early spring, has been successful at reducing *V. myuros* populations (DiTomaso 2007).

## **Rangeland Monitoring Workshop**

In April 2013, CNPS ecologists, Jennifer Buck-Diaz and Julie Evens, provided a two-day rangeland monitoring workshop at the UC Cooperative Extension in Merced. Ceci Dale-Cesmat contributed to the oral presentation and field component during the first day. Eleven attendees from public and private agencies came together to learn about sampling and monitoring rangeland vegetation and to better understand the challenges of rangeland management.

On the first day, participants were introduced to the CNPS NRCS-CIG project, and we described the protocols and results of sampling and classification within Great Valley rangeland vegetation. A local ranching family assisted in an afternoon tour in eastern Merced and described management strategies for this region. The site was arranged with the assistance of John Vollmar and Jaymee Marty of Vollmar Natural Lands Consulting. Staff assisted students in field identification of both native and non-native rangeland plant species.

The second day of the workshop focused on training participants in the CNPS Relevé field sampling protocol. Attendees learned how to collect standardized plot data, and we discussed the protocol's practical uses for vegetation assessment and monitoring.

## DISCUSSION

A long-term objective of this project is to understand the impacts of non-native plants and rangeland practices for Great Valley grasslands, and to develop conservation and restoration strategies that promote biodiversity, productivity, and sustainability of these grasslands. This final report provides baseline information about variation in grassland habitats of the region, including areas dominated by both native and non-native plants, and areas with important native species richness.

Non-native grasses and forbs such as *Bromus* spp. and *Erodium* spp. were the most frequently encountered plant species across more than 800 compiled surveys. These non-native species are habitat generalists and tend to occur across all community types. The most frequently encountered native grassland species were *Vulpia microstachys*, *Croton setigerus*, *Trifolium microcephalum*, *Juncus bufonius*, and *Castilleja attenuata*; each occurring in 20% or more of all the compiled surveys.

Across sites sampled in 2011–2012, the Carrizo Plain National Monument and the Wind Wolves Preserve showed the highest variation and number of grassland vegetation associations. Deer Creek Hills, Madera Ranch and the Rominger Ranch exhibited the highest average richness of native plant species per plot while Semitropic Ridge and Viera Ranch had the highest average relative cover of native plants.

Five sites were prioritized for follow-up management based on the presence of invasive species (those with moderate to high threat ranks) and a high abundance of non-native plant cover. Many of the invasive species identified here are not limited to these sites and the same recommendations could be applied broadly. Through detailed site descriptions, we specifically recommend that land managers consider action in the following locations: Carrizo Plains, Deer Creek, Dutchman Creek, Tejon Ranch, and Wind Wolves Preserve.

The first step toward implementing a grassland management plan should include the identification of disturbed areas. The application of effective restoration techniques following weed management activities is imperative. One strategy is to focus on the eradication of heavily invaded areas while another is to focus on removing isolated plant populations in order to reduce the spread. Large infestations may take many years of multiple treatments using several different methods to reduce or eliminate invasive species. In addition to reducing the invasion of non-native plant species, management activities can enhance native plant cover and increase the forage value of rangelands (e.g., by decreasing *Taeniatherum caput-medusae* and other non-palatable herbs).

### ***Vegetation mapping assessment***

This innovative pilot project implemented a fine-scale mapping approach within the understudied grassland habitats of the Carrizo Plain. Mapping of grassland habitats has proven difficult in the past because the variation in grassland types is typically not visible or interpretable on aerial or satellite imagery. This project utilized high intensity plot sampling and reconnaissance surveys to apply detailed alliance and association-level units for mapping grasslands with successful results.

Additional NRCS funding supported supplementary field assessment and updates of the vegetation map. We revisited grassland and related vegetation across 10,000 acres of the Carrizo Plain to identify changes in habitat features between 2010 and 2011. One significant

change encountered was the die-back of spinescale saltbush (*Atriplex spinifera*) around Soda Lake on the Carrizo Plain. The baseline imagery (1-foot true color) used in the mapping was flown in 2007 and some areas converted from shrub-dominated communities to herbaceous dominated communities over the three year time period of this project.

On the ground field verification confirmed the accuracy and stability of certain mapped vegetation types, including perennial grasslands dominated by *Poa secunda* as well as annual types such as the *Lasthenia californica* – *Plantago erecta* – *Vulpia microstachys* Alliance. Field assessment of polygons originally mapped as the *Amsinckia (menziesii, tessellata)* Alliance revealed variation across years; in some areas the dominant species shifted from *Amsinckia tessellata* to *Salsola tragus*. Additional sampling could capture the range of variation and stability in annual grassland types.

The fine-scale vegetation map and associated field data will serve as baseline information to assess future conservation efforts, adaptively manage resources, assess impacts of climate change, and make other land-use decisions. Uses of the resulting map include identifying preferred wildlife habitats, identifying areas of high native plant cover and/or sensitive plant species, as well as identifying locations significantly threatened by invasive plants.

### **Vegetation analysis**

This project sampled and described a significant diversity of herbaceous vegetation types in the Great Valley and Carrizo Plain, including 30 alliances and 60 associations. Of these types, we defined eight new alliances and 37 new associations not previously published in *A Manual of California Vegetation* (Sawyer et al. 2009). The attached alliance descriptions and stand summary tables are useful in understanding the assemblage of species present within types, including dominant and/or characteristic species, which may be suitable for developing restoration palettes in different subregions of the state.

One innovation in this project was to compare sites sampled in different times of the year (i.e., spring versus summer) to evaluate seasonal variation. Overall trends show that spring surveys detected more species than summer surveys, and they also had higher cover of native species when compared to summer surveys. When sampling upland herbaceous stands, we recommend that surveys are well-timed in the spring to adequately represent the floristic composition, abundance and overall significance of native plants. Summer surveys appear to over-emphasize non-native plants and under-represent the presence of native annuals.

Some species were detected in spring surveys but not in summer revisits (e.g. *Claytonia perfoliata*, *Lasthenia gracilis*, *Microseris* spp. and *Trifolium depauperatum*). Additional species were detected only in late season revisits including *Atriplex* spp., *Eriogonum* spp., *Croton setigerus*, and *Trichostema lanceolatum*. To fully capture the suite of species occurring in annual grasslands, surveys should take place in both early and late season. However, seasonal plant community analyses revealed little variation in the alliance classification of stands. This speaks to the stability of vegetation types in annual-dominated plant communities when compared across the same year.

To ensure a robust and stable classification for grassland communities, we focused on identifying significant indicator species. Indicator species tend to specialize in a specific habitat, thus they are better representatives of that environment than a habitat generalist. We also identified species that have a high constancy values. Constancy is the proportion of plots

sampled within a type which contain a particular species. Another consideration is temporal persistence which is a measure of how often a species is detected over time (Buck 2004).

For example, *Trifolium variegatum* is an annual clover classified as a facultative wetland species, meaning that it is usually associated with water but is occasionally found in upland settings. This species is a strong native indicator consistently found in swales, seeps, moist grassy flats, and intermittent stream channels along with a mix of native and non-native plants. Nine stands classified to the *Trifolium variegatum* Herbaceous Alliance were revisited 2–4 times, both seasonally and annually. The average temporal persistence of *T. variegatum* was 85%, indicating a high probability of detecting this species in the same stand over time. Not surprisingly, the perennial bunchgrass *Poa secunda*, which is a strong indicator species along the western edge of the Great Valley, had a temporal persistence of 100% within repeated visits to 11 stands.

In 2010, highly diverse native forb stands were sampled and classified in the Carrizo Plain and southern San Joaquin Valley to the *Lasthenia californica*–*Plantago erecta*–*Vulpia microstachys* Alliance. These same stands were visited in dry years (2008, 2012) and were sometimes classified within the *Schismus (arabicus, barbatus)* stand type of the *Bromus rubens*–*Schismus (arabicus, barbatus)* Alliance, with a sparse cover of non-natives and a lack of germination of native species that remained dormant in the seed bank. Thus, annual grasslands sampled within only one year may not reflect the full suite of species present. Multiple years of sampling may be needed in semi-arid regions to best categorize the species composition of a site, capturing the full diversity and variation in abundance of native and non-native plants.

Annual revisits allowed us to analyze temporal changes of vegetation across years. We found that both the richness and cover of native species varied between years. In the Carrizo Plain and the southern San Joaquin Valley, a threshold of precipitation appears important for the full expression of some annual vegetation types. This pattern is similar to the annual flush of desert species. In some areas, such as the northern Mojave Desert, rainfall and phenological patterns have been analyzed with a rainfall threshold of around 25 mm necessary to stimulate germination of winter annual plants (Turner and Randall 1989). Additional sampling and analysis across multiple years could help establish a precipitation threshold for the southern San Joaquin region, though it is likely that the timing of rainfall within a water year has additional influence on species richness, composition, and cover. A longer term dataset could reveal more fine-scale patterns of native plant cover based on the timing of precipitation during the year.

More than three years of repeat sampling in Carrizo reveals a snapshot of change over time. While annual plant species are not static over time in this region, there does not appear to be a directional change in composition and abundance. Ideally, we would resample stands in another wet year like 2010 to determine if the community composition returns to that state. If vegetation patterns converge to a type that is characteristic of one of the earlier sample periods, the plant assemblage may be stable at a loose equilibrium over time (Collins 2000).

Analysis of environmental variables indicate that native and non-native species follow patterns significantly influenced by rainfall, elevation, and position within the Great Valley and Carrizo Plain. Plant species and vegetation alliances are not distributed randomly across the landscape. Some non-native species are widespread (*Bromus hordeaceus*) while others are currently more limited to the Sacramento Valley (e.g., *Taeniatherum caput-medusae*) or to the San Joaquin Valley and warm-deserts (e.g., *Schismus* spp.). We note significant changes in species richness over years and between seasons; this change appears to be driven by the composition of native species. The richness of non-native species tend to remain steady across repeat sampling. This

highlights the adaptations of native species to thrive under specific environmental conditions and to remain dormant when the setting is not ideal.

Our current results provide a comparison of grassland vegetation in the central and southern Great Valley. Additional seasonal and inter-annual sampling across the central and northern Great Valley would allow us to fully compare the native and non-native variation across this ecoregion. Most sites sampled within this project are grazed by cattle with the exception of sheep in the southern San Joaquin Valley. A more detailed comparison of paired grazed and ungrazed plots within the same site and across different sites would allow evaluation of grazing as a tool for long term management.

This project reveals an amazing diversity and variation of grassland vegetation within the Carrizo Plain and San Joaquin Valley. It establishes a baseline of surveys across the region, and thus provides for long-term monitoring and management of resources, and substantiates the high value of grazed grasslands. These grassland sites also could be revisited for more detailed soil data collection and analysis. Additionally, our approach and protocols are applicable to future rangeland monitoring projects, and our descriptions will improve NRCS's ecological site descriptions for grasslands in this region.

## REFERENCES

- Baldwin, B. G., D. H. Goldman, D. J. Keil, R. Patterson, T. J. Rosatti, and D. H. Wilken, editors. 2012. The Jepson manual: vascular plants of California, second edition. University of California Press, Berkeley, CA.
- Braun-Blanquet, J. 1932/1951. Plant Sociology: the Study of Plant Communities. McGraw-Hill, New York, NY.
- Bossard, C.C., J.M. Randall, and M.C. Hoshovsky, editors. 2000. Invasive Plants of California Wildlands. UC Press: Berkeley, CA.
- Buck, J. 2004. Temporal Vegetation Dynamics in Central and Northern California Vernal Pools. Master's Thesis, Plant Biology Graduate Group, University of California, Davis.
- Buck-Diaz, J., B. Harbert and J. Evens. 2011. California rangeland monitoring and mapping: a focus on grassland habitats of the San Joaquin Valley and Carrizo Plain. Final report to the Natural Resources Conservation Service.
- Buck-Diaz, J., and J. Evens. 2011. Carrizo Plain National Monument Vegetation Classification and Mapping Project. California Native Plant Society, Sacramento. Final Report to Bureau of Land Management.
- Buck-Diaz, J., S. Batiuk, and J. M. Evens. 2012. Vegetation Alliances and Associations of the Great Valley Ecoregion, California. California Native Plant Society, Sacramento. Final report to the Geographical Information Center, Chico State University.
- California Department of Forestry and Fire Protection. 2013. Fire and Resource Assessment Program (FRAP). Fire Perimeters shapefile. Accessed 2013 from <http://frap.cdf.ca.gov/data/frapgisdata/select.asp?theme=5>
- California Invasive Plant Council. 2006. California Invasive Plant Inventory. Cal-IPC Publication 2006-02 Berkeley, CA. <http://www.cal-ipc.org/ip/inventory/index.php>. Accessed on January 7, 2011.
- California Native Plant Society (CNPS). 2013. Inventory of Rare and Endangered Plants (online edition, v8). California Native Plant Society. Sacramento, CA.
- Christian, C.E., L.R. Saslaw, J.F. Pollock, and D.F. Doak. in prep. Conditional impacts of livestock grazing on an arid California grassland.
- Deregibus, V.A., J.J. Casal, E.J. Jacob, D. Gibson, M. Kauffman, and A.M. Rodriguez. 1994. Evidence that heavy grazing may promote the germination of *Lolium multiflorum* seeds via phytochrome-mediated perception of high red/far-red ratios. Functional Ecology 8, 536-542.
- DiTomaso, J. M., E. A. Healy. 2007. Weeds of California and Other Western States. Regents of the University of California.

- Elkhorn Slough National Estuarine Research Reserve. 2000. Weed Control by Species. Elkhorn Slough Foundation, California. <http://www.elkhornslough.org/plants/restoration.htm>, accessed January 7, 2011.
- FGDC. 2008. National Vegetation Classification Standard, Version 2. FGDC-STD-005-2008. Federal Geographic Data Committee, Vegetation Committee. Reston, Virginia.
- Giessow, J., P. Zedler. 1996. The Effects of Fire Frequency and Firebreaks on the Abundance and Species Richness of Exotic Plant Species in Coastal Sage Scrub. In Proceedings of the California Exotic Pest Plant Council Symposium, Vol. 2.
- Holloran P., A. Mackenzie, S. Farrell & D. Johnson. 2004. The Weed Workers' Handbook: A Guide to Techniques for Removing Bay Area Invasive Plants. The Watershed Council and California Invasive Plant Council. Berkeley, CA.
- Huntsinger, L., J.W. Bartolome and C.M. D'Antonio. 2007. Chapter 20. Grazing management of California grasslands. In: Ecology and Management of California Grasslands, Corbin J, Stromberg M, and D'Antonio CM (eds). UC Press, Berkeley, CA.
- Janes, E.B. 1969. Botanical composition and productivity in the California annual grassland in relation to rainfall. Master's thesis. University of California Berkeley, CA.
- Jennings, M. D., D. Faber-Langendoen, R. K. Peet, O. L. Loucks, D. C. Glenn- Lewin, A. Damman, M. G. Barbour, R. Pfister, D. H. Grossman, D. Roberts, D. Tart, M. Walker, S. S. Talbot, J. Walker, G. S. Hartshorn, G. Waggoner, M. D. Abrams, A. Hill, and M. Rejmanek. 2003. Description, documentation, and evaluation of associations and alliances within the U.S. National Vegetation Classification, Version 5.1. Panel on Vegetation Classification, Ecological Society of America, Washington, DC.
- Keeley, J.E. 2001. Fire and invasives in mediterranean-climate ecosystems of California. Pages 81–94 in K.E.M. Galley and T.P. Wilson (eds) Proceedings of the Invasive Species Workshop: The Role of Fire in the Control and Spread of Invasive Species. Fire Conference 2000: The First National Congress on Fire Ecology, Prevention, and Management. Miscellaneous Publication No. 11, Tall Timbers Research Station, Tallahassee, FL.
- McCune, B. and J.B. Grace (with D.L. Urban). 2002. Analysis of ecological communities. MjM Software Design, Gleneden Beach, OR, US
- McCune, B. and M.J. Mefford. 1997. PC-Ord. Multivariate analysis of ecological data. Version 5.33. MJM Software Gleneden Beach, OR.
- McGraw, J. 2002. Management of rare native plants amidst exotic plant competition. In, M. Kelly, (ed.). Proceedings of the California Exotic Pest Plant Council Symposium. Vol. 6: 2000–2002.
- PRISM Climate Group. 2013. Oregon State University. Corvallis, Oregon. Accessed 2013 from <http://www.ocs.oregonstate.edu/prism/index.phtml>
- Sawyer, J.O., T. Keeler-Wolf, and J. Evens. 2009. A Manual of California Vegetation. California Native Plant Society, Sacramento, CA.

- The Nature Conservancy (TNC). 2009. Elemental Stewardship Abstracts.  
<http://www.imapinvasives.org/GIST/ESA/index.html> Accessed 2013.
- Turner, F.B. and Randall, D.C. 1989. Net production by shrubs and winter annuals in Southern Nevada. *J. Arid Environ.* 17:23–26.
- UC Davis. 2004. Encycloweedia. University of California, Davis, California Department of Food and Agriculture. [http://www.cdfa.ca.gov/phpps/ipc/encycloweedia/encycloweedia\\_hp.htm](http://www.cdfa.ca.gov/phpps/ipc/encycloweedia/encycloweedia_hp.htm)
- USDA-NRCS. 2013. The PLANTS Database (<http://plants.usda.gov>). National Plant Data Team, Greensboro, NC 27401-4901 USA.
- Vegetation Classification and Mapping Program. 2010. Metadata and Mapping Report, Vegetation of the California Department of Fish and Game Carrizo Plain Ecological Reserve, including the Chimineas, American, Panorama, and Elkhorn Units, San Luis Obispo County, California.
- Witham, C.W. 2004. Sacramento Valley Conservancy, Grazing Oral History. Prepared for Sacramento Valley Conservancy, Sacramento, CA

## APPENDIX A. CNPS FIELD SAMPLING PROTOCOL AND FIELD FORMS

### CALIFORNIA NATIVE PLANT SOCIETY / DEPARTMENT OF FISH AND GAME PROTOCOL FOR COMBINED VEGETATION RAPID ASSESSMENT AND RELEVÉ SAMPLING FIELD FORM (March 22, 2010)

#### Introduction

This protocol describes the methodology for both the relevé and rapid assessment vegetation sampling techniques as recorded in the combined relevé and rapid assessment field survey form dated March 22, 2010. The same environmental data are collected for both techniques. However, the relevé sample is plot-based, with each species in the plot and its cover being recorded. The rapid assessment sample is based not on a plot but on the entire stand, with 12–20 of the dominant or characteristic species and their cover values recorded. For more background on the relevé and rapid assessment sampling methods, see the relevé and rapid assessment protocols at [www.cnps.org](http://www.cnps.org).

#### **Selecting stands to sample:**

To start either the relevé or rapid assessment method, a stand of vegetation needs to be defined. A stand is the basic physical unit of vegetation in a landscape. It has no set size. Some vegetation stands are very small, such as alpine meadow or tundra types, and some may be several square kilometers in size, such as desert or forest types. A stand is defined by two main unifying characteristics:

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

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

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

Depending on the project goals, you may want to select just one or a few representative stands of each homogeneous vegetation type for sampling (*e.g.*, for developing a classification for a vegetation mapping project), or you may want to sample all of them (*e.g.*, to define a rare vegetation type and/or compare site quality between the few remaining stands).

*For the rapid assessment method, you will collect data based on the entire stand.*

#### **Selecting a plot to sample within in a stand (for relevés only):**

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

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

Selecting a plot requires that you see enough of the stand you are sampling to feel comfortable in choosing a representative plot location. Take a brief walk through the stand and look for variations in species composition and in stand structure. In many cases in hilly or mountainous terrain look for a vantage point from which you can get a representative view of the whole stand. Variations in vegetation that are repeated throughout the stand should be included in your plot. Once you assess the variation within the stand, attempt to find an area that captures the stand's common species composition and structural condition to sample.

### **Plot Size**

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

Herbaceous communities: 100 sq. m plot

Special herbaceous communities, such as vernal pools, fens: 10 sq m plot

Shrublands and Riparian forest/woodlands: 400 sq. m plot

Open desert and other shrublands with widely dispersed but regularly occurring woody species: 1000 sq. m plot

Upland Forest and woodland communities: 1000 sq. m plot

### **Plot Shape**

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

If we are sampling broad homogeneous stands, we would most likely choose a shape such as a circle (which has the advantage of the edges being equidistant to the center point) or a square (which can be quickly laid out using perpendicular tapes).

### **Definitions of fields in the protocol**

**Relevé or Rapid Assessment** Circle the method that you are using.

### **LOCATIONAL/ENVIRONMENTAL DESCRIPTION**

**Polygon/Stand #:** Number assigned either in the field or in the office prior to sampling. It is usually denoted with a four-letter abbreviation of the sampling location and then a four-number sequential number of that locale (e.g. CARR0001 for Carrizo sample #1). The maximum number of letters/numbers is eight.

**Air photo #:** The number given to the aerial photo in a vegetation-mapping project, for which photo interpreters have already done photo interpretation and delineations of polygons. If the sample site has not been photo-interpreted, leave blank.

**Date:** Date of the sampling.

**Name(s) of surveyors:** The full names of each person assisting should be provided for the first field form for the day. On successive forms, initials of each person assisting can be recorded. Please note: The person recording the data on the form should circle their name/initials.

**GPS waypoint #:** The waypoint number assigned by a Global Positioning System (GPS) unit when marking and storing a waypoint for the sample location. Stored points should be downloaded in the office to serve as a check on the written points and to enter into a GIS.

*For relevé plots, take the waypoint in the southwest corner of the plot or in the center of a circular plot.*

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

**Datum: (NAD 83)** The standard GPS datum used is NAD 83. If you are using a different datum, note it here.

**Bearing, left axis at SW pt (note in degrees) of Long or Short side:** For square or rectangular plots: from the SW corner (= the GPS point location), looking towards the plot, record the bearing of the axis to your left. If the plot is a rectangle, indicate whether the left side of the plot is the long or short side of the rectangle by circling "long" or "short" side (no need to circle anything for circular or square plots). If there are no stand constraints, you would choose a circular or square plot and straight-sided plots should be set up with boundaries running in the cardinal directions. If you choose a rectangular plot that is not constrained by the stand dimensions, the short side should run from east to west, while the long side should run from north to south.

**UTM coordinates:** Easting (UTME) and northing (UTMN) location coordinates using the Universal Transverse Mercator (UTM) grid. Record in writing the information from a GPS unit or a USGS topographic map.

**UTM zone:** Universal Transverse Mercator zone. Zone 10 is for California west of the 120<sup>th</sup> longitude, zone 11 is for California east of 120<sup>th</sup> longitude, which is the same as the straight portion of California's eastern boundary.

**Error: ±** The accuracy of the GPS location, when taking the UTM field reading. Please record the error units by circling feet (ft), meters (m), or positional dilution of precision (pdop). If your GPS does not determine error, insert N/A in this field.

**Is GPS within stand? Yes / No** Circle "Yes" to denote that the GPS waypoint was taken directly within or at the edge of the stand being assessed for a rapid assessment, or circle "No" if the waypoint was taken at a distance from the stand (such as with a binocular view of the stand).

**If No, cite from waypoint to stand, distance (note in meters) & bearing (note in degrees):** An estimate of the number of meters and the compass bearing from the GPS waypoint to the stand.

**Elevation:** Recorded from the GPS unit or USGS topographic map. Please circle feet (ft) or meters (m).

**Photograph #s:** Write the name or initials of the camera owner, JPG/frame number, and direction of photos (note the roll number if using film). *Take four photos in the main cardinal directions (N, E, S, W) clockwise from the north, from the GPS location.* If additional photos are taken in other directions, please note this information on the form.

**Stand Size:** Estimate the size of the entire stand in which the sample is taken. As a measure, one acre is about 4000 square meters (approximately 64 x 64 m), or 208 feet by 208 feet. One acre is similar in size to a football field.

**Plot Size:** If this is a relevé, circle the size of the plot.

**Plot Shape:** Record the length and width of the plot and circle measurement units (i.e., ft or m). If it is a circular plot, enter radius (or just put a check mark in the space).

**Exposure:** (Enter actual ° and circle general category): With your back to the general uphill direction of the slope (i.e., by facing downhill of the slope), read degrees of the compass for the aspect or the direction you are standing, using degrees from north, adjusted for declination. Average the reading over the entire stand, even if you are sampling a relevé plot, since your plot is representative of the stand. If estimating the exposure, write “N/A” for the actual degrees, and circle the general category chosen. “Variable” may be selected if the same, homogenous stand of vegetation occurs across a varied range of slope exposures. Select “all” if stand is on top of a knoll that slopes in all directions or if the same, homogenous stand of vegetation occurs across all ranges of slope.

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

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

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

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

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

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

- % Water:** Estimate the percent surface cover of running or standing water, ignoring the substrate below the water.
- % BA Stems:** Percent surface cover of the plant basal area, *i.e.*, the basal area of stems at the ground surface. Note that for most vegetation types BA is 1–3% cover.
- % Litter:** Percent surface cover of litter, duff, or wood on the ground.
- % Bedrock:** Percent surface cover of bedrock.
- % Boulders:** Percent surface cover of rocks > 60 cm in diameter.
- % Stone:** Percent surface cover of rocks 25–60 cm in diameter.
- % Cobble:** Percent surface cover of rocks 7.5 to 25 cm in diameter.
- % Gravel:** Percent surface cover of rocks 2 mm to 7.5 cm in diameter.
- % Fines:** Percent surface cover of bare ground and fine sediment (e.g. dirt) < 2 mm in diameter.

**% Current year bioturbation:** Estimate the percent of the sample or stand exhibiting soil disturbance by fossorial organisms (any organism that lives underground). Do not include disturbance by ungulates. Note that this is a separate estimation from surface cover.

**Past bioturbation present?** Circle Yes if there is evidence of bioturbation from previous years.

**% Hoof punch:** Note the percent of the sample or stand surface that has been punched down by hooves (cattle or native grazers) in wet soil.

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

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

**Disturbance code / Intensity (L,M,H):** List codes for potential or existing impacts on the stability of the plant community. Characterize each impact each as **L** (=Light), **M** (=Moderate), or **H** (=Heavy). For invasive exotics, divide the total exotic cover (e.g. 25% *Bromus diandrus* + 8% *Bromus madritensis* + 5% *Centaurea melitensis* = 38% total exotics) by the total % cover of all the layers when added up (e.g. 15% tree + 5% low tree + 25% shrub + 40% herbs = 85% total) and multiply by 100 to get the % relative cover of exotics (e.g. 38% total exotics/85% total cover = 45% relative exotic cover). L = 0–33% relative cover of exotics; M = 34–66% relative cover, and H = > 66% relative cover. See code list for impacts.

## II. HABITAT AND VEGETATION DESCRIPTION per California Wildlife-Habitat Relationships (CWHR)

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

**Tree DBH:** Record tree size classes when the tree canopy closure exceeds 10 percent of the total cover (except in desert types), or if young tree density indicates imminent tree dominance. Size class is based on the average diameter at breast height (dbh) of each trunk (standard breast height is 4.5ft/137cm). When marking the main size class, make sure to estimate the mean diameter of all trees over the entire stand, and weight the mean if there are some larger tree dbh's. The "**T6 multi-layered**" dbh size class contains a multi-layered tree canopy (with a size class T3 and/or T4 layer growing under a T5 layer and a distinct height separation between the classes) exceeding 60% total cover. Stands in the T6 class need also to contain at least 10% cover of size class 5 (>24" dbh) trees growing over a distinct layer with at least 10% combined cover of trees in size classes 3 or 4 (>11–24" dbh).

**Shrub** (mark one): Record shrub size classes when shrub canopy closure exceeds 10 percent (except in desert types). You can record shrub size class by circling the class that is predominant in the survey. Shrub size class is based on the average amount of crown decadence (dead standing vegetation on live shrubs when looking across the crowns of the shrubs).

**Herb** (mark one): Record herb height when herbaceous cover exceeds 2 percent. You can record herb class by the size class that is predominant in the survey (H1 or H2). *This height class is based on the average plant height at maturity, not necessarily at the time of observation.*

### **Overall cover of vegetation**

Provide an estimate of cover for the following categories below (based on functional life forms). Record a specific number for the total aerial cover or "bird's-eye view" looking from above for each category, estimating cover for the living plants only. Litter/duff should not be included in these estimates. The porosity of the vegetation should be taken into consideration when estimating percent cover (how much of

the sky can you see when you are standing under the canopy of a tree, or how much light passes through the canopy of the shrub layer?).

To come up with a specific number estimate for percent cover, first use to the following CWHR cover intervals as a reference aid to get a generalized cover estimate: <2%, 2–9%, 10–24%, 25–39%, 40–59%, 60–100%. While keeping these intervals in mind, you can then refine your estimate to a specific percentage for each category below.

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

**% Total Vasc Veg cover:** The total cover of all vascular vegetation taking into consideration the porosity, or the holes, in the vegetation. This is an estimate of the absolute vegetation cover, disregarding overlap of the various tree, shrub, and/or herbaceous layers and species.

### **% Cover**

**% Conifer Tree /Hardwood Tree:** The total foliar cover (considering porosity) of all live tree species, disregarding overlap of individual trees. Estimate conifer and hardwood covers separately.

**Please note:** These cover values should not include the coverage of regenerating tree species (i.e., tree seedlings and saplings).

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

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

**%Herbaceous:** The total cover (considering porosity) of all graminoid species (grasses, sedges, etc.), disregarding overlap of individual herbs. The total cover (considering porosity) of all forb species, disregarding overlap of individual herbs.

### **Height Class**

Modal height for conifer tree /hardwood tree, shrub, and herbaceous categories: Provide an estimate of height for each category listed. Record an average height value per each category by estimating the mean height for each group. Please use the following height intervals to record a height class: 01 =< 1/2m, 02=1/2-1m, 03 = 1-2 m, 04 = 2-5 m, 05 = 5-10 m, 06 = 10-15 m, 07 = 15-20 m, 08 = 20-35 m, 09 = 35-50 m, 10 => 50m.

### **Species list and coverage**

**For rapid assessments,** list the 10–20 species that are dominant or that are characteristically consistent throughout the stand. These species may or may not be abundant, but they should be constant representatives in the survey. When different layers of vegetation occur in the stand, make sure to list species from each stratum. As a general guide, make sure to list at least 1–2 of the most abundant species per stratum.

**For relevés,** list all species present in the plot, using the second species list page if necessary.

For both sample types, provide the stratum where:

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

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

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

**E = Seedling.** A tree species clearly of a very young age that is less than 1" dbh.

**A = Sapling.** 1" – <6" dbh and young in age, OR small trees that are less than 1" diameter at breast height and are clearly of appreciable age and kept short by repeated browsing or burning.

**N = Non-vascular.** Includes mosses, liverworts, hornworts, cryptogamic crust, lichens, and algae.

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

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

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

Use Jepson Manual nomenclature. Write out the genus and species of the plant. Do not abbreviate. When uncertain of an identification (which you intend to confirm later) use parentheses to indicate what part of the determination needs to be confirmed. For example, you could write out *Brassica (nigra)* if you are sure it is a *Brassica* but you need further clarification on the specific epithet.

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

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

Keeping these classes in mind, then refine your estimate to a specific percentage. All species percent covers may total over 100% because of overlap.

Include the percent cover of snags (standing dead) of trees and shrubs. Note their species, if known, in the "Stand history, stand age and comments" section.

For rapid assessments, make sure that the major non-native species occurring in the stand also are listed in the space provided in the species list with their strata and % cover. For relevés, all non-native species should be included in the species list.

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

## INTERPRETATION OF STAND

**Field-assessed vegetation alliance name:** Name of alliance or habitat following the most recent CNPS classification system or the Manual of California Vegetation (Sawyer J.O., Keeler-Wolf T., and Evens, J. 2009). Please use scientific nomenclature, e.g., *Quercus agrifolia* forest. An alliance is based on the dominant or diagnostic species of the stand, and is usually of the uppermost and/or dominant height stratum. A dominant species covers the greatest area. A diagnostic species is consistently found in some vegetation types but not others.

Please note: The field-assessed alliance name may not exist in the present classification, in which case you can provide a new alliance name in this field. If this is the case, also make sure to state that it is not in the MCV under the explanation for “Confidence in alliance identification.”

**Field-assessed association name** (optional): Name of the species in the alliance and additional dominant/diagnostic species from any strata, as according to CNPS classification. In following naming conventions, species in differing strata are separated with a slash, and species in the uppermost stratum are listed first (e.g., *Quercus douglasii*/*Toxicodendron diversilobum*). Species in the same stratum are separated with a dash (e.g., *Quercus lobata*-*Quercus douglasii*).

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

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

**Confidence in Identification: (L, M, H)** With respect to the “field-assessed alliance name”, note whether you have L (=Low), M (=Moderate), or H (=High) confidence in the interpretation of this alliance name.

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

**Phenology:** Indicate early (E), peak (P) or late (L) phenology for each of the strata.

**Other identification problems or mapping issues:** Discuss any further problems with the identification of the assessment or issues that may be of interest to mappers. Note if this sample represents a type that is likely too small to map. If it does, how much of the likely mapping unit would be comprised of this type. For example: “this sample represents the top of kangaroo rat precincts in this general area, which are surrounded by vegetation represented by CARR000x; this type makes up 10% of the mapping unit.”

**Is polygon >1 type: Yes / No** (circle one): In areas that have been delineated as polygons on aerial photographs/imagery for a vegetation-mapping project, assess if the polygon is mapped as a single stand. “Yes” is noted when the polygon delineated contains the field-assessed alliance and other vegetation type(s), as based on species composition and structure. “No” is noted when the polygon is primarily representative of the field-assessed alliance.

**If yes, explain:** If “Yes” above, explain the other vegetation alliances that are included within the polygon, and explain the amount and location that they cover in the polygon.



**APPENDIX B. SPECIES LIST OF SCIENTIFIC AND COMMON NAMES FOR ALL TAXA IDENTIFIED IN THE 2011–2012 VEGETATION SURVEYS**

Sites Include: Agua Fria Ranch (AGUA), Bitter Creek NWR (BTCR), Carrizo National NM (CARR), Deer Creek Hills (DCH), Dutchman's Creek (DUTC), Flying M Ranch (FLYM), Lokern Preserve (LOKE), Madera Ranch (MADR), Rominger Ranch (ROMI), Semitropic Ridge (SEMI), Tejon Ranch (TEJO), Viera Ranch (SAND), and Wind Wolves Preserve (WIND)

Code	Scientific Name	Common Name	Sites
ACMI2	<i>Achillea millefolium</i>	common yarrow	BTCR, WIND
ACMO2	<i>Achyrrachaena mollis</i>	blow wifes	AGUA, CARR, ROMI, WIND
AETR	<i>Aegilops triuncialis</i> *	barbed goatgrass	DCH
AGOSE	<i>Agoseris</i> sp.	agoseris	WIND
AGGR	<i>Agoseris grandiflora</i>	bigflower agoseris	BTCR, CARR
AGEL4	<i>Agrostis elliotiana</i>	Elliott's bentgrass	DCH
AICA	<i>Aira caryophyllea</i> *	silver hairgrass	DCH
2ALGA	<i>Alga</i>	algae	CARR, FLYM, MDRA
ALOC2	<i>Allenrolfea occidentalis</i>	iodinebush	MDRA
ALLIU	<i>Allium</i> sp.	onion	CARR
ALHO2	<i>Allium howellii</i>	Howell's onion	CARR
ALLA3	<i>Allium lacunosum</i>	pitted onion	CARR
ALGI	<i>Allophyllum gilviflorum</i>	dense false gilyflower	WIND
ALSA3	<i>Alopecurus saccatus</i>	Pacific foxtail	MDRA
AMARA	<i>Amaranthus</i> sp.	pigweed	AGUA
AMCA	<i>Amaranthus californicus</i>	California amaranth	SEMI
AMSIN	<i>Amsinckia</i> sp.	fiddleneck	AGUA, BTCR, CARR, WIND
AMEA2	<i>Amsinckia eastwoodiae</i>	Eastwood's fiddleneck	TEJO
AMME	<i>Amsinckia menziesii</i>	Menzies' fiddleneck	BTCR, CARR, DCH, DUTC, FLYM, LOKE, MDRA, ROMI, SEMI, TEJO, WIND
AMMEI2	<i>Amsinckia menziesii</i> var. <i>intermedia</i>	common fiddleneck	CARR, DUTC, SEMI
AMMEM2	<i>Amsinckia menziesii</i> var. <i>menziesii</i>	Menzies' fiddleneck	CARR, FLYM, LOKE, SEMI, TEJO, WIND
AMTE3	<i>Amsinckia tessellata</i>	bristly fiddleneck	CARR, WIND
AMTET	<i>Amsinckia tessellata</i> var. <i>tessellata</i>	bristly fiddleneck	CARR, LOKE, SEMI, WIND
ANAR	<i>Anagallis arvensis</i> *	scarlet pimpernel	AGUA, DCH
ANMI4	<i>Anagallis minima</i>	chaffweed	DCH
APAR2	<i>Aphanes occidentalis</i>	field parsley piert	DCH, ROMI
ASCLE	<i>Asclepias</i> sp.	milkweed	AGUA, WIND
ASCA3	<i>Asclepias californica</i>	California milkweed	WIND
ASER	<i>Asclepias eriocarpa</i>	woollypod milkweed	WIND
ASFA	<i>Asclepias fascicularis</i>	Mexican whorled milkweed	MDRA
ASVE2	<i>Asclepias vestita</i>	woolly milkweed	AGUA
ASTRA	<i>Astragalus</i> sp.	milkvetch	MDRA

Code	Scientific Name	Common Name	Sites
ASDI3	<i>Astragalus didymocarpus</i>	dwarf white milkvetch	BTCR, CARR, LOKE, MDRA, SEMI, WIND
ASGA	<i>Astragalus gambelianus</i>	Gambel's dwarf milkvetch	TEJO
ASLE8	<i>Astragalus lentiginosus</i>	freckled milkvetch	CARR
ASLEN	<i>Astragalus lentiginosus</i> var. <i>nigricalycis</i>	freckled milkvetch	CARR, LOKE, WIND
ASOX	<i>Astragalus oxyphysus</i>	Mt. Diablo milkvetch	CARR
ATPU	<i>Athysanus pusillus</i>	common sandweed	BTCR, WIND
ATRIP	<i>Atriplex</i> sp.	saltbush	CARR, DUTC, MDRA, SEMI, WIND
ATPO	<i>Atriplex polycarpa</i>	cattle saltbush	CARR, LOKE
ATSP	<i>Atriplex spinifera</i>	spinescale saltbush	CARR
ATVA	<i>Atriplex vallicola</i>	Lost Hills saltbush	CARR
AVENA	<i>Avena</i> sp. *	oat	DUTC, FLYM
AVBA	<i>Avena barbata</i> *	slender oat	AGUA, BTCR, CARR, DCH, FLYM, ROMI, TEJO, WIND
AVFA	<i>Avena fatua</i> *	wild oat	BTCR, CARR, DUTC, ROMI, WIND
BADE2	<i>Balsamorhiza deltoidea</i>	deltoid balsamroot	BTCR
BLCR	<i>Bloomeria crocea</i>	common goldenstar	WIND
BOCAC	<i>Bombycilaena californica</i> var. <i>californica</i>	q-tips	AGUA, DCH
BRDI2	<i>Brachypodium distachyon</i> *	purple false brome	DCH, SEMI
BRNI	<i>Brassica nigra</i> *	black mustard	DUTC
BRMI2	<i>Briza minor</i> *	little quakinggrass	DCH, FLYM
BRODI	<i>Brodiaea</i> sp.	brodiaea	DCH
BROMU	<i>Bromus</i> sp. *	brome	AGUA, BTCR, DCH, MDRA, WIND
BRAR3	<i>Bromus arenarius</i> *	Australian brome	AGUA, BTCR, CARR, MDRA, WIND
BRAR4	<i>Bromus arizonicus</i> *	Arizona brome	LOKE
BRBE6	<i>Bromus berterioanus</i> *	Chilean chess	BTCR, LOKE
BRCA5	<i>Bromus carinatus</i>	California brome	BTCR
BRCA6	<i>Bromus catharticus</i> *	rescuegrass	BTCR, WIND
BRDI3	<i>Bromus diandrus</i> *	ripgut brome	AGUA, BTCR, CARR, DCH, DUTC, FLYM, MDRA, ROMI, TEJO, WIND
BRHO2	<i>Bromus hordeaceus</i> *	soft brome	AGUA, BTCR, CARR, DCH, DUTC, FLYM, MDRA, ROMI, TEJO, SAND, WIND
BRMA3	<i>Bromus madritensis</i> *	compact brome	BTCR, CARR
BRRU2	<i>Bromus rubens</i> *	red brome	AGUA, BTCR, CARR, DCH, DUTC, FLYM, LOKE, MDRA, ROMI, SEMI, TEJO, WIND
BRTE	<i>Bromus tectorum</i> *	cheatgrass	BTCR, CARR, WIND
CACI2	<i>Calandrinia ciliata</i>	fringed redmaids	CARR, DCH, DUTC,

Code	Scientific Name	Common Name	Sites
			FLYM, ROMI, WIND
CAMA3	<i>Callitriche marginata</i>	winged water-starwort	MDRA
CALOC	<i>Calochortus</i> sp.	mariposa lily	WIND
CAVE3	<i>Calochortus venustus</i>	butterfly mariposa lily	WIND
CAMAM4	<i>Calystegia malacophylla</i> ssp. <i>malacophylla</i>	Sierra false bindweed	WIND
CAMIS	<i>Camissonia</i> sp.	suncup	BTCCR, CARR, WIND
CABOD	<i>Camissonia boothii</i> ssp. <i>decorticans</i>	shredding suncup	WIND
CACA33	<i>Camissonia campestris</i>	Mojave suncup	CARR, LOKE, WIND
CACO34	<i>Camissonia contorta</i>	plains evening primrose	CARR
CAGR14	<i>Camissonia graciliflora</i>	hill suncup	CARR, WIND
CAKEG	<i>Camissonia kernensis</i> ssp. <i>gilmanii</i>	Gilman's evening primrose	LOKE
CAPA39	<i>Camissonia parvula</i>	Lewis River suncup	TEJO
CABU2	<i>Capsella bursa-pastoris</i> *	shepherd's purse	AGUA, CARR, DUTC, FLYM, ROMI, SEMI
CAPY2	<i>Carduus pycnocephalus</i> *	Italian plumeless thistle	DCH, ROMI
CASTI2	<i>Castilleja</i> sp.	Indian paintbrush	CARR, MDRA
CAAT25	<i>Castilleja attenuata</i>	attenuate Indian paintbrush	CARR, DCH, DUTC, FLYM, TEJO
CABR37	<i>Castilleja brevistyla</i>	shortstyle Indian paintbrush	SEMI
CADE29	<i>Castilleja densiflora</i>	denseflower Indian paintbrush	CARR, SEMI
CAEX14	<i>Castilleja exserta</i>	exserted Indian paintbrush	CARR, MDRA, TEJO, WIND
CAEXE	<i>Castilleja exserta</i> ssp. <i>exserta</i>	exserted Indian paintbrush	CARR, SEMI, TEJO
CAAN25	<i>Caulanthus anceps</i>	Lemmon's mustard	CARR
CEME2	<i>Centaurea melitensis</i> *	Maltese star-thistle	AGUA, CARR, MDRA, WIND
CESO3	<i>Centaurea solstitialis</i> *	yellow star-thistle	DCH, ROMI
CEPU14	<i>Centromadia pungens</i>	common tarweed	SEMI
CEPUP6	<i>Centromadia pungens</i> ssp. <i>pungens</i>	common tarweed	DUTC, MDRA, SEMI, SAND
CEGL2	<i>Cerastium glomeratum</i> *	sticky chickweed	DCH, DUTC, FLYM, MDRA, ROMI, WIND
CHAEN	<i>Chaenactis</i> sp.	pincushion	CARR, WIND
CHGL	<i>Chaenactis glabriuscula</i>	yellow pincushion	WIND
CHGLG2	<i>Chaenactis glabriuscula</i> var. <i>glabriuscula</i>	yellow pincushion	TEJO
CHST	<i>Chaenactis stevioides</i>	Esteve's pincushion	WIND
CHAMA15	<i>Chamaesyce</i> sp.	sandmat	CARR
CHOC	<i>Chamaesyce ocellata</i>	Contura Creek sandmat	AGUA, DCH, WIND
CHOCO	<i>Chamaesyce ocellata</i> ssp. <i>ocellata</i>	Contura Creek sandmat	WIND
CHENO	<i>Chenopodium</i> sp.	goosefoot	SEMI

Code	Scientific Name	Common Name	Sites
CHAN2	<i>Chlorogalum angustifolium</i>	narrowleaf soap plant	DCH, WIND
CHOR12	<i>Chorizanthe</i> sp.	spineflower	CARR, WIND
CHPO4	<i>Chorizanthe polygonoides</i>	knotweed spineflower	CARR
CHPOP5	<i>Chorizanthe polygonoides</i> var. <i>polygonoides</i>	knotweed spineflower	CARR
CHUN	<i>Chorizanthe uniaristata</i>	oneawn spineflower	CARR
CIQU3	<i>Cicendia quadrangularis</i>	Oregon timwort	DCH, FLYM
CIVU	<i>Cirsium vulgare</i> *	bull thistle	WIND
CLARK	<i>Clarkia</i> sp.	clarkia	BTCR, CARR, MDRA, WIND
CLAF	<i>Clarkia affinis</i>	chaparral clarkia	AGUA
CLCY	<i>Clarkia cylindrica</i>	speckled clarkia	BTCR, CARR, WIND
CLCYC2	<i>Clarkia cylindrica</i> ssp. <i>cylindrica</i>	speckled clarkia	BTCR, WIND
CLPU2	<i>Clarkia purpurea</i>	winecup clarkia	WIND
CLPUQ	<i>Clarkia purpurea</i> ssp. <i>quadrivulnera</i>	winecup clarkia	CARR
CLTET	<i>Clarkia tembloriensis</i> ssp. <i>tembloriensis</i>	Temblor Range clarkia	CARR
CLPE	<i>Claytonia perfoliata</i>	miner's lettuce	BTCR, CARR, WIND
CLIS	<i>Cleome isomeris</i>	bladderpod spiderflower	WIND
COLLI	<i>Collinsia</i> sp.	blue eyed Mary	BTCR
COHE	<i>Collinsia heterophylla</i>	purple Chinese houses	SEMI
CONVO	<i>Convolvulus</i> sp. *	bindweed	WIND
COCA9	<i>Leptosyne calliopsidea</i>	leafstem tickseed	CARR
COFI2	<i>Corethrogyne filaginifolia</i>	common sandaster	BTCR, CARR, WIND
CRAQ	<i>Crassula aquatica</i>	water pygmyweed	MDRA, SAND
CRCO34	<i>Crassula connata</i>	sand pygmyweed	AGUA, CARR, DUTC, FLYM, LOKE, MDRA, ROMI, SEMI, TEJO, SAND
CRTI	<i>Crassula tillaea</i> *	moss pygmyweed	DCH, DUTC, FLYM
CRTR5	<i>Cressa truxillensis</i>	spreading alkaliweed	CARR, MDRA
CRSE11	<i>Croton setigerus</i>	dove weed	AGUA, BTCR, CARR, DCH, DUTC, FLYM, LOKE, MDRA, ROMI, TEJO, SAND, WIND
CRYPS	<i>Crypsis</i> sp.	pricklegrass	ROMI
CRYPT	<i>Cryptantha</i> sp.	cryptantha	WIND
CRFL4	<i>Cryptantha flaccida</i>	weakstem cryptantha	WIND
CRMI3	<i>Cryptantha microstachys</i>	Tejon cryptantha	CARR
CRNER	<i>Cryptantha nevadensis</i> var. <i>rigida</i>	Nevada cryptantha	BTCR, WIND
CRYPTO	Cryptogamic crust	crytobiotic crust	AGUA, CARR, DCH, DUTC, FLYM, LOKE, MDRA, SEMI, SAND
CUSAS	<i>Cuscuta salina</i> var. <i>salina</i>	saltmarsh dodder	MDRA
DAPU3	<i>Daucus pusillus</i>	American wild carrot	CARR, DCH, ROMI
DEINA2	<i>Deinandra</i> sp.	tarweed	BTCR, WIND
DEPA17	<i>Deinandra pallida</i>	Kern tarweed	WIND

Code	Scientific Name	Common Name	Sites
DEPE5	<i>Deinandra pentactis</i>	Salinas River tarweed	CARR
DELPH	<i>Delphinium</i> sp.	larkspur	BTCR, CARR, MDRA
DERE2	<i>Delphinium recurvatum</i>	Byron larkspur	CARR, SEMI
DEDA	<i>Deschampsia danthonioides</i>	annual hairgrass	DUTC, FLYM, MDRA, SEMI, SAND
DESCU	<i>Descurainia</i> sp. *	tansymustard	CARR
DESO2	<i>Descurainia sophia</i> *	herb sophia	CARR
DICHE2	<i>Dichelostemma</i> sp.	snakelily	DCH, WIND
DICA14	<i>Dichelostemma capitatum</i>	bluedicks	CARR, DUTC, FLYM, MDRA, SEMI, TEJO, WIND
DICAC5	<i>Dichelostemma capitatum</i> ssp. <i>capitatum</i>	bluedicks	SEMI
DISP	<i>Distichlis spicata</i>	saltgrass	AGUA, BTCR, CARR, DUTC, MDRA, SEMI, SAND, WIND
EAEL	<i>Eastwoodia elegans</i>	yellow aster	BTCR
ELCA	<i>Elatine californica</i>	California waterwort	MDRA, SAND
ELAC	<i>Eleocharis acicularis</i>	needle spikerush	SAND
ELMA5	<i>Eleocharis macrostachya</i>	pale spikerush	MDRA, ROMI
ELYMU	<i>Elymus</i> sp.	wildrye	DCH, WIND
ELEL5	<i>Elymus elymoides</i>	squirreltail	BTCR, WIND
ELMU3	<i>Elymus multisetus</i>	big squirreltail	BTCR, CARR, WIND
EPILO	<i>Epilobium</i> sp.	willowherb	DCH, MDRA
EPBR3	<i>Epilobium brachycarpum</i>	tall annual willowherb	WIND
EPTO4	<i>Epilobium torreyi</i>	Torrey's willowherb	DCH
ERPA14	<i>Eremalche parryi</i>	Parry's mallow	CARR
ERPAK	<i>Eremalche parryi</i> ssp. <i>kernensis</i>	Kern mallow	LOKE
ERPL2	<i>Eriastrum pluriflorum</i>	Tehachapi woollystar	BTCR, CARR
ERLI6	<i>Ericameria linearifolia</i>	narrowleaf goldenbush	BTCR
ERFO2	<i>Erigeron foliosus</i>	leafy fleabane	WIND
ERIOG	<i>Eriogonum</i> sp.	buckwheat	BTCR, CARR, LOKE, TEJO, WIND
ERAN3	<i>Eriogonum angulosum</i>	anglestem buckwheat	WIND
ERGR6	<i>Eriogonum gracillimum</i>	rose and white buckwheat	CARR
ERNU3	<i>Eriogonum nudum</i>	naked buckwheat	WIND
ERTE15	<i>Eriogonum temblorense</i>	Temblor buckwheat	CARR
ERTRH	<i>Eriogonum trichopes</i> var. <i>hooveri</i>	Hoover's deserttrumpet	CARR
ERODI	<i>Erodium</i> sp. *	stork's bill	DUTC, MDRA, SAND
ERBO	<i>Erodium botrys</i> *	longbeak stork's bill	AGUA, CARR, DCH, DUTC, FLYM, TEJO, SAND
ERBR14	<i>Erodium brachycarpum</i> *	shortfruit stork's bill	AGUA, CARR, DUTC, FLYM, MDRA, ROMI, TEJO, WIND
ERCI6	<i>Erodium cicutarium</i> *	redstem stork's bill	All
ERMO7	<i>Erodium moschatum</i> *	musky stork's bill	AGUA, DCH, DUTC, FLYM, LOKE, MDRA,

Code	Scientific Name	Common Name	Sites
			ROMI, SEMI, TEJO
ERYNG	<i>Eryngium</i> sp.	eryngo	AGUA
ERCA33	<i>Eryngium castrense</i>	Great Valley eryngo	FLYM, SAND
ERVA5	<i>Eryngium vaseyi</i>	coyotethistle	MDRA
ERCA14	<i>Erysimum capitatum</i>	sanddune wallflower	WIND
ESCHS	<i>Eschscholzia</i> sp.	California poppy	BTCR, WIND
ESCA2	<i>Eschscholzia californica</i>	California poppy	BTCR, CARR, WIND
ESLE	<i>Eschscholzia lemmonii</i>	Lemmon's poppy	BTCR, WIND
FILAG	<i>Filago</i> sp. *	cottonrose	CARR
2FORB	Forb (herbaceous, not grass nor grasslike)	unknown forb	AGUA, BTCR, CARR, DCH, DUTC, LOKE, MDRA, SEMI, TEJO, WIND
FRSA	<i>Frankenia salina</i>	alkali seaheath	AGUA, CARR, MDRA, SEMI
GALIU	<i>Galium</i> sp.	bedstraw	DCH, WIND
GAAP2	<i>Galium aparine</i>	stickywilly	BTCR, WIND
GAPA5	<i>Galium parisiense</i> *	wall bedstraw	DCH, ROMI
GAPH2	<i>Gastridium phleoides</i> *	nit grass	DCH
GEDI	<i>Geranium dissectum</i> *	cutleaf geranium	ROMI
GEMO	<i>Geranium molle</i> *	dovefoot geranium	DCH
GILIA	<i>Gilia</i> sp.	gilia	BTCR, CARR, MDRA
GICA5	<i>Gilia capitata</i>	bluehead gilia	WIND
GITR2	<i>Gilia tricolor</i>	bird's-eye gilia	CARR, DCH, SEMI, TEJO, WIND
GNAPH	<i>Gnaphalium</i>	cudweed	MDRA
GNPA	<i>Gnaphalium palustre</i>	western marsh cudweed	LOKE
2GRAM	Graminoid (grass or grasslike)	unknown graminoid	SEMI
GRCA	<i>Grindelia camporum</i>	Great Valley gumweed	CARR
GUILL2	<i>Guillenia</i> sp.	mustard	CARR
GULA4	<i>Guillenia lasiophylla</i>	California mustard	CARR, LOKE
GUCA	<i>Gutierrezia californica</i>	San Joaquin snakeweed	CARR
HECR2	<i>Hedynois cretica</i> *	Cretanweed	FLYM
HEAN3	<i>Helianthus annuus</i>	common sunflower	WIND
HEMIZ	<i>Hemizonia</i> sp.	tarweed	CARR, DUTC
HEFI	<i>Hemizonia fitchii</i>	Fitch's tarweed	DCH
HEHI7	<i>Herniaria hirsuta</i> *	hairy rupturewort	BTCR, CARR, MDRA
HEHIC	<i>Herniaria hirsuta</i> ssp. <i>cinerea</i> *	hairy rupturewort	AGUA, BTCR, CARR, SEMI, WIND
HECA30	<i>Hesperevax caulescens</i>	dwarf dwarf-cudweed	ROMI
HESPS2	<i>Hesperevax sparsiflora</i> var. <i>sparsiflora</i>	erect dwarf-cudweed	ROMI
HEUN3	<i>Heterodraba unilateralis</i>	ladiestongue mustard	CARR
HIIN3	<i>Hirschfeldia incana</i> *	shortpod mustard	BTCR, CARR
HOLA2	<i>Hollisteria lanata</i>	false spikeflower	CARR
HOOB	<i>Holocarpha obconica</i>	San Joaquin tarweed	AGUA
HOVI	<i>Holocarpha virgata</i>	yellowflower tarweed	DCH, FLYM

Code	Scientific Name	Common Name	Sites
HORDE	<i>Hordeum</i> sp.	barley	MDRA
HOBR2	<i>Hordeum brachyantherum</i>	meadow barley	MDRA, WIND
HODE2	<i>Hordeum depressum</i>	dwarf barley	DUTC, MDRA, SEMI, SAND
HOMA2	<i>Hordeum marinum</i> *	seaside barley	AGUA, DCH, DUTC, FLYM, MDRA, SAND, WIND
HOMAG	<i>Hordeum marinum</i> ssp. <i>gussonianum</i> *	Mediterranean barley	AGUA, DCH, DUTC, FLYM
HOMU	<i>Hordeum murinum</i> *	mouse barley	AGUA, BTCR, CARR, DCH, DUTC, LOKE, MDRA, SEMI, TEJO, SAND, WIND
HOMUG	<i>Hordeum murinum</i> ssp. <i>glaucum</i> *	smooth barley	CARR, SEMI
HOMUL	<i>Hordeum murinum</i> ssp. <i>leporinum</i> *	hare barley	AGUA, DUTC, FLYM, ROMI, SAND
HOMUM	<i>Hordeum murinum</i> ssp. <i>murinum</i> *	wall barley	CARR
HOPR4	<i>Hornungia procumbens</i> *	prostrate hutchinsia	CARR
HYPER	<i>Hypericum</i> sp.*	St. Johnswort	DCH
HYPE	<i>Hypericum perforatum</i> *	common St. Johnswort	DCH
HYPOC	<i>Hypochaeris</i> sp.*	cat's ear	FLYM
HYGL2	<i>Hypochaeris glabra</i> *	smooth cat's ear	AGUA, DCH, DUTC, FLYM, ROMI, TEJO
HYRA3	<i>Hypochaeris radicata</i> *	hairy cat's ear	FLYM
ISAC2	<i>Isocoma acradenia</i>	alkali goldenbush	CARR, MDRA, SEMI, WIND
ISACB	<i>Isocoma acradenia</i> var. <i>bracteosa</i>	alkali goldenbush	CARR, MDRA, SEMI, WIND
JUNCU	<i>Juncus</i> sp.	rush	BTCR
JUBU	<i>Juncus bufonius</i>	toad rush	CARR, DCH, DUTC, FLYM, MDRA, SEMI
JUCA5	<i>Juncus capitatus</i> *	leafybract dwarf rush	DCH, FLYM
LACTU	<i>Lactuca</i> sp.*	lettuce	WIND
LASE	<i>Lactuca serriola</i> *	prickly lettuce	BTCR, CARR, DCH, DUTC, ROMI, SEMI, WIND
LARA	<i>Lagophylla ramosissima</i>	branched lagophylla	AGUA, BTCR, CARR, WIND
LACO4	<i>Lastarriaea coriacea</i>	leather spineflower	CARR
LASTH	<i>Lasthenia</i> sp.	goldfields	BTCR, CARR, FLYM, MDRA, SEMI, WIND
LACA7	<i>Lasthenia californica</i>	California goldfields	BTCR, CARR, FLYM, SEMI
LAFE	<i>Lasthenia ferrisiae</i>	Ferris' goldfields	CARR
LAFR4	<i>Lasthenia fremontii</i>	Fremont's goldfields	DUTC, FLYM
LAGR10	<i>Lasthenia gracilis</i>	needle goldfields	CARR, DUTC, LOKE, MDRA, SAND, WIND
LAMI5	<i>Lasthenia minor</i>	coastal goldfields	CARR, LOKE, TEJO
LAYIA	<i>Layia</i> sp.	tidytips	CARR
LAFR2	<i>Layia fremontii</i>	Fremont's tidytips	DCH, FLYM

Code	Scientific Name	Common Name	Sites
LAGL5	<i>Layia glandulosa</i>	whitedaisy tidytips	BTCR, CARR
LAMU2	<i>Layia munzii</i>	Munz's tidytips	CARR
LAPE	<i>Layia pentachaeta</i>	Sierra tidytips	LOKE
LAPEA	<i>Layia pentachaeta</i> ssp. <i>albida</i>	Sierra tidytips	LOKE, SEMI
LAPL	<i>Layia platyglossa</i>	coastal tidytips	CARR
LETA	<i>Leontodon taraxacoides</i> *	lesser hawkbit	DCH, FLYM
LEPID	<i>Lepidium</i> sp.	pepperweed	CARR, LOKE, MDRA
LEDI2	<i>Lepidium dictyotum</i>	alkali pepperweed	CARR, FLYM, MDRA, SEMI, SAND, WIND
LEDIA	<i>Lepidium dictyotum</i> var. <i>acutidens</i>	alkali pepperwort	LOKE, SEMI
LEDID	<i>Lepidium dictyotum</i> var. <i>dictyotum</i>	alkali pepperweed	DUTC, SEMI, SAND, WIND
LELAL3	<i>Lepidium latipes</i> var. <i>latipes</i>	San Diego pepperweed	AGUA
LENI	<i>Lepidium nitidum</i>	shining pepperweed	AGUA, BTCR, CARR, DCH, DUTC, FLYM, LOKE, MDRA, ROMI, SEMI, TEJO, SAND, WIND
LEBI8	<i>Leptosiphon bicolor</i>	true babystars	DCH, FLYM, WIND
LELI14	<i>Leptosiphon liniflorus</i>	narrowflower flaxflower	CARR, MDRA
LEPA51	<i>Leptosiphon parviflorus</i>	variable linanthus	BTCR, WIND
LEYMU	<i>Leymus</i> sp.	wildrye	BTCR, CARR, WIND
LECI4	<i>Leymus cinereus</i>	basin wildrye	BTCR, WIND
LECO12	<i>Leymus condensatus</i>	giant wildrye	BTCR, WIND
LETR5	<i>Leymus triticoides</i>	beardless wildrye	BTCR, CARR, WIND
2LICHN	Lichen	lichen	AGUA, BTCR, DCH, FLYM, WIND
LINAN2	<i>Linanthus</i> sp.	linanthus	AGUA, BTCR, MDRA, WIND
LIDI2	<i>Linanthus dichotomus</i>	eveningsnow	SEMI, WIND
LIBI5	<i>Linum bienne</i>	pale flax	DCH
LIPA5	<i>Lithophragma parviflorum</i>	smallflower woodland-star	BTCR, WIND
2LW	Liverwort	liverwort	DCH, DUTC, LOKE, SEMI
LOCA19	<i>Logfia californica</i>	California cottonrose	TEJO
LOGA2	<i>Logfia gallica</i> *	narrowleaf cottonrose	AGUA, DCH, FLYM, ROMI
LOPE	<i>Lolium perenne</i> *	perennial ryegrass	AGUA, DCH, DUTC, FLYM, ROMI
LOMAT	<i>Lomatium</i> sp.	desertparsley	BTCR
LOCA5	<i>Lomatium caruifolium</i>	alkali desertparsley	FLYM
LOUT	<i>Lomatium utriculatum</i>	common lomatium	BTCR
LOTUS	<i>Lotus</i> sp.	trefoil	CARR, DCH, MDRA
LOHU2	<i>Lotus humistratus</i>	foothill deervetch	FLYM
LOMI	<i>Lotus micranthus</i>	desert deervetch	DCH
LOUNU	<i>Acmispon americanus</i>	American bird's-foot trefoil	DCH

Code	Scientific Name	Common Name	Sites
LOWR2	<i>Lotus wrangelianus</i>	Chilean bird's-foot trefoil	AGUA, BTCR, CARR, LOKE, MDRA, ROMI, TEJO, WIND
LUPIN	<i>Lupinus</i> sp.	lupine	BTCR, DCH
LUAL4	<i>Lupinus albifrons</i>	silver lupine	BTCR, CARR
LUBI	<i>Lupinus bicolor</i>	miniature lupine	BTCR, CARR, DCH, MDRA, ROMI, TEJO, WIND
LUFOF	<i>Lupinus formosus</i> var. <i>formosus</i>	summer lupine	BTCR
LUNA3	<i>Lupinus nanus</i>	sky lupine	TEJO
LUSUS	<i>Lupinus subvexus</i> var. <i>subvexus</i>	valley lupine	BTCR, CARR, WIND
LUSU3	<i>Lupinus succulentus</i>	hollowleaf annual lupine	WIND
LYHY3	<i>Lythrum hyssopifolium</i> *	hyssop loosestrife	MDRA
MADIA	<i>Madia</i> sp.	tarweed	BTCR
MAEL	<i>Madia elegans</i>	common madia	BTCR
MALAC3	<i>Malacothrix</i>	desertdandelion	CARR
MACO3	<i>Malacothrix coulteri</i>	snake's head	CARR, LOKE, SEMI, WIND
MAPA5	<i>Malva parviflora</i> *	cheeseweed mallow	AGUA, DUTC, ROMI, TEJO
MALE3	<i>Malvella leprosa</i>	alkali mallow	MDRA
MARAH	<i>Marah</i> sp.	manroot	WIND
MADI6	<i>Matricaria discoidea</i> *	disc mayweed	FLYM, SEMI
MEPO3	<i>Medicago polymorpha</i> *	burclover	AGUA, DCH, DUTC, FLYM, MDRA, ROMI, TEJO, SAND, WIND
MECA2	<i>Melica californica</i>	California melicgrass	AGUA
MEIN2	<i>Melilotus indicus</i> *	annual yellow sweetclover	DUTC, MDRA, WIND
MENTZ	<i>Mentzelia</i> sp.	blazingstar	CARR, WIND
MEAF2	<i>Mentzelia affinis</i>	yellowcomet	CARR
MEDI	<i>Mentzelia dispersa</i>	bushy blazingstar	TEJO, WIND
MICRO6	<i>Microseris</i> sp.	silverpuffs	CARR, DUTC, MDRA, SAND
MIAC	<i>Microseris acuminata</i>	Sierra foothill silverpuffs	DCH, FLYM, LOKE
MICA2	<i>Microseris campestris</i>	San Joaquin silverpuffs	AGUA, CARR, DUTC, FLYM, MDRA, SEMI, WIND
MIDO	<i>Microseris douglasii</i>	Douglas' silverpuffs	CARR, MDRA
MIDOD	<i>Microseris douglasii</i> ssp. <i>douglasii</i>	Douglas' silverpuffs	CARR
MIDOT	<i>Microseris douglasii</i> ssp. <i>tenella</i>	Douglas' silverpuffs	DUTC, FLYM
MIEL	<i>Microseris elegans</i>	elegant silverpuffs	CARR, DUTC, MDRA, ROMI
MILI5	<i>Microseris lindleyi</i>	Lindley's silverpuffs	BTCR, CARR, LOKE, WIND
MIGRG4	<i>Microsteris gracilis</i> var. <i>gracilis</i>	slender phlox	BTCR, CARR, WIND
MONOL2	<i>Monolopia</i> sp.	monolopia	CARR, WIND
MOLA3	<i>Monolopia lanceolata</i>	common monolopia	BTCR, CARR
MOST	<i>Monolopia stricta</i>	Crum's monolopia	CARR

Code	Scientific Name	Common Name	Sites
MOFO	<i>Montia fontana</i>	annual water minerslettuce	DCH
2MOSS	Moss	moss	AGUA, BTCR, CARR, DCH, DUTC, FLYM, LOKE, MDRA, SEMI, TEJO, SAND, WIND
MUMA2	<i>Muilla maritima</i>	sea muilla	DUTC
MYMI2	<i>Myosurus minimus</i>	tiny mousetail	SAND
NASSE	<i>Nassella</i> sp.	needlegrass	DCH
NACE	<i>Nassella cernua</i>	nodding needlegrass	AGUA, BTCR, CARR, WIND
NAPU4	<i>Nassella pulchra</i>	purple needlegrass	DCH, MDRA, ROMI
NAIN2	<i>Navarretia intertexta</i>	needleleaf navarretia	DCH
NATA3	<i>Navarretia tagetina</i>	marigold pincushionplant	DCH
NEMOP	<i>Nemophila</i> sp.	baby blue eyes	WIND
NEME	<i>Nemophila menziesii</i>	baby blue eyes	BTCR, WIND
NEMEM	<i>Nemophila menziesii</i> var. <i>menziesii</i>	baby blue eyes	BTCR
PAIN	<i>Parapholis incurva</i>	curved sicklegrass	WIND
PECTO	<i>Pectocarya</i> sp.	combseed	CARR, LOKE, SEMI
PELI	<i>Pectocarya linearis</i>	sagebrush combseed	CARR
PEPE26	<i>Pectocarya penicillata</i>	sleeping combseed	CARR, LOKE, TEJO
PEDU2	<i>Petrorhagia dubia</i> *	hairypink	DCH, ROMI
PHACE	<i>Phacelia</i> sp.	phacelia	BTCR, CARR
PHCI2	<i>Phacelia ciliata</i>	Great Valley phacelia	CARR
PHDI	<i>Phacelia distans</i>	distant phacelia	CARR
PHTA	<i>Phacelia tanacetifolia</i>	lacy phacelia	LOKE, SEMI
PHLOX	<i>Phlox</i> sp.	phlox	CARR, MDRA
PHNO2	<i>Phyla nodiflora</i>	turkey tangle fogfruit	DUTC
PIAM	<i>Pilularia americana</i>	American pillwort	MDRA
PLAGI	<i>Plagiobothrys</i> sp.	popcornflower	AGUA, FLYM, LOKE, MDRA, SEMI, TEJO, SAND, WIND
PLAC	<i>Plagiobothrys acanthocarpus</i>	adobe popcornflower	AGUA, DUTC, MDRA, SAND
PLAR	<i>Plagiobothrys arizonicus</i>	Arizona popcornflower	LOKE, SEMI, TEJO, WIND
PLCA2	<i>Plagiobothrys canescens</i>	valley popcornflower	CARR, DUTC, LOKE, TEJO
PLCOC	<i>Plagiobothrys collinus</i> var. <i>californicus</i>	Cooper's popcornflower	WIND
PLFU	<i>Plagiobothrys fulvus</i>	fulvous popcornflower	DCH, FLYM, ROMI
PLFUC	<i>Plagiobothrys fulvus</i> var. <i>campestris</i>	fulvous popcornflower	CARR, FLYM
PLGR	<i>Plagiobothrys greenei</i>	Greene's popcornflower	DCH, FLYM
PLHU	<i>Plagiobothrys humistratus</i>	dwarf popcornflower	FLYM
PLLE	<i>Plagiobothrys leptocladus</i>	finebranched popcornflower	SEMI, SAND
PLNO	<i>Plagiobothrys nothofulvus</i>	rusty popcornflower	DCH, FLYM, TEJO

Code	Scientific Name	Common Name	Sites
PLSTM	<i>Plagiobothrys stipitatus</i> var. <i>micranthus</i>	stalked popcornflower	DUTC, FLYM, ROMI
PLANT	<i>Plantago</i> sp.	plantain	CARR, WIND
PLEL	<i>Plantago elongata</i>	prairie plantain	DUTC, MDRA, SEMI, SAND
PLER3	<i>Plantago erecta</i>	dotseed plantain	AGUA, CARR, DCH, FLYM, ROMI, SEMI, TEJO
PLCA5	<i>Platystemon californicus</i>	creamcups	BTCR, WIND
PLCI	<i>Plectritis ciliosa</i>	longspur seablush	BTCR, WIND
PLCII	<i>Plectritis ciliosa</i> ssp. <i>insignis</i>	longspur seablush	WIND
POAN	<i>Poa annua</i> *	annual bluegrass	DUTC, FLYM, ROMI
POBU	<i>Poa bulbosa</i> *	bulbous bluegrass	BTCR, CARR, WIND
POSE	<i>Poa secunda</i>	Sandberg bluegrass	AGUA, BTCR, CARR, WIND
POZI	<i>Pogogyne ziziphoroides</i>	Sacramento mesamint	FLYM
POTET2	<i>Polycarpon tetraphyllum</i> ssp. <i>tetraphyllum</i> *	fourleaf manyseed	ROMI
PSBR	<i>Psilocarphus brevissimus</i>	short woollyheads	FLYM, MDRA, SAND
PSOR	<i>Psilocarphus oregonus</i>	Oregon woollyheads	DUTC, FLYM
PSTE	<i>Psilocarphus tenellus</i>	slender woollyheads	DUTC, FLYM, MDRA, ROMI, SEMI
PUSI	<i>Puccinellia simplex</i>	California alkaligrass	MDRA
QUDO	<i>Quercus douglasii</i>	blue oak	WIND
RAHE	<i>Ranunculus hebecarpus</i>	delicate buttercup	ROMI
RAMU2	<i>Ranunculus muricatus</i> *	spinyfruit buttercup	FLYM
ROCR3	<i>Rostraria cristata</i>	Mediterranean hairgrass	MDRA
RUPU3	<i>Rumex pulcher</i> *	fiddle dock	DCH, DUTC
SADE	<i>Sagina decumbens</i>	trailing pearlwort	DCH, MDRA
SADEO	<i>Sagina decumbens</i> ssp. <i>occidentalis</i>	western pearlwort	DCH
SATR12	<i>Salsola tragus</i> *	prickly Russian thistle	CARR, DUTC
SACA8	<i>Salvia carduacea</i>	thistle sage	CARR, LOKE
SABI3	<i>Sanicula bipinnatifida</i>	purple sanicle	WIND
SCHIS	<i>Schismus</i> sp. *	Mediterranean grass	CARR
SCAR	<i>Schismus arabicus</i> *	Arabian schismus	BTCR, CARR, LOKE, TEJO, WIND
SCBA	<i>Schismus barbatus</i> *	common Mediterranean grass	CARR, LOKE, SEMI
SEPU4	<i>Sedella pumila</i>	Sierra mock stonecrop	FLYM
SEVU	<i>Senecio vulgaris</i> *	old-man-in-the-Spring	FLYM, LOKE, SEMI, TEJO
SEVE2	<i>Sesuvium verrucosum</i>	verrucose seapurslane	SEMI
SHAR2	<i>Sherardia arvensis</i> *	blue fieldmadder	WIND
2SHRUB	Shrub (>.5m)	unknown shrub	BTCR, MDRA, WIND
SIGA	<i>Silene gallica</i> *	common catchfly	AGUA, DCH, FLYM, ROMI, TEJO
SIMA3	<i>Silybum marianum</i> *	blessed milkthistle	DUTC, ROMI
SISYM	<i>Sisymbrium</i> sp. *	hedgemustard	AGUA, BTCR, CARR,

Code	Scientific Name	Common Name	Sites
			DUTC
SIAL2	<i>Sisymbrium altissimum</i> *	tall tumbledustard	BTCR, CARR, WIND
SIIR	<i>Sisymbrium irio</i> *	London rocket	CARR, LOKE, SEMI
SIOF	<i>Sisymbrium officinale</i> *	hedgemustard	ROMI
SIOR4	<i>Sisymbrium orientale</i> *	Indian hedgemustard	CARR
SOSE2	<i>Soliva sessilis</i> *	field burweed	DCH, FLYM, ROMI
SONCH	<i>Sonchus</i> sp. *	sowthistle	DUTC, LOKE, SEMI, SAND, WIND
SOAS	<i>Sonchus asper</i> *	spiny sowthistle	SEMI
SOOL	<i>Sonchus oleraceus</i> *	common sowthistle	AGUA, CARR, DUTC, LOKE, ROMI, SEMI, TEJO, WIND
SPERG	<i>Spergula</i> sp.	spurry	SEMI
SPERG2	<i>Spergularia</i> sp.	sandspurry	AGUA, CARR, MDRA
SPAT	<i>Spergularia atrosperma</i>	blackseed sandspurry	DUTC, SAND
SPMA	<i>Spergularia macrotheca</i>	sticky sandspurry	MDRA
SPMAL	<i>Spergularia macrotheca</i> var. <i>leucantha</i>	sticky sandspurry	MDRA
SPSA5	<i>Spergularia salina</i>	salt sandspurry	CARR, SEMI
SPAI	<i>Sporobolus airoides</i>	alkali sacaton	DUTC, MDRA, SEMI
SNAG	Standing snag	snag	CARR, MDRA, WIND
STELL	<i>Stellaria</i> sp.	starwort	DUTC, FLYM, SAND
STME2	<i>Stellaria media</i> *	common chickweed	DUTC, MDRA, SAND, WIND
STMEP	<i>Stellaria media</i> ssp. <i>pallida</i> *	common chickweed	AGUA, ROMI
STNI	<i>Stellaria nitens</i>	shiny chickweed	BTCR, WIND
STEPH	<i>Stephanomeria</i> sp.	wirelettuce	CARR, WIND
STEX	<i>Stephanomeria exigua</i>	small wirelettuce	CARR, WIND
STHE3	<i>Stylomecon heterophylla</i>	windpoppy	WIND
SUMO	<i>Suaeda moquinii</i>	Mojave seablite	LOKE, SEMI
TACA8	<i>Taeniatherum caput-medusae</i> *	medusahead	AGUA, DCH, ROMI
THCU	<i>Thysanocarpus curvipes</i>	sand fringe pod	BTCR, CARR, WIND
TONO	<i>Torilis nodosa</i> *	knotted hedgeparsley	ROMI
TRTE	<i>Tribulus terrestris</i> *	puncturevine	ROMI
TRICH9	<i>Trichostema</i> sp.	bluecurls	TEJO
TRLA4	<i>Trichostema lanceolatum</i>	vinegarweed	AGUA, CARR, DCH, DUTC, FLYM, MDRA, TEJO, WIND
TRIFO	<i>Trifolium</i> sp.	clover	CARR, MDRA, ROMI, TEJO, WIND
TRAL5	<i>Trifolium albopurpureum</i>	rancheria clover	CARR, DCH, FLYM, ROMI, TEJO, WIND
TRBI	<i>Trifolium bifidum</i>	notchleaf clover	ROMI
TRCI	<i>Trifolium ciliolatum</i>	foothill clover	DCH, DUTC, FLYM, WIND
TRDE	<i>Trifolium depauperatum</i>	cowbag clover	CARR, DCH, DUTC, FLYM, MDRA, SEMI
TRDEA	<i>Trifolium depauperatum</i> var. <i>amplectens</i>	balloon sack clover	MDRA, SAND
TRDED	<i>Trifolium depauperatum</i> var.	cowbag clover	CARR, DCH, DUTC,

Code	Scientific Name	Common Name	Sites
	<i>depauperatum</i>		FLYM, MDRA, SEMI, SAND
TRDES	<i>Trifolium depauperatum</i> var. <i>truncatum</i>	balloon sack clover	DUTC, FLYM, MDRA, ROMI, SEMI, SAND, WIND
TRDU2	<i>Trifolium dubium</i> *	suckling clover	DCH, LOKE, ROMI
TRGR2	<i>Trifolium gracilentum</i>	pinpoint clover	BTCR, CARR, DUTC, FLYM, MDRA, SEMI, TEJO, SAND, WIND
TRGRG	<i>Trifolium gracilentum</i> var. <i>gracilentum</i>	pinpoint clover	DUTC, SEMI
TRHI4	<i>Trifolium hirtum</i> *	rose clover	DCH, ROMI
TRMI4	<i>Trifolium microcephalum</i>	smallhead clover	DCH, DUTC, FLYM, MDRA, TEJO, WIND
TRMI5	<i>Trifolium microdon</i>	thimble clover	FLYM
TRSU3	<i>Trifolium subterraneum</i> *	subterranean clover	DCH, ROMI
TRTO4	<i>Trifolium tomentosum</i> *	woolly clover	ROMI
TRVA	<i>Trifolium variegatum</i>	whitewtip clover	DCH, DUTC, FLYM
TRWI3	<i>Trifolium willdenovii</i>	tomcat clover	BTCR, CARR, FLYM, MDRA, TEJO, WIND
TRER6	<i>Triphysaria eriantha</i>	johnny-tuck	DCH, FLYM
TRERE2	<i>Triphysaria eriantha</i> ssp. <i>eriantha</i>	johnny-tuck	DCH
TRPU16	<i>Triphysaria pusilla</i>	dwarf owl's-clover	DCH
TRHY3	<i>Triteleia hyacinthina</i>	white brodiaea	DCH, FLYM
TRIXS	<i>Triteleia ixioides</i> ssp. <i>scabra</i>	prettyface	WIND
TRLA16	<i>Triteleia laxa</i>	lthuriel's spear	FLYM
TRGR5	<i>Tropidocarpum gracile</i>	dobie pod	AGUA, CARR, DUTC
URDI	<i>Urtica dioica</i>	stinging nettle	WIND
VEPE2	<i>Veronica peregrina</i>	neckweed	MDRA
VICIA	<i>Vicia</i> sp.*	vetch	WIND
VIVI	<i>Vicia villosa</i> *	winter vetch	ROMI
VIPU4	<i>Viola purpurea</i>	goosefoot violet	WIND
VUBR	<i>Vulpia bromoides</i> *	brome fescue	AGUA, BTCR, CARR, DCH, DUTC, FLYM, MDRA, ROMI, SAND, WIND
VUMI	<i>Vulpia microstachys</i>	small fescue	AGUA, BTCR, CARR, DUTC, FLYM, LOKE, MDRA, SEMI, SAND, WIND
VUMIC	<i>Vulpia microstachys</i> var. <i>ciliata</i>	Eastwood fescue	WIND
VUMIM	<i>Vulpia microstachys</i> var. <i>microstachys</i>	desert fescue	CARR, WIND
VUMY	<i>Vulpia myuros</i> *	rat-tail fescue	All

\*denotes non-native species

**APPENDIX C.** TABLE OF RANKED INVASIVE SPECIES IDENTIFIED IN THE STUDY AREA WITH REFERENCES FOR ADDITIONAL INFORMATION. MODERATE AND HIGH RANKED SPECIES ARE HIGHLIGHTED IN GREY

Non-Native Species	Cal-IPC <sup>1</sup> Rank	Grass (G) Forb (F)	Annual (A) Biennial (B) Perennial (P)	TNC-Element Stewardship Abstract <sup>2</sup>	Weed Control Elkhorn Slough <sup>3</sup>	IPCW <sup>4</sup>	Weeds of CA <sup>5</sup>	USDA <sup>6</sup>	Encylo-weedia <sup>7</sup>	Site Occurrence <sup>8</sup>
<i>Aegilops triuncialis</i>	High	G	A	no	no	no	yes	no	yes	DCH
<i>Avena barbata</i>	Mod	G	A or P	no	yes	no	yes	no	no	AGUA, BTCR, CARR, DCH, FLYM, ROMI, TEJO, WIND
<i>Avena fatua</i>	Mod	G	A	no	yes	no	yes	no	no	BTCR, CARR, DUTC, ROMI, WIND
<i>Brachypodium distachyon</i>	Mod	G	A or P	no	no	no	yes	no	no	DCH, SEMI
<i>Brassica nigra</i>	Mod	F	A	no	yes	no	yes	no	no	DUTC
<i>Bromus diandrus</i>	Mod	G	A	no	yes	no	yes	no	no	AGUA, BTCR, CARR, DEER, DUTC, FLYM, MADR, ROMI, TEJO, WIND
<i>Bromus hordeaceus</i>	Limited	G	A	no	no	no	yes	yes	no	AGUA, BTCR, CARR, DCH, DUTC, FLYM, MADR, ROMI, SAND, TEJO, WIND
<i>Bromus rubens</i>	High	G	A	yes	no	yes	yes	no	no	AGUA, BTCR, CARR, DCH, DUTC, FLYM, LOKE, MADR, ROMI, SEMI, TEJO, WIND
<i>Bromus tectorum</i>	High	G	A	yes	no	yes	yes	yes	no	BTCR, CARR, WIND

Non-Native Species	Cal-IPC <sup>1</sup> Rank	Grass (G) Forb (F)	Annual (A) Biennial (B) Perennial (P)	TNC-Element Stewardship Abstract <sup>2</sup>	Weed Control Elkhorn Slough <sup>3</sup>	IPCW <sup>4</sup>	Weeds of CA <sup>5</sup>	USDA <sup>6</sup>	Encylo-weedia <sup>7</sup>	Site Occurrence <sup>8</sup>
<i>Carduus pycnocephalus</i>	Mod	F	A	yes	yes	yes	yes	no	yes	DCH, ROMI
<i>Centaurea melitensis</i>	Mod	F	A or B	no	yes	yes	yes	no	yes	AGUA, CARR, MADR, WIND
<i>Centaurea solstitialis</i>	High	F	A	yes	yes	yes	yes	yes	yes	DCH, ROMI
<i>Cirsium vulgare</i>	Mod	F	P	no	yes	yes	yes	no	yes	WIND
<i>Descurainia sophia</i>	Limited	F	A	no	no	no	yes	no	no	CARR
<i>Erodium cicutarium</i>	Limited	F	A	no	yes	no	yes	no	no	AGUA, BTCR, CARR, DCH, DUTC, FLYM, LOKE, MADR, ROMI, SAND, SEMI, TEJO, WIND
<i>Geranium dissectum</i>	Limited	F	A	no	no	no	yes	no	no	ROMI
<i>Hirschfeldia incana</i>	Mod	F	A or P	no	no	no	yes	no	no	BTCR, CARR
<i>Hordeum marinum, H. murinum</i>	Mod	G	A	yes	yes	no	yes	no	no	ALL
<i>Hypericum perforatum</i>	Mod	F	P	no	no	no	yes	yes	yes	DCH
<i>Hypochaeris glabra</i>	Limited	F	A	no	no	no	yes	no	no	AGUA, DCH, DUTC, FLYM, ROMI, TEJO
<i>Hypochaeris radicata</i>	Mod	F	P	no	yes	no	yes	no	no	FLYM

Non-Native Species	Cal-IPC <sup>1</sup> Rank	Grass (G) Forb (F)	Annual (A) Biennial (B) Perennial (P)	TNC-Element Stewardship Abstract <sup>2</sup>	Weed Control Elkhorn Slough <sup>3</sup>	IPCW <sup>4</sup>	Weeds of CA <sup>5</sup>	USDA <sup>6</sup>	Encyclo-weedia <sup>7</sup>	Site Occurrence <sup>8</sup>
<i>Lolium multiflorum</i>	Mod	G	A or P	no	yes	no	yes	yes	no	AGUA, DCH, DUTC, FLYM, ROMI
<i>Medicago polymorpha</i>	Limited	F	A	no	no	no	yes	no	no	AGUA, DCH, DUTC, FLYM, MADR, ROMI, SAND, TEJO, WIND
<i>Salsola tragus</i>	Limited	F	A	no	yes	no	yes	no	yes	CARR, DUTC
<i>Schismus arabicus, S.barbatus</i>	Limited	G	A	no	no	yes	yes	no	no	BTCR, CARR, LOKE, SEMI, TEJO, WIND
<i>Silybum marianum</i>	Limited	F	A or P	yes	yes	no	yes	no	no	DUTC, ROMI
<i>Sisymbrium irio</i>	Mod	F	A	no	no	no	yes	no	no	CARR, LOKE, SEMI
<i>Taeniatherum caput-medusae</i>	High	G	A	yes	no	yes	yes	yes	yes	AGUA, DCH, ROMI
<i>Trifolium hirtum</i>	Mod	F	A	no	no	no	yes	no	no	DCH, ROMI
<i>Vulpia myuros</i>	Mod	G	A	no	no	no	yes	no	no	ALL

<sup>1</sup>California Invasive Plant Council 2006. California Invasive Plant Inventory. <http://www.cal-ipc.org/ip/inventory/index.php>

<sup>2</sup>The Nature Conservancy. 2009. The Nature Conservancy's Elemental Abstracts. <http://www.imapinvasives.org/GIST/ESA/index.html>

<sup>3</sup>Elkhorn Slough National Estuarine Research Reserve. 2000. Weed Control by Species. <<http://www.elkhornslough.org/habitat-restoration/weeds.PDF>>

<sup>4</sup>Bossard, C.C., J.M. Randall, & M.C. Hoshosvky, editors. 2000. Invasive Plants of California Wildlands. UC Press: Berkeley, CA.

<sup>5</sup>DiTomaso, Joseph M., Evelyn A. Healy. 2007. Weeds of California and Other Western States. Regents of the University of California.

<sup>6</sup>United States Department of Agriculture. January, 2011. USDA-Plants Fact Sheets <http://plants.usda.gov/java/factSheet>

<sup>7</sup>California Department of Food and Agriculture. March, 2004. Encycloweedia. <http://www.cdfa.ca.gov/phpps/ipc/weedinfo>

<sup>8</sup>Sites Include: Agua Fria Ranch (AGUA), Bitter Creek NWR (BTCR), Carrizo National NM (CARR), Deer Creek Hills (DCH), Dutchman's Creek (DUTC), Flying M Ranch (FLYM), Lokern Preserve (LOKE), Madera Ranch (MADR), Rominger Ranch (ROMI), Semitropic Ridge (SEMI), Tejon Ranch (TEJO), Viera Ranch (SAND), and Wind Wolves Preserve (WIND)

## APPENDIX D. ORAL HISTORY INTERVIEWS

Interview Questions						
Date of interview	6/24/2010	6/29/2010	6/22/2010	6/28/2010	6/28/2010	1/7/2011
EQIP eligible?	Heard of it. Hasn't applied. Has a conservation easement with TNC	Yes	Haven't heard of the program. Not sure if eligible.	No	No	No
Property/Parcel Name?	Chance Ranch	Dutchman Creek	Chimney Springs Ranch	Semitropic Ridge	Lokern	Tejon Ranch
Approximate parcel acreage?	10,000	500	4000	3700	3000	75,000
Type of livestock operation?	stocker	cow/calf	cow/calf	sheep	sheep	stocker and cow/calf
Typical date to begin grazing	late Oct./ early Nov.	30-Oct	year round	Feb.	Feb.	year round
Typical date to end grazing	early may	31-May	year round	mid-march	mid-may	year round
Typical stocking rates?	2.5–3 acres/head	75–78 pair/500 acres	1 pair/10 acres	1 band (1000 ewes/lambs)	2 bands	Variable – max head of 14,500 across 270,000
Amount of standing matter at the end of the grazing season?	leave enough dry grass for next year feed - level out on weight gain	>1,000 lb/ac	not considered - look at weight gain	500–700 lb/ac	500–700 lb/ac	one sample taken showed 2000 lbs/acre
Supplements?	plain salt	liquid molasses	no hay currently	no	no	no

Interview Questions						
Do you use any rest/rotation management?	pastures are stocked per acre	no	13 pastures, rotate year-round	yes, constant movement; sheep herder and dogs	yes, constant movement; sheep herder and dogs	seasonally move them, some pastures rested
Has parcel ever been used year-round?	no	yes - over 5 years ago	yes	no	no	yes
Have you noticed any major changes in weeds over the years?	star thistle trying to come up	no	bull thistle under trees	weeds are precip driven, when wet, the annual grasses, star thistle, and saharan mustard flourish	when dry not much can persist	Last year a pulse of milk/italian thistles in canyons and riparian. Flat grasslands are stable.
Current weed management	Spray it or put cattle in to overstock	no	Smash it with a skip loader. Graze early when succulent. Tenant responsible.	Round up for tumble mustard, hit in April when seeds are still green.	Round up for tumble mustard, hit in April when seeds are still green.	fuel breaks/clearing or mowing along roads
Have herbicides, pesticides, or fertilizers been used on parcel?	yes	no	no	yes	yes	yes
Has any planting or seeding been done on the parcel?	no	no	no	Seeded <i>Atriplex polycarpa</i> . Round-up application before planting, K-rats hammer seedlings		no
Have you noticed any change in the quality of your forage over the years?	not really, soft chess, brome, filaree and bur clover	no	if you don't graze hard enough or if you overgraze	drought is a major driver, animal trails create microhabitat		shifts from this to that species

<b>Interview Questions</b>			
Date of interview	4/24/2011	10/3/2012	10/3/2012
EQIP eligible?	No	Yes, have participated	Haven't heard of the program.
Property/Parcel Name?	Bitter Creek NWR	Rominger Ranch	Agua Fria
Approximate parcel acreage?	14,000	2200	3200
Type of livestock operation?	None, previously cattle	cow/calf & steers	cow/calf & steers
Typical date to begin grazing	N/A	Year round - rotate on dry grass, sometimes rested - mostly off in the summer .	Depends on the year
Typical date to end grazing	N/A	Usually take off by May and June, but left a few this year	Off when it is dry
Typical stocking rates?	N/A	Not sure	Not sure
Amount of standing matter at the end of the grazing season?	Thousands of pounds/acre	not considered	Not considered. May be mandated in the future under easements.
Supplements?	No	Rarely, occasionally bring in some hay	Yes, hay
Do you use any rest/rotation management?	All are rested	yes	Yes
Has parcel ever been used year-round?	Possibly	yes - lightly	Not in 35 yrs

Interview Questions			
Have you noticed any major changes in weeds over the years?	Yes	Medusae head and goat grass have come in, weren't around 30 years ago. Natives have increased with the recent tenant	two years ago, there was loco weed
Current weed management	Unsure	Tie in grazing – especially with sheep	Hand pulling
Have herbicides, pesticides, or fertilizers been used on parcel?	Not recently	No, years ago had sprayed thistle	some spraying esp. in hilly areas
Has any planting or seeding been done on the parcel?	No	Not in sampled area	No
Have you noticed any change in the quality of your forage over the years?	Thatch buildup	Better under current grazing tenant but weedy grasses are reducing quality	No

## **APPENDIX E. FIELD KEY TO GRASSLAND VEGETATION TYPES IN THE SAN JOAQUIN VALLEY AND CARRIZO PLAIN**

The following field key was created to distinguish the grassland vegetation types classified in the San Joaquin Valley and Carrizo Plain, California. The alliances and associations within this key are based on one or more dominant and/or characteristic species occurring in the landscape and on environmental settings.

The field key is based on the classification of more than 550 field surveys, collected between 2001 and 2012 by a variety of entities including the California Native Plant Society, California Department of Fish and Wildlife, and numerous researchers. The plant taxonomy in the key is based upon the USDA Plants Database (USDA-NRCS 2013).

Due to the diversity of vegetation, and to avoid an excessively long document, a series of paired statements (or couplets) was not developed for each option. Instead, sets of characteristics with choices beneath them are provided. The key will first lead the user to the general options, and the individual selections for the vegetation associations will be listed beneath these options. The user will need to work through the numbered list of types from the more general to the most specific options until the best fit is reached. The choices are identified by a combination of alpha-numeric codes, using capital letters, numerals, upper- and lowercase letters, and decimal points to distinguish the different key levels. The most basic, general levels in the key are on the left side of the alpha-numeric code, and the most specific are on the right side. The coding system in this key relates to a series of left indentations. Thus, the major groupings are down the left-hand side of the pages; nested within them are the sub-groupings. The more specific lists are generally based on the presence/absence or dominance/sub-dominance of individual species.

***Please note:** Since there may be more than two alternatives in a group, be sure to work through all of the options in a list before you decide on the best choice.*

### **Terms and Concepts Used Throughout the Key**

#### ***Terms regarding species abundance/cover/constancy:***

**Dominance by layer:** Tree, shrub, and herbaceous layers are considered physiognomically distinct. A vegetation type is considered to belong to a certain physiognomic group if it is dominated by one layer. Layers are prioritized in order of height when naming the type.

**Dominant:** Dominance refers to the preponderance of vegetation cover in a stand of uniform composition and site history. It may refer to cover of an individual species (as in "dominated by valley oak"), or it may refer to dominance by a physiognomic group, as in "dominated by shrubs." Dominance refers to the relative cover of one species or physiognomic group as compared to another species or physiognomic group.

**Co-dominant:** Co-dominance refers to two or more species in a stand that share dominance and have between 30 and 60 percent relative cover each.

**Diagnostic (species):** Any species or group of species whose relative constancy or abundance differentiates one vegetation type from another; a species of high fidelity to a particular type and one whose presence serves as a criterion of recognition of that type (Jennings et al. 2009).

**Absolute cover:** The percentage of the ground covered by the vertical projection of the plant crowns of a species or defined set of plants (also known as the vertical projection of foliage of plants) as viewed from above. Small openings in the canopy and overlap are excluded. The absolute cover of herbaceous plants includes any standing (attached to a living plant, and not lying on the ground) plant parts, whether alive or dead; this definition excludes litter and other separated plant material.

**Relative cover:** A measure of the cover of a species in relation to that of other species within a set area or sample of vegetation. This is usually calculated for species that occur in the same layer (or stratum) of vegetation, and this measure can be calculated across a group of samples (or across a space or time).

**Terms regarding vegetation types:**

**Alliance:** A vegetation classification unit containing one or more associations, and defined by a characteristic range of species composition, habitat conditions, physiognomy, and diagnostic species, typically at least one of which is found in the uppermost or dominant stratum of the vegetation (Jennings et al., 2009).

**Association:** A vegetation classification unit defined on the basis of a characteristic range of species composition, diagnostic species occurrence, habitat conditions, and physiognomy (Jennings et al., 2009).

**Sub-Alliance:** An informal subdivision of an alliance usually developed when an alliance contains various associations but incomplete floristic data exist for analyzing and defining specific associations.

**Phase:** An informal subdivision of an association (within a subset of the samples used to define the association) that often describes and emphasizes the dominance of certain non-diagnostic species, or sometimes denotes the absence of certain typical but not diagnostic species of the association.

**Semi-natural Stands:** A vegetation classification unit defined by the strong dominance of naturalized (non-native) plants, and they often grow in non-agricultural settings with insignificant cover of native plants. These stands can be valuable habitat for wildlife species (e.g., *Eucalyptus* stands as nesting and perching sites for raptors, *Bromus (hordeaceus, diandrus)*–*Brachypodium distachyon* stands as burrowing and feeding sites for small mammals and hunting grounds for birds and larger mammals). While these types are differentiated from the natural Alliance stands, little effort has been taken to differentiate many associations/stand types of this classification unit. Ultimately, with areas of semi-natural stands identified, future management efforts could be undertaken to enhance native diversity and abundance in these stands to restore them to more native states.

**Stand:** A spatially continuous unit of vegetation with relatively uniform composition, structure, and environmental conditions. This term is often used to indicate a particular example or patch of a plant community (Jennings et al. 2006).

**Other terms:**

**Phenology (peak):** The study of periodic species life cycle events, which are influenced by seasonal and interannual variations. Peak phenology for annual plant types in Mediterranean California is typically early to mid-spring, whereby some annual types may be difficult to properly identify the alliances in late spring and summer in most years.

**Characteristically present (or characterize):** A species is characteristically present (or characterizes a stand) when it is important in distinguishing a type of vegetation, regardless of what cover it exhibits in a stand. Also see diagnostic species.

**Often present:** Present at least 50% of the time in the stands identified as that type.

**Typically present:** Present at least 80% of the time in the stands identified as that type, or usually exhibiting a certain feature (e.g., high or low cover).

---

**Group I. Stands found in wetlands or alkaline lowlands (where water is present in the winter). Includes >30% absolute cover of wetland or riparian grasses (e.g., *Juncus* and *Leymus* spp.), alkaline-tolerant seasonally flooded perennials (e.g., *Allenrolfea occidentalis*, *Distichlis spicata*, *Frankenia salina*, and *Sporobolus airoides*), or other seasonally flooded, perennial and annual forbs. Note: some stands may occur in ephemeral wetlands and can also be keyed in the ephemeral wetland category (Group II)...**

**I.A.** Alkaline or salt-tolerant annuals and/or perennials, including *Distichlis spicata*, *Frankenia salina*, *Sporobolus airoides*, *Hordeum murinum*, *H. depressum*, and various others, are characteristically present to dominant...

**IA.1.** *Sporobolus airoides* is characteristic and co-dominant to dominant in the herbaceous layer with other plants including *Bromus* spp., *Cressa truxillensis*, *Distichlis spicata*, *Frankenia salina*, *Hordeum* spp., and *Vulpia* spp....

***Sporobolus airoides* Herbaceous Alliance**

**IA1.a.** *Sporobolus airoides* is dominant to co-dominant with other grasses including non-natives such as *Bromus diandrus*, *B. hordeaceus*, *Hordeum* spp. and *Vulpia myuros*. Other species often present at low cover include *Frankenia salina*, *Distichlis spicata*, *Cressa truxillensis*, and *Vulpia bromoides*...

***Sporobolus airoides* Herbaceous Association**

**IA1.b.** *Sporobolus airoides* is characteristically present to co-dominant with other grasses, including *Bromus* spp., *Hordeum murinum*, *H. depressum*, and *Vulpia myuros*. *Allenrolfea occidentalis* characteristically occurs at low cover (<2% absolute cover). Other non-native and native herbs are typically present at higher cover including *Trifolium gracilentum*, *T. depauperatum*, and *Lepidium* spp. ...

***Sporobolus airoides* / *Allenrolfea occidentalis* Herbaceous Association**

**IA.2.** *Distichlis spicata* is dominant or co-dominant in the herb layer with other grasses and/or forbs. Soils are often alkaline or saline and poorly drained...

***Distichlis spicata* Herbaceous Alliance**

**IA2.a.** *Distichlis spicata* dominant in the herb layer, though various annual or perennial plants may be present at relatively lower cover...

***Distichlis spicata* Herbaceous Association**

**IA2.b.** *Distichlis spicata* is co-dominant in stands with moderate to high cover of non-native annual grasses such as *Bromus hordeaceus*, *B. diandrus*, *B. rubens*, *Lolium perenne*, *Hordeum marinum* or *Vulpia myuros*...

***Distichlis spicata* – Annual grasses Herbaceous Association**

**IA2.c.** *Distichlis spicata* is co-dominant in ponded areas with vernal pool indicators including *Eryngium castrense*, *Plagiobothrys* spp., *Deschampsia danthonioides*, and *Psilocarphus brevissimus*...

***Distichlis spicata* – *Eryngium castrense* Herbaceous Association (Provisional) of the *Lasthenia fremontii* – *Downingia (bicornuta)* Herbaceous Alliance**

**IA.3.** Other herbs of ephemeral alkaline wetlands are present in swales, pools, and scalds with very gradual or no slope. All have standing water during the winter and early spring, which may fill and evaporate multiple times during a normal rainy season (“flashy” hydrology).

**IA3.a** *Cotula coronopifolia*, *Cressa truxillensis*, *Crypsis schoenoides*, *Distichlis spicata*, *Frankenia salina*, *Hordeum depressum*, *Myosurus minimus*, and *Triphysaria* spp. present along with diagnostic vernal pool plants including *Downingia insignis*, *D. pulchella*, *Lasthenia fremontii*, and *Psilocarphus brevissimus*. Found in alkaline or saline vernal pools...

***Lasthenia fremontii* – *Distichlis spicata* Herbaceous Alliance**

**IA3.a.i.** *Hordeum depressum* characterizes stands along with *H. murinum* ssp. *leporinum*; *H. marinum*, *Lepidium* spp., and *Spergularia* spp. are present. Stands are found in shallow swales or scalded flats...

***Hordeum (depressum, leporinum)* Herbaceous Association**

**IA3.b.** Native annual species *Atriplex vallicola*, *Lasthenia ferrisiae*, and/or *Lepidium jaredii* dominate, co-dominate, or are characteristically present in stands. Sometimes, *Lepidium nitidum* or *L. dictyotum* may be higher cover than the indicator species of the association, and other native herbs such as *Spergularia marina* are often present and variable in cover. Found in and around Soda Lake in the Carrizo Plain...

***Atriplex vallicola* – *Lasthenia ferrisiae* – *Lepidium jaredii* Herbaceous Association of the *Lasthenia fremontii*–*Distichlis spicata* Herbaceous Alliance**

**IA3.c.** *Centromadia pungens* and *Lepidium dictyotum* are characteristically present to co-dominant with other forb and grass species such as *Distichlis spicata*. (This type may be related to *Downingia bella* – *Centromadia pungens* from Barbour et al. (2007))...

***Centromadia pungens* – *Lepidium dictyotum* Herbaceous Association of the *Centromadia (pungens)* Herbaceous Alliance**

**IA4.** *Frankenia salina* is dominant or co-dominant with *Distichlis spicata* and/or annual grasses, though sometimes *Frankenia salina* is characteristically present with non-natives dominant including *Elytrigia pontica* and *Hordeum murinum*. Soils are usually alkaline or saline and poorly drained...

***Frankenia salina* Herbaceous Alliance**

**IA4.a.** *Frankenia salina* is dominant, co-dominant, or characteristically present with other herbs, including non-native grasses...

***Frankenia salina* Herbaceous Association**

**IA4.b.** *Distichlis spicata* occurs with *Frankenia salina* and other herbs including non-native grasses as co-dominants...

***Frankenia salina* – *Distichlis spicata* Herbaceous Association**

**I.B.** Rushes (*Juncus* spp.) dominate the herb layer though other species may occur with high cover such as *Carex praegracilis*...

**IB.1.** *Juncus arcticus* var. *balticus* and/or var. *mexicanus* are dominant or co-dominant with a variety of other wetland species. In some cases, *Carex praegracilis* may be dominant, but *J. arcticus* is present and usually has >5% cover...

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

**IB1.a.** *Juncus arcticus* var. *balticus* is typically co-dominant to dominant with other wetland species, may co-occur with *J. arcticus* var. *mexicanus*...

***Juncus arcticus* var. *balticus* Herbaceous Association**

**I.C.** Native perennial grasses (*Leymus* spp.) dominate or are characteristic in the herbaceous layer; usually found in wet areas or riparian margins. Other wetland graminoids (*Juncus* sp., *Carex* sp.) may also be present...

**IC.1.** *Leymus triticoides* dominates or co-dominates in the herbaceous layer with alkali-tolerant species such as *Frankenia salina* and *Distichlis spicata* and non-natives including *Bromus hordeaceus* and *Lactuca serriola*...

***Leymus triticoides* Herbaceous Alliance**

**IC1.a.** *Leymus triticoides* dominates the herbaceous layer and may occur with alkali-tolerant species such as *Frankenia salina* and *Distichlis spicata* and non-native *Bromus* spp. and *Lactuca serriola*...

***Leymus triticoides* Herbaceous Association**

**IC1.b.** *Leymus triticoides* is characteristic in the herbaceous layer with non-natives including *Bromus diandrus*, *B. hordeaceus*, *Centaurea* spp. and *Erodium* spp....

***Leymus triticoides* – *Bromus* spp. – *Avena* spp. Herbaceous Association**

**IC.2.** *Leymus cinereus* dominates the herbaceous layer with *Bromus* spp. and forbs and grasses including *Claytonia perfoliata*...

***Leymus cinereus* Herbaceous Association (Provisional)  
of the *Leymus cinereus* Herbaceous Alliance**

---

**Group II. Vegetation dominated by herbaceous species of seasonally moist to dry areas (but not usually wet conditions throughout the growing season); vegetation types on alkaline lowlands are keyed above. This group includes upland grasslands, mesa tops, or vernally wet to moist habitats, including swales and vernal pools. Species include native and non-native grasses (*Bromus*, *Lolium*, *Nassella*, *Poa*, *Vulpia*, etc.), forbs (*Lasthenia*, *Layia*, *Plagiobothrys*, *Trifolium*, etc.), and cryptogamic species. Stand identification may be contingent upon appropriate phenology. Vegetation should be identified in early to mid-spring and will be more difficult to identify in late spring and summer in most years...**

**II.A.** Stands are in relatively moist and vernally wet areas associated with flat to gradually sloping terrain. Landforms may include shallow ponds, lake margins, vernal pools, swales, and vernal seeps on slopes...

**IIA.1.** Stands are on moist edges of vernal pools, swales, and seeps, and are usually not inundated for multiple days during the pool or swale wetting phases, although they may have sheet flow across slopes. Stands include significant cover of native annual forbs and grasses, but may be dominated in cover by non-native annual grasses and forbs. Seasonality is extremely important when assessing these stands, since dominance shifts rapidly from early spring dominants (*Blennosperma*, *Limnanthes*) to mid and late season dominants (*Deschampsia danthonioides*, *Achyrachaena mollis*, *Layia fremontii*, *Trifolium variegatum*, *Leontodon taraxacoides*)...

**IIA1.a.** *Trifolium variegatum* is characteristic of stands in the early- to mid-spring, growing in swales, seeps, and moist grassy areas. Often found with the following non-native species: *Vulpia bromoides*, *Hypochaeris glabra*, *Leontodon taraxacoides*, and *Lolium perenne*...

***Trifolium variegatum* Herbaceous Alliance**

**IIA1a.i.** *Trifolium variegatum*, *Vulpia bromoides*, *Hypochaeris glabra*, *Juncus bufonius*, and *Leontodon taraxacoides* collectively characterize the herbaceous layer, though occasionally 1–2 of these species may not be evident. A number of grass and broad-leaf annuals intermix. Found on relatively clay rich sites...

**IIA1a.i.x.** *Hypochaeris glabra* and/or *Leontodon taraxacoides* are usually co-dominant to dominant in the herbaceous layer. If present, *Trifolium variegatum* and *Juncus bufonius* each tend to have <3% cover. Often found in late season or degraded settings...

**(*Trifolium variegatum* – *Vulpia bromoides*) – *Hypochaeris glabra* – *Leontodon taraxacoides* Herbaceous Association**

**IIA1a.i.xx.** *Trifolium variegatum* and *Juncus bufonius* characterize stands, frequently with more than 5% combined cover. Stands are found primarily in early season or moist (but not wet) settings, and *Hypochaeris glabra* and *Leontodon taraxacoides* are less significant than in previous association. This association was previously defined by Klein et al. (2007) as *Trifolium variegatum*–*Vulpia bromoides* (*Hypochaeris glabra*–*Leontodon taraxacoides*) Association...

***Trifolium variegatum* – *Juncus bufonius* Herbaceous Association**

**IIA1.b.** *Layia fremontii* is an indicator (may be dominant to sub-dominant), forming early spring displays along edges of vernal pools, and in vernally moist flats and swales. It often occurs with *Triphysaria eriantha* subsp. *eriantha*, *Navarretia tagetina*, and *Lasthenia californica*. This is a transitional alliance, occurring between upland and vernal pool settings (see IIA.2. group). *Cicendia quadrangularis*, *Plantago erecta*, and other more upland species, usually occur with low cover and combine with vernally moist site indicators such as *Plagiobothrys austiniiae*, *Navarretia tagetina*, and *Deschampsia danthonioides*. Non-native species such as *Hypochaeris glabra*, *Bromus hordeaceus*, and *Taeniatherum caput-medusae* may be present with as much or higher cover as the native species, especially later in the season. If *Lasthenia californica*, *Plantago*

*erecta*, and/or *Vulpia microstachys* are present in more upland settings, they are less than half the cover as the indicator species of this vernal wet alliance...

***Layia fremontii* – *Achyrrachaena mollis* Herbaceous Alliance**

**IIA1b.i.** *Layia fremontii*, *Achyrrachaena mollis*, *Triphysaria eriantha*, *Clarkia purpurea*, *Taeniatherum caput-medusae* as well as vernal pool species such as *Lasthenia fremontii*, *Eryngium* spp., *Limnanthes alba*, *Psilocarphus brevissimus*, and *Pogogyne* spp. are present and abundant. Usually found on vernal pool edges, swale edges, or broad vernal moist flats in open grasslands on volcanic soils. This is a broadly defined association with multiple phases. One phase includes *Layia chrysanthemoides* instead of *L. fremontii*, though other plants are similar to the typical stands of this association. Another phase includes *Lasthenia californica* with *Layia fremontii* and *Achyrrachaena* as characteristic species, this phase was previously defined by Klein et al. (2007) as *Layia fremontii* – *Lasthenia californica* – *Achyrrachaena mollis* Herbaceous Association...

***Layia fremontii* – *Achyrrachaena mollis* Herbaceous Association**

**IIA1.c.** *Centromadia pungens* and *Lepidium dictyotum* are characteristically present to co-dominant with other forb and grass species such as *Distichlis spicata*. (This type may be related to *Downingia bella* – *Centromadia pungens* from Barbour et al. (2007))...

***Centromadia pungens* – *Lepidium dictyotum* Herbaceous Association  
of the *Centromadia (pungens)* Herbaceous Alliance**

**IIA.2.** Vegetation characterized by herbs of ephemeral wetlands in swales and vernal pools with very gradual or no slope. All have standing water during the winter and early spring, which may fill and evaporate multiple times during a normal rainy season (“flashy” hydrology). *Deschampsia danthonioides*, *Frankenia salina*, *Plagiobothrys stipitatus*, *Lasthenia fremontii*, *Downingia bicornuta*, *D. cuspidata*, *D. ornatissima*, and/or *Eryngium castrense* may be characteristic. *Layia fremontii*, *Trifolium variegatum*, and other species of moist stands described above usually are absent or not high in cover. Deeper pools with longer inundation periods and *Eleocharis* spp. diagnostically present may also be keyed here...

**IIA2.a.** *Lasthenia fremontii*, *Downingia* spp., *Navarretia leucocephala*, and/or *Eryngium* (*castrense*, *vaseyi*) are present and *Deschampsia danthonioides* is characteristic. Upland species such as *Holocarpha virgata*, *Trifolium variegatum*, *Trifolium depauperatum*, *Hypochaeris glabra*, *Erodium botrys*, *Bromus hordeaceus*, and *Vulpia bromoides* are typically absent. Found in shallow pools and broad pool margins throughout the region...

***Lasthenia fremontii* – *Downingia (bicornuta)* Herbaceous Alliance**

**IIA2a.i.** *Downingia ornatissima*, *D. cuspidata*, *D. bicornuta*, and *Lasthenia fremontii* are absent or insignificant in the herbaceous layer. *Eryngium vaseyi*, *E. castrense*, *Plagiobothrys stipitatus* var. *micranthus*, and *Psilocarphus brevissimus* are present and abundant with other vernal pool taxa. Found in vernal pools with deeper or longer inundation, hardpan pools, and volcanic mudflows in the northeastern and northwestern Sacramento Valley as well as central and northeastern San Joaquin Valley regions...

***Eryngium (vaseyi, castrense)* Herbaceous Association**

**IIA2.b.** *Cotula coronopifolia*, *Cressa truxillensis*, *Crypsis schoenoides*, *Distichlis spicata*, *Frankenia salina*, *Hordeum depressum*, *Myosurus minimus*, and *Triphysaria* spp. present along with diagnostic vernal pool plants including *Downingia insignis*, *D. pulchella*, *Lasthenia fremontii*, and *Psilocarphus brevissimus*. Found in alkaline or saline vernal pools...

***Lasthenia fremontii* – *Distichlis spicata* Herbaceous Alliance**

**IIA2b.i.** *Distichlis spicata* is co-dominant with vernal pool indicators including *Eryngium castrense*, *Plagiobothrys* spp., *Deschampsia danthonioides*, and *Psilocarphus brevissimus*...

***Distichlis spicata* – *Eryngium castrense* Herbaceous Association (Provisional)**

**IIA2b.ii.** *Hordeum depressum* characterizes stands along with *H. murinum* ssp. *leporinum*; *H. marinum*, *Lepidium* spp., and *Spergularia* spp. are present. Stands are found in shallow swales or scalded flats...

***Hordeum (depressum, leporinum) Herbaceous Association***

**IIA2.c.** Native annual species *Atriplex vallicola*, *Lasthenia ferrisiae*, and/or *Lepidium jaredii* dominate, co-dominant, or are characteristically present in stands. Sometimes, *Lepidium nitidum* or *L. dictyotum* may be higher cover than the indicator species of the association, and other native herbs such as *Spergularia marina* are often present and variable in cover. Found in and around Soda Lake in the Carrizo Plain...

***Atriplex vallicola – Lasthenia ferrisiae – Lepidium jaredii Herbaceous Association of the Lasthenia fremontii – Distichlis spicata Herbaceous Alliance***

**II.B.** Stands occur in upland to moist areas that dry quickly by mid to late spring; not in vernal wet flats, swales and pools. *Trifolium variegatum* and *Layia fremontii* are not typically conspicuous. Stands may be dominated or characterized by native or non-native annual or perennial grasses or forbs. Settings include steep rocky slopes, rock outcrops, gently to moderately sloping uplands, flats, among others...

**II.B.1.** *Lasthenia californica*, *L. gracilis*, *L. minor*, *Plantago erecta*, and/or *Vulpia microstachys* is/are characteristically present in herbaceous stands. A variety of native forbs including *Lepidium nitidum*, *Trifolium*, *Layia*, and upland *Plagiobothrys* are present. If *Achyrrachaena mollis* or *Layia fremontii* are present, they are less than half the cover of the indicator species in this upland and moist alliance...

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

**II.B1.a.** *Lasthenia californica* or *L. gracilis* is dominant in the herbaceous layer. Other characteristic or often present herbs include *Lepidium dictyotum*, *Centromadia pungens*, *Crassula connata*, *Bromus hordeaceus*, and *Vulpia myuros*. Found on vernal alkaline flats, scalds and low mounds...

***Lasthenia (californica, gracilis) Herbaceous Association***

**II.B1.b.** *Lasthenia minor* is dominant or co-dominant with other herbs on vernal alkaline flats...

***Lasthenia minor Herbaceous Association (Provisional)***

**II.B1.c.** *Vulpia microstachys*, *Lasthenia californica*, and/or *Plantago erecta* occur with characteristic species *Sedella pumila*, *Triphysaria eriantha*, *Hypochaeris glabra*, and *Lepidium nitidum*. Found on skeletal soils of rocky volcanic tablelands and ridge-top mudflows...

***Vulpia microstachys – Lasthenia californica – Sedella pumila Herbaceous Association***

**II.B1.d.** *Vulpia microstachys* and *Plantago erecta* occur with other native and non-native species including *Trifolium depauperatum*, *Bromus hordeaceus*, and *Hypochaeris glabra*. *Navarretia tagetina* is typically absent. Found in moist upland grassland of the southern Sacramento and northern San Joaquin Valley...

***Vulpia microstachys – Plantago erecta Herbaceous Association***

**II.B1.e.** *Erodium cicutarium* and *Schismus* appear co-dominant to dominant in stands with *Vulpia microstachys*, and other native herbs such as *Amsinckia tessellata*, *Astragalus didymocarpus*, *Eriogonum gracillimum*, *Lepidium nitidum*, *Malacothrix coulteri*, *Microseris elegans*, and *Trifolium gracilentum*, with a variety of other native and non-native herbs...

***Erodium cicutarium – Vulpia microstachys Herbaceous Association***

**II.B1.f.** *Lepidium nitidum* is dominant to co-dominant with other native and non-native plants including *Bromus rubens*, *Crassula connata*, *Erodium cicutarium*, *Lasthenia californica*, *Trifolium gracilentum*, and *Vulpia microstachys*...

***Lepidium nitidum – Trifolium gracilentum – Vulpia microstachys Herbaceous Association***

**IIB1.g.** *Plagiobothrys acanthocarpa* is dominant to co-dominant with other native and non-native plants including *Lasthenia californica*, *Plantago erecta*, *Juncus bufonius*, *Hedypnois cretica*, *Medicago polymorpha*, and *Soliva sessilis*. Stands are currently sampled in Merced County on upland alluvium...

***Lasthenia californica* – *Plagiobothrys acanthocarpa* – *Medicago polymorpha* Herbaceous Association (Provisional)**

**IIB1.h.** *Layia pentachaeta*, *Plagiobothrys canescens* and/or *P. arizonicus* are characteristic and sub-dominant to co-dominant with other native and non-native plants including *Amsinckia menziesii*, *Bromus rubens*, *Erodium cicutarium*, *Hordeum murinum*, *Lasthenia* spp., *Pectocarya* spp. and *Schismus* spp. In open, patchy grasslands that are in upland grassland and hummocky or concave moist sites...

***Layia pentachaeta* – *Plagiobothrys (canescens)* Herbaceous Association (Provisional)**

**IIB.2.** *Layia platyglossa*, *Pectocarya linearis* or *P. penicillata* is seasonally co-dominant to dominant on sandy flats with a variety of other herbs, including *Erodium cicutarium*, *Vulpia microstachys*, and *Lasthenia gracilis*.

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

**IIB2.a.** *Layia platyglossa* is dominant to co-dominant with other native and non-native plants including *Bromus rubens*, *Erodium cicutarium*, *Vulpia microstachys*, and *Lasthenia gracilis*...

***Layia platyglossa* Herbaceous Association (Provisional)**

**IIB2.b.** *Pectocarya linearis* or *P. penicillata* is seasonally co-dominant to dominant on sandy flats with *Calandrinia ciliata*, *Camissonia campestris*, *Erodium cicutarium*, *Lasthenia gracilis*, *Linanthus liniflorus*, *Schismus* sp., *Vulpia microstachys*, and other herbs. Stands interdigitate with *Amsinckia* herb stands and *Ephedra* shrub stands...

***Pectocarya (linearis, penicillata)* Herbaceous Association**

**IIB.3.** Stands are characterized or dominated by perennial grasses or forbs such as *Bromus carinatus*, *Elymus elymoides*, *Eriogonum nudum*, *Isocoma acradenia*, *Poa secunda*, and *Nassella* spp. Native and non-native annuals including *Bromus* spp. and *Avena* spp. may be more abundant than the perennials. Stands usually occur in upland to moist settings and are not a component of wet meadows or marsh vegetation...

**IIB3.a.** *Nassella pulchra* is dominant, co-dominant, or characteristically present (with at least 2% absolute cover). Other native and non-native species, including *Bromus hordeaceus*, *Leontodon taraxacoides* and *Vulpia bromoides*, intermix with variable cover...

***Nassella pulchra* Herbaceous Alliance**

**IIB3a.i.** *Nassella pulchra* is characteristic in stands and non-native plants (including *Bromus* spp., *Vulpia bromoides*, and *Taeniatherum caput-medusae*) may be high in cover. Native grasses and forbs, including *Nassella*, *Distichlis spicata*, and *Dichelostemma capitata*, have at least 10% relative cover in these stands...

***Nassella pulchra* Herbaceous Association**

**IIB3.b.** *Nassella cernua* is typically co-dominant as a characteristic grass. Other native and non-native species, including *Bromus hordeaceus*, *B. rubens*, and *Eschscholzia californica*, intermix with variable cover...

***Nassella cernua* Herbaceous Association  
of the *Nassella cernua* Herbaceous Alliance**

**IIB3.c.** *Poa secunda* characterizes the herbaceous layer...

***Poa secunda* Herbaceous Alliance**

**IIB3c.i.** *Leptosyne calliopsidea* (= *Coreopsis calliopsidea*), *Monolopia stricta*, and/or *Poa secunda* are seasonally co-dominant to dominant in the Soda Lake basin of Carrizo Plain associated with *Erodium cicutarium*, *Heterodraba unilateralis*, *Layia munzii*, *Layia platyglossa*, and other herbs...

***Monolopia stricta* – *Poa secunda* Herbaceous Association**

**IIB3c.ii.** *Poa secunda* is dominant or co-dominant with *Bromus rubens* on clay flats and north-facing hillslopes along with *Allium* spp., *Claytonia parviflora*, *Erodium cicutarium*, *Dichelostemma capitata*, *Trifolium willdenovii*, and other herbs...

***Poa secunda* – *Bromus rubens* Herbaceous Association**

**IIB3c.iii.** *Poa secunda* is dominant or characteristic on north-facing slopes with non-native *Bromus* spp. and a diverse mix of native grasses and forbs including *Clarkia cylindrica*, *Elymus multisetus*, *Eriogonum* spp., and *Vulpia microstachys* among others...

***Poa secunda* – (*Elymus* sp.) – *Clarkia cylindrica* Herbaceous Association**

**IIB3.d.** *Elymus elymoides* is characteristic and/or co-dominant in the herbaceous layer with non-native *Bromus* spp. which may be high in cover. Other herbs, including *Poa secunda*, *Corethrogyne filaginifolia*, and *Eriogonum* sp. are present...

***Elymus elymoides* Herbaceous Association (Provisional)  
of the *Elymus elymoides* Herbaceous Alliance (Provisional)**

**IIB3.e.** *Bromus carinatus* is characteristic in the herbaceous layer with other native perennial grasses including *Elymus glaucus*, *Hordeum brachyantherum*, *Melica californica*, *Stipa pulchra* and *Poa secunda*. Non-native grasses including annual *Bromus* spp., *Holcus lanatus*, and *Poa bulbosa* may be present...

***Bromus carinatus* Herbaceous Association (Provisional)  
of the *Bromus carinatus* Herbaceous Alliance (Provisional)**

**IIB3.f.** *Isocoma acradenia* is characteristic in the herbaceous layer with variable cover, as a perennial forb or sub-shrub. Other herbs, including *Bromus* spp., *Frankenia salina*, *Hordeum* spp. and *Lepidium dictyotum*, are present and may be co-dominant. Stands occur on edges of alkali rain pools as well as clay flats to sandy toe-slopes, and they are often seasonally flooded...

***Isocoma acradenia* Shrubland Association  
of the *Isocoma acradenia* Shrubland Alliance**

**IIB3.g.** *Eriogonum nudum* is characteristic in the herbaceous layer with variable cover. Other herbs, including *Bromus rubens* may be co-dominant. The shrub layer may be sparse and may include *Gutierrezia californica*. Stands occur on hills, slopes and grassy flats. This association was previously defined from the Inner Central Coast Range by Evens et al. 2006 as *Eriogonum nudum* var. *indictum* – *Eriogonum vestitum*...

***Eriogonum nudum* Herbaceous Association (Provisional)  
of the *Eriogonum (elongatum, nudum)* Herbaceous Alliance**

**IIB.4.** Stands have a characteristic presence in the spring of native and annual upland forbs, though non-natives are often present with conspicuous cover. Diagnostic natives include *Amsinckia* spp., *Eschscholzia californica*, *Leptosyne calliopsidea* (= *Coreopsis calliopsidea*), *Lupinus* spp., *Madia elegans*, *Monolopia lanceolata*, *Plagiobothrys nothofulvus*, *Phacelia* spp., and *Salvia carduacea*...

**IIB4.a.** *Amsinckia menziesii*, *A. tessellata*, *A. vernicosa*, *Phacelia ciliata* and/or *P. tanacetifolia* is/are seasonally characteristic in the herbaceous layer. Soils are often well-drained and loamy and may have high levels of bioturbation (e.g., kangaroo rat precincts), high levels of (past/current) grazing and/or other disturbance...

***Amsinckia (menziesii, tessellata)* Herbaceous Alliance**

**IIB4a.i.** *Amsinckia menziesii* (= *A. menziesii* var. *menziesii*) or *A. intermedia* (= *A. menziesii* var. *intermedia*) is present and dominant to sub-dominant with *Erodium* spp.; non-native grasses including *Hordeum murinum* and *Vulpia myuros* may be present with a variety of other native and non-native herbs. This association was previously defined by Buck-Diaz et al. (2011) and Klein and Evens (2005) as *Amsinckia menziesii* – *Bromus diandrus* and *Amsinckia menziesii* – *Erodium* spp. Association, respectively...

***Amsinckia (intermedia, menziesii) Herbaceous Association***

**IIB4a.ii.** *Erodium cicutarium* is present and sub-dominant to dominant with *Amsinckia tessellata*, *Astragalus didymocarpus*, *Bromus rubens*, *Guillenia lasiophylla*, *Acmispon wrangelianus* (= *Lotus wrangelianus*), and *Vulpia microstachys* may be present with a variety of other native and non-native herbs...

***Amsinckia tessellata – Erodium cicutarium Herbaceous Association***

**IIB4a.iii.** *Phacelia ciliata* is present and sub-dominant to dominant with *Amsinckia*, *Bromus rubens*, *Descurainia sophia*, *Erodium cicutarium*, *Guillenia lasiophylla*, *Lasthenia* and other species. Stands occur on terraces, flats and toeslopes, usually adjacent to *Amsinckia* stands on well-drained soils and on grazed lands...

***Phacelia ciliata Herbaceous Association (Provisional)***

**IIB4a.iv.** *Phacelia tanacetifolia* is seasonally dominant or co-dominant with a variety of other herbs such as *Amsinckia menziesii*, *Erodium cicutarium*, and *Layia pentachaeta*. Sometimes *P. distans* or *P. imbricata* may be the dominant instead of *P. tanacetifolia*, though stands occur in similar environments that are typically sloped (rarely flat) with sandy/clay loam to clay soils...

***Phacelia tanacetifolia Herbaceous Association (Provisional)***

**IIB4.b.** *Leptosyne calliopsidea* (= *Coreopsis calliopsidea*), *Monolopia* spp, *Mentzelia pectinata* and/or *Camissonia boothii* ssp. *decorticans* is/are seasonally dominant or co-dominant on steep, dry slopes. A variety of other native herbs such as *Amsinckia tessellata*, *Astragalus didymocarpus*, *Caulanthus inflatus*, and *Malacothrix coulteri* are often present...

***Monolopia (lanceolata) – Leptosyne (calliopsidea) Herbaceous Alliance***

**IIB4b.i.** *Leptosyne calliopsidea*, *Mentzelia pectinata* and/or *Camissonia boothii* ssp. *decorticans* are seasonally dominant on steep, dry slopes with siltstone and gypsum-derived soils. A variety of other herbs such as *Amsinckia tessellata*, *Caulanthus inflatus*, *Chaenactis stevioides*, *Guillenia lasiophylla*, *Erodium cicutarium*, and *Phacelia* species are often present...

***Leptosyne calliopsidea – Mentzelia pectinata Herbaceous Association***

**IIB4b.ii.** *Monolopia lanceolata* is seasonally dominant or co-dominant on fine-textured, moderate to steep slopes and occasionally on flats/terraces...

***Monolopia lanceolata Herbaceous Association***

**IIB4.c.** *Salvia carduacea* is dominant or co-dominant on moist alluvial toeslopes and terraces adjacent to washes with well-drained sandy soils and alluvium. *Camissonia campestris*, *Chaenactis glabriuscula*, *Erodium cicutarium*, *Malacothrix californica*, *Linanthus liniflorus*, *Pectocarya penicillata*, *Schismus* and others often occur in the herb layer, and *Gutierrezia californica* typically occurs at low cover in the shrub layer...

***Salvia carduacea Herbaceous Association  
of the Salvia carduacea Herbaceous Alliance (Provisional)***

**IIB4.d.** *Plagiobothrys nothofulvus* is characteristically present with variable cover and may be sub-dominant to dominant with *Bromus* spp., *Castilleja* spp., *Erodium* spp., and *Trifolium* spp....

***Plagiobothrys nothofulvus Herbaceous Alliance***

**IIB4d.i.** *Plagiobothrys nothofulvus* and *Trifolium microcephalum* are characteristically present with *Bromus hordeaceus*, *Erodium botrys*, and other non-natives. Native species *Amsinckia menziesii*, *Castilleja attenuata*, and *Daucus pusillus* are often present with a variety of other forbs and grasses. The similar association of *Trifolium microcephalum* – *Daucus pusillus* – *Bromus hordeaceus* was previously defined in Yosemite National Park by Keeler-Wolf et al. (2003a)...

***Plagiobothrys nothofulvus* – *Daucus pusillus* – *Trifolium microcephalum* Herbaceous Association**

**IIB4d.ii.** *Plagiobothrys nothofulvus*, *Castilleja exserta* and *Lupinus nanus* are characteristic with other species including non-natives such as *Bromus rubens* *Erodium cicutarium*, and/or others. Native species such as *Crassula connata*, *Acmispon wrangelianus* (= *Lotus wrangelianus*), and *Plagiobothrys arizonicus* are often present with a variety of other forbs and grasses...

***Plagiobothrys nothofulvus* – *Castilleja exserta* – *Lupinus nanus* Herbaceous Association (Provisional)**

**IIB4.e.** *Plagiobothrys fulvus* is characteristic with low cover in stands that are dominated by *Bromus hordeaceus* and/or *Erodium botrys*. *Croton setigerus*, *Eschscholzia lobbii*, *Trifolium* spp. and a variety of other herbs are frequently present...

***Bromus hordeaceus* – *Erodium botrys* – *Plagiobothrys fulvus* Herbaceous Stand Type of the *Bromus (diandrus, hordeaceus)* – *Brachypodium distachyon* Semi-Natural Herbaceous Stands**

**IIB4.f.** *Madia elegans* is dominant in the herbaceous layer with a diverse mixture of native and non-native forbs and grasses including *Amsinckia menziesii*, *Bromus* spp., *Clarkia* spp., *Lupinus bicolor*, *Plagiobothrys nothofulvus*, and *Trifolium* spp. Stands often occur adjacent to or in openings of blue oak woodlands of the southern Sierra Nevada foothills...

***Madia elegans* Association of the *Madia elegans* Alliance**

**IIB4.g.** *Lupinus benthamii* and/or *Chorizanthe membranacea* characterize steep sandy or rocky hill slopes in the southern Sierra Nevada foothills. A diverse mix of native and non-native forbs and grasses are present including *Bromus* spp., *Hypochaeris glabra*, *Phacelia cicutaria*, and *Pterostegia drymarioides*...

***Lupinus benthamii* – *Chorizanthe membranacea* Association (Provisional) of the *Lupinus benthamii* – *Chorizanthe membranacea* Alliance (Provisional)**

**IIB4.h.** *Eschscholzia californica* and/or *Lupinus bicolor* is/are seasonally dominant on upland slopes or flats with sandy to loamy soils that are well drained. *Amsinckia*, *Avena*, *Bromus*, *Castilleja exserta*, *Erodium cicutarium*, *Uropappus lindleyi* and a variety of other native and non-native forbs and grasses may be present...

***Eschscholzia (californica)* Herbaceous Alliance**

**IIB4h.i.** *Eschscholzia californica* is seasonally dominant on upland slopes or flats...

***Eschscholzia californica* Herbaceous Association**

**IIB4h.ii.** *Lupinus bicolor* is seasonally dominant on grazed flats...

***Lupinus bicolor* Provisional Herbaceous Association**

**IIB4.i.** Other native herbs seasonally dominant or characteristic, occurring on upland and irregularly flooded riparian sites...

**California Annual Grassland Group of the California Annual and Perennial Grassland Macrogroup**

**IIB.5.** Stands have low or insignificant cover of native grasses or forbs, even during peak phenology. Stands are strongly dominated by non-native annual grasses and/or forbs including species of *Avena*, *Bromus*, *Centaurea*, *Taeniatherum caput-medusae*, *Schismus* and *Vulpia* spp...

**IIB5.a.** *Avena barbata* or *A. fatua* dominates or co-dominates with *Taeniatherum caput-medusae* in the herbaceous layer...

***Avena (barbata, fatua) Semi-Natural Herbaceous Stands***

**IIB5a.i.** *Avena barbata* is dominant. Additional non-native herbs intermix with varying cover, including *Bromus hordeaceus*. Usually found in stands with shallow soils and greater nativity than other non-native types, including native species such as *Clarkia purpurea*...

***Avena barbata Herbaceous Stand Type***

**IIB5.b.** *Bromus diandrus*, *B. hordeaceus*, *Brachypodium distachyon*, *Erodium* spp., *Hordeum marinum*, and/or *Hordeum murinum* is/are dominant or co-dominant with other non-natives in the herbaceous layer...

***Bromus (diandrus, hordeaceus) – Brachypodium distachyon  
Semi-Natural Herbaceous Stands***

**IIB5b.i.** *Bromus diandrus* strongly dominates stands composed largely of non-natives, including *Bromus hordeaceus* and *Hordeum murinum*...

***Bromus diandrus Herbaceous Stand Type***

**IIB5b.ii.** *Bromus hordeaceus* and *Leontodon taraxacoides* collectively dominate stands and often have similar cover. Stands are composed largely of non-natives, including characteristic species *Aira caryophyllea*, *Erodium botrys*, *Trifolium dubium*, *Hypochaeris glabra*, *Briza minor* and *Trifolium hirtum*...

***Bromus hordeaceus – Leontodon taraxacoides Herbaceous Stand Type***

**IIB5b.iii.** *Bromus hordeaceus* and *Hordeum* spp. co-dominate stands composed largely of non-natives including *Medicago polymorpha*...

***Bromus hordeaceus – Hordeum spp. – Medicago polymorpha Herbaceous Stand Type***

**IIB5b.iv.** *Plagiobothrys fulvus* is characteristic with low cover in stands that are dominated by *Bromus hordeaceus* and/or *Erodium botrys*. *Croton setigerus*, *Eschscholzia lobbii*, *Trifolium* spp. and a variety of other herbs are frequently present...

***Bromus hordeaceus – Erodium (botrys) – Plagiobothrys fulvus Herbaceous  
Stand Type***

**IIB5b.v.** *Taeniatherum caput-medusae* and *Bromus hordeaceus* co-dominate stands composed largely of non-natives...

***Bromus hordeaceus – Taeniatherum caput-medusae Herbaceous Stand Type***

**IIB5.c.** *Hypochaeris glabra*, *Vulpia bromoides*, *V. myuros*, and/or *Bromus* spp. are dominant or co-dominant in the herbaceous layer with other non-natives including *Erodium botrys*...

***Hypochaeris glabra – Vulpia bromoides Herbaceous Stand Type  
of the Bromus (diandrus, hordeaceus) – Brachypodium distachyon  
Semi-Natural Herbaceous Stands***

**IIB5.d.** *Bromus rubens* and/or *Schismus* spp. are conspicuous in the herbaceous layer, with virtually no significant cover of native species...

***Bromus rubens – Schismus (arabicus, barbatus)  
Semi-Natural Herbaceous Stands***

**IIB5d.i.** *Bromus rubens* intermixes with other non-natives such as *Erodium cicutarium*...

***Bromus rubens Herbaceous Stand Type***

**IIB5d.ii.** *Schismus* spp. dominates the herbaceous layer, and native species such as *Amsinckia* spp. and *Pectocarya* spp. maybe trace in cover...

***Schismus (arabicus, barbatus)* Herbaceous Stand Type**

**IIB5.e.** *Centaurea melitensis* is conspicuous (especially later in the season) in the herbaceous layer and often co-dominant with *Bromus rubens*; stands have no significant or detectable cover of native species ...

***Centaurea melitensis* Herbaceous Stand Type (Provisional)  
of the *Centaurea (melitensis, solstitialis)* Semi-Natural Herbaceous Stands**

**IIB5.f.** Other non-native herbs are strongly dominant (>90% relative cover) in the herbaceous layer forming open to continuous cover. Non-natives include (*Hordeum murinum*, *Silybum marianum*, *Sorghum halepense*, and *Vulpia myuros*). Stands occur adjacent to riparian areas and in upland sites...

**California Semi-natural Grassland & Forb Meadow Group**

## APPENDIX F. ALLIANCE DESCRIPTIONS

### ***Amsinckia (menziesii, tessellata)* Alliance (Fiddleneck fields)**

An *Amsinckia* spp. and/or *Phacelia* spp. is dominant or co-dominant in the herb layer with *Erodium cicutarium*, *Hordeum murinum*, *Bromus diandrus*, and others. Herbs are <1 m, and cover is open to continuous. Stands occur on upland slopes and foothills, broad valleys, grazed or recently burned hills, and fallow fields. Soils are well drained and loamy, and they are often subject to high levels of bioturbation.



**Samples used to describe type:** 29

#### **Local Environmental Table:**

Elevation: range 57 - 1202, average 320.6 m  
Total vegetation cover: range 11 - 101%, average 52.9%  
Tree cover: range 0.2 - 3%, average 1.8%  
Shrub cover: range 0.2 - 2%, average 0.8%  
Herb cover: range 10 - 101%, average 51.8%  
Percent native cover relative to non-native cover: 43.9%

**Ecoregion Sections and Subsection Codes:** Central Valley Coast Ranges: M262Ad, M262Ai, M262Aj; Great Valley: 262Ag, 262Ah, 262As, 262Ax, 262Ay; Sierra Nevada Foothills: M261Fc, M261Fd

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb									
	ERCI6	<i>Erodium cicutarium</i>	72	6.2	0.2	65			
	AMME	<b><i>Amsinckia menziesii</i></b>	69	11.1	0.2	65			
	HOMU	<i>Hordeum murinum</i>	59	2.5	0.2	34			
	BRDI3	<i>Bromus diandrus</i>	55	5.2	0.2	30			
	BRHO2	<i>Bromus hordeaceus</i>	52	2	0.2	10			
	BRRU2	<i>Bromus rubens</i>	48	1.8	0.2	27			
	CRSE11	<i>Croton setigerus</i>	31	0.2	0.2	3			
	VUMY	<i>Vulpia myuros</i>	24	0.3	0.2	5			
	AVFA	<i>Avena fatua</i>	21	7.1	0.2	80			
	ERBO	<i>Erodium botrys</i>	21	0.8	0.2	14			
	MEPO3	<i>Medicago polymorpha</i>	21	0.7	0.2	10			
	LUBI	<i>Lupinus bicolor</i>	21	0.1	0.2	2			

**Association(s) Defined:**

***Amsinckia (intermedia, menziesii)***

***Amsinckia tessellata–Erodium cicutarium***

***Phacelia ciliata***

***Phacelia tanacetifolia* Provisional**

## ***Amsinckia (intermedia, menziesii)* Association**

**Samples used to describe type:** 22

### **Local Environmental Table:**

Elevation: range 57 - 713, average 227.1 m

Total vegetation cover: range 11 - 101%, average 53.7%

Tree cover: range 0.2 - 3%, average 1.8%

Shrub cover: range 0.2 - 2%, average 1.1%

Herb cover: range 10 - 101%, average 52.4%

Percent native cover relative to non-native cover: 46.5%

**Ecoregion Sections and Subsection Codes:** Central Valley Coast Ranges: M262Ad; Great Valley: 262Ag, 262Ah, 262As, 262Ay; Sierra Nevada Foothills: M261Fc, M261Fd

### **Plant Constancy/Cover Summary Table:**

<b>Stratum</b>	<b>Code</b>	<b>Species Name</b>	<b>Con</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>	<b>C</b>	<b>D</b>	<b>cD</b>
Herb									
	AMME	<b><i>Amsinckia menziesii</i></b>	82	14.3	0.2	65	X		
	BRDI3	<i>Bromus diandrus</i>	73	6.9	0.2	30			
	BRHO2	<i>Bromus hordeaceus</i>	64	2.6	1	10			
	ERCI6	<i>Erodium cicutarium</i>	64	1.9	0.2	35			
	HOMU	<i>Hordeum murinum</i>	55	1.6	0.2	10			
	CRSE11	<i>Croton setigerus</i>	36	0.2	0.2	3			
	LASE	<i>Lactuca serriola</i>	32	0.1	0.2	1			
	AVFA	<i>Avena fatua</i>	27	9.3	0.2	80			
	ERBO	<i>Erodium botrys</i>	27	1.1	0.2	14			
	MEPO3	<i>Medicago polymorpha</i>	27	0.9	0.2	10			
	VUMY	<i>Vulpia myuros</i>	27	0.4	0.2	5			
	LUBI	<i>Lupinus bicolor</i>	27	0.2	0.2	2			

***Amsinckia tessellata*–*Erodium cicutarium* Association**

**Samples used to describe type:** 4

**Local Environmental Table:**

Elevation: range 607 - 1202, average 756.8 m

Total vegetation cover: range 25 - 70%, average 42.5%

Tree cover: range 0 - 0%, average 0%

Shrub cover: range 0.2 - 0.2%, average 0.2%

Herb cover: range 25 - 70%, average 42.5%

Percent native cover relative to non-native cover: 20.4%

**Ecoregion Sections and Subsection Codes:** Central Valley Coast Ranges: M262Ai, M262Aj

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb									
	ERIC6	<i>Erodium cicutarium</i>	100	23.5	2	65	X		X
	BRRU2	<i>Bromus rubens</i>	100	3.1	0.2	7	X		
	AMTE3	<i>Amsinckia tessellata</i>	75	3.8	0.2	11	X		
	SCAR	<i>Schismus arabicus</i>	50	3.1	0.2	12			
	ASDI3	<i>Astragalus didymocarpus</i>	50	0.1	0.2	0.2			
	LAPL	<i>Layia platyglossa</i>	50	0.1	0.2	0.2			
	SATR12	<i>Salsola tragus</i>	25	6.5	26	26			
	AMSIN	<i>Amsinckia</i> sp.	25	3	12	12			
	SIAL2	<i>Sisymbrium altissimum</i>	25	0.3	1	1			
	TRGR2	<i>Trifolium gracilentum</i>	25	0.3	1	1			

## ***Phacelia ciliata* Association**

**Samples used to describe type:** 2

### **Local Environmental Table:**

Elevation: range 598 - 598, average 598 m

Total vegetation cover: range 40 - 81%, average 60.5%

Tree cover: range 0 - 0%, average 0%

Shrub cover: range 0 - 0%, average 0%

Herb cover: range 40 - 81%, average 60.5%

Percent native cover relative to non-native cover: 37%

**Ecoregion Sections and Subsection Codes:** Central Valley Coast Ranges: M262Ai

### **Plant Constancy/Cover Summary Table:**

<b>Stratum</b>	<b>Code</b>	<b>Species Name</b>	<b>Con</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>	<b>C</b>	<b>D</b>	<b>cD</b>
Herb									
	ERC16	<i>Erodium cicutarium</i>	100	22.5	20	25	X		X
	PHCI2	<b><i>Phacelia ciliata</i></b>	100	21	15	27	X		X
	BRRU2	<i>Bromus rubens</i>	100	15	3	27	X		
	HOMU	<i>Hordeum murinum</i>	100	1.6	0.2	3	X		
	GULA4	<i>Guillenia lasiophylla</i>	100	0.6	0.2	1	X		
	MIGRG4	<i>Microsteris gracilis</i> var. <i>gracilis</i>	100	0.6	0.2	1	X		
	AMMEI2	<i>Amsinckia menziesii</i> var. <i>intermedia</i>	50	0.5	1	1			
	DESO2	<i>Descurainia sophia</i>	50	0.5	1	1			
	SISYM	<i>Sisymbrium</i>	50	0.5	1	1			
	AMTE3	<i>Amsinckia tessellata</i>	50	0.1	0.2	0.2			
	LASE	<i>Lactuca serriola</i>	50	0.1	0.2	0.2			
	LAGR10	<i>Lasthenia gracilis</i>	50	0.1	0.2	0.2			

## ***Phacelia tanacetifolia* Provisional Association**

**Samples used to describe type: 1**

### **Local Environmental Table:**

Elevation: 78 m

Total vegetation cover: 60%

Tree cover: 0%

Shrub cover: 0%

Herb cover: 60%

Percent native cover relative to non-native cover: 96.6%

**Ecoregion Sections and Subsection Codes:** Great Valley: 262Ax

### **Plant Constancy/Cover Summary Table:**

<b>Stratum</b>	<b>Code</b>	<b>Species Name</b>	<b>Con</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>	<b>C</b>	<b>D</b>	<b>cD</b>
Herb	PHTA	<b><i>Phacelia tanacetifolia</i></b>	100	50	50	50	X	X	
	AMMEM2	<i>Amsinckia menziesii</i> var. <i>menziesii</i>	100	5	5	5	X		
	LAPE	<i>Layia pentachaeta</i>	100	3	3	3	X		
	BRBE6	<i>Bromus trinii</i>	100	1	1	1	X		
	BRRU2	<i>Bromus rubens</i>	100	0.2	0.2	0.2	X		
	ERC16	<i>Erodium cicutarium</i>	100	0.2	0.2	0.2	X		
	SCBA	<i>Schismus barbatus</i>	100	0.2	0.2	0.2	X		
	SIIR	<i>Sisymbrium irio</i>	100	0.2	0.2	0.2	X		
	TRDU2	<i>Trifolium dubium</i>	100	0.1	0.11	0.11	X		

***Avena (barbata, fatua)* Semi-Natural Stands**  
**(Wild oats grasslands)**

*Avena barbata* and/or *A. fatua* is dominant or co-dominant in the herbaceous layer, often occurring with *Bromus hordeaceus*, *Lolium perenne*, *Erodium cicutarium*, and others. Herbs are <1 m, and cover is open to continuous. Stands occur in rangelands, openings in woodlands, and disturbed areas. It potentially occurs across cismontane California on sedimentary and igneous parent materials at elevations below 5000 ft, especially where agriculture, hay, and cattle grazing have been introduced (Evens and San 2004). Stands lack diagnostic native herbaceous species, thus are recognized by the overwhelming presence of non-native taxa.



**Samples used to describe type:** 11

**Local Environmental Table:**

Elevation: range 94 - 821, average 252.5 m  
Total vegetation cover: range 30 - 98%, average 63.5%  
Tree cover: range 0 - 0%, average 0%  
Shrub cover: range 0 - 0%, average 0%  
Herb cover: range 30 - 98%, average 63.5%  
Percent native cover relative to non-native cover: 4.6%

**Ecoregion Sections and Subsection Codes:** Central California Coast: 261Ac; Central Valley Coast Ranges: M262Ac, M262Ad, M262Af; Great Valley: 262Ag; Sierra Nevada Foothills:

M261Fe

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb	AVBA	<i>Avena barbata</i>	100	28.2	5	60	X		X
	BRHO2	<i>Bromus hordeaceus</i>	100	5.9	0.2	14	X		
	BRMA3	<i>Bromus madritensis</i>	64	1.9	0.2	8			
	ERBO	<i>Erodium botrys</i>	55	20.9	20	90			
	ERCI6	<i>Erodium cicutarium</i>	55	3	0.2	20			
	VUMY	<i>Vulpia myuros</i>	55	0.8	0.2	5			
	HYGL2	<i>Hypochaeris glabra</i>	55	0.3	0.2	1			
	HOMU	<i>Hordeum murinum</i>	45	0.5	0.2	5			
	ACMO2	<i>Achyraea mollis</i>	45	0.3	0.2	2			
	VUBR	<i>Vulpia bromoides</i>	36	0.5	0.2	3			
	LOGA2	<i>Filago gallica</i>	36	0.1	0.2	1			
	LOPEM2	<i>Lolium perenne</i>	27	2.3	0.2	20			
	MEPO3	<i>Medicago polymorpha</i>	27	1.9	0.2	20			
	ERBR14	<i>Erodium brachycarpum</i>	27	1.3	0.2	8			
	BRDI3	<i>Bromus diandrus</i>	27	0.5	0.2	5			
Non-vasc	2MOSS	Moss	36	0.4	0.2	3			

**Stand Type(s) Defined: *Avena barbata***

***Avena barbata* Stand Type**

Since only one stand type was sampled of this alliance in the study area, its description is the same as the information above.

***Bromus (diandrus, hordeaceus)*–*Brachypodium distachyon* Semi-Natural Stands  
(Annual brome grasslands)**

*Bromus hordeaceus*, *B. diandrus*, *Brachypodium distachyon*, *Erodium* spp., *Hordeum marinum*, and/or *H. murinum* is/are strongly dominant in the herbaceous layer, often occurring with *Hypochaeris glabra*, *Vulpia bromoides*, and others. Herbs are <75 cm, and cover is open to continuous. Stands occur in all topographic settings in grassland foothills, rangelands, openings in woodlands, and disturbed places. Annual bromes are now considered “resident annuals” and permanent members of the broader category of “California Annual Grassland.” The associations in this type are coarser-level than others in this report. This underscores the shifting composition of relatively non-diagnostic alien and native species in associations of this semi-natural stands type. Further analysis with full species lists from field surveys, over a period of several seasons and years in permanent plots, are needed to understand the relationships between the component vegetation associations of this type and other similar associations in the *Avena (barbata, fatua)* Semi-Natural Stands type.



**Samples used to describe type:** 103

**Local Environmental Table:**

Elevation: range 3 - 1028, average 179.9 m  
Total vegetation cover: range 12 - 100%, average 61.6%  
Tree cover: range 0.2 - 5%, average 2.1%  
Shrub cover: range 1.8 - 1.8%, average 1.8%  
Herb cover: range 12 - 100%, average 61.6%  
Percent native cover relative to non-native cover: 8.6%

**Ecoregion Sections and Subsection Codes:** Central California Coast: 261Aa, 261Ab, 261Aj; Central Valley Coast Ranges: M262Ac, M262Ad, M262Af, M262Bf; Great Valley: 262Ag, 262Ah, 262Ao, 262As; Sierra Nevada: M261Eg; Sierra Nevada Foothills: M261Fa, M261Fb, M261Fc, M261Fd; Southern California Mountains and Valleys: M262Bf

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb	BRHO2	<b><i>Bromus hordeaceus</i></b>	96	20.8	0.2	100	X		
	HYGL2	<i>Hypochaeris glabra</i>	70	3.8	0.2	40			
	ERBO	<b><i>Erodium botrys</i></b>	68	5.8	0.2	38			
	VUBR	<i>Vulpia bromoides</i>	57	3.8	0.2	60			
	BRDI3	<b><i>Bromus diandrus</i></b>	51	7.9	0.1	85			
	LOPEM2	<i>Lolium perenne</i>	44	0.9	0.1	20			
	TRMI4	<i>Trifolium microcephalum</i>	42	0.3	0.1	7			
	AVBA	<i>Avena barbata</i>	40	1.4	0.2	30			
	BRMI2	<i>Briza minor</i>	38	0.1	0.2	1			
	TRHI4	<i>Trifolium hirtum</i>	36	0.7	0.1	10			
	CAAT25	<i>Castilleja attenuata</i>	35	0.1	0.1	5			
	VUMY	<i>Vulpia myuros</i>	33	1.4	0.2	40			
	LETA	<i>Leontodon taraxacoides</i>	31	2.4	0.2	26			
	CRSE11	<i>Croton setigerus</i>	31	0.2	0.2	8			
	TACA8	<i>Taeniatherum caput-medusae</i>	30	2.9	0.2	40			
	CEGL2	<i>Cerastium glomeratum</i>	30	0.3	0.2	10			
	AICA	<i>Aira caryophylla</i>	29	0.3	0.2	5			
	JUBU	<i>Juncus bufonius</i>	29	0.3	0.2	8			
	PLFU	<i>Plagiobothrys fulvus</i>	27	0.2	0.1	3			
	TRDU2	<i>Trifolium dubium</i>	25	0.6	0.1	20			
	AVFA	<i>Avena fatua</i>	21	1.2	0.2	40			
	HOMA2	<b><i>Hordeum marinum</i></b>	21	0.4	0.2	20			
Non-vasc	2MOSS	Moss	28	1.5	0.2	25			

**Stand Type(s) Defined:**

***Bromus diandrus***

***Bromus hordeaceus*(–*Vicia villosa*–*Lolium perenne*)–*Trifolium hirtum***

***Bromus hordeaceus*–*Bromus tectorum***

***Bromus hordeaceus*–*Taeniatherum caput-medusae***

***Bromus hordeaceus*–*Erodium (botrys)*–*Plagiobothrys fulvus***

***Bromus hordeaceus*–*Hordeum* spp.–*Medicago polymorpha***

***Bromus hordeaceus*–*Leontodon taraxacoides***

***Bromus hordeaceus*–*Lupinus nanus*–*Trifolium* spp. Provisional**

***Hypochaeris glabra*–*Vulpia bromoides***

## ***Bromus diandrus* Stand Type**

**Samples used to describe type:** 15

### **Local Environmental Table:**

Elevation: range 57 - 1028, average 460.3 m  
 Total vegetation cover: range 17 - 97%, average 68.2%  
 Tree cover: range 3 - 5%, average 4%  
 Shrub cover: range 1.75 - 1.75%, average 1.8%  
 Herb cover: range 18 - 97%, average 68.3%  
 Percent native cover relative to non-native cover: 7.6%

**Ecoregion Sections and Subsection Codes:** Central California Coast: 261Aj; Central Valley Coast Ranges: M262Ac, M262Ad, M262Af; Great Valley: 262As, 262Ag; Sierra Nevada Foothills: M261Fc; Southern California Mountains and Valleys: M262Bf

### **Plant Constancy/Cover Summary Table:**

<b>Stratum</b>	<b>Code</b>	<b>Species Name</b>	<b>Con</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>	<b>C</b>	<b>D</b>	<b>cD</b>
Herb									
	BRDI3	<b><i>Bromus diandrus</i></b>	100	30.7	5	85	X		X
	BRHO2	<i>Bromus hordeaceus</i>	73	6.4	0.2	30			
	AVFA	<i>Avena fatua</i>	53	7.8	0.2	40			
	ERBO	<i>Erodium botrys</i>	53	6.7	0.2	30			
	HOMU	<i>Hordeum murinum</i>	40	1.2	0.2	10			
	ERCI6	<i>Erodium cicutarium</i>	33	1.2	0.2	15			
	AMME12	<i>Amsinckia menziesii</i> var. <i>intermedia</i>	33	0.4	0.2	2			
	BRMA3	<i>Bromus madritensis</i>	33	0.2	0.2	2			
	VUMY	<i>Vulpia myuros</i>	33	0.2	0.2	2			
	LOPEM2	<i>Lolium perenne</i>	27	0.4	0.2	5			
	NAPU4	<i>Nassella pulchra</i>	27	0.3	0.2	4.38			
	STME2	<i>Stellaria media</i>	27	0.2	0.2	1			
Non-vasc									
	2MOSS	Moss	27	1.8	0.2	25			

***Bromus hordeaceus*–*Erodium (botrys)*–*Plagiobothrys fulvus* Stand Type**

**Samples used to describe type:** 28

**Local Environmental Table:**

Elevation: range 89 - 647, average 133.3 m  
 Total vegetation cover: range 12 - 100%, average 51.1%  
 Tree cover: range 0 - 0%, average 0%  
 Shrub cover: range 0 - 0%, average 0%  
 Herb cover: range 12 - 100%, average 51.1%  
 Percent native cover relative to non-native cover: 7.5%

**Ecoregion Sections and Subsection Codes:** Great Valley: 262Ag, 262Ao; Sierra Nevada Foothills: M261Fb, M261Fd

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb	BRHO2	<b><i>Bromus hordeaceus</i></b>	100	25	1	79	X		X
	HYGL2	<i>Hypochaeris glabra</i>	75	4.5	0.2	23	X		
	ERBO	<b><i>Erodium botrys</i></b>	71	6.7	0.2	35			
	VUBR	<i>Vulpia bromoides</i>	71	4	0.2	60			
	PLFU	<b><i>Plagiobothrys fulvus</i></b>	64	0.4	0.11	3			
	TRMI4	<i>Trifolium microcephalum</i>	61	0.2	0.11	1			
	CAAT25	<i>Castilleja attenuata</i>	54	0.1	0.11	1			
	BRDI3	<i>Bromus diandrus</i>	46	3.4	0.11	40			
	LOPEM2	<i>Lolium perenne</i>	43	0.1	0.2	1			
	SIGA	<i>Silene gallica</i>	43	0.1	0.2	1			
	AVBA	<i>Avena barbata</i>	39	0.7	0.2	9			
	BRMI2	<i>Briza minor</i>	39	0.2	0.2	1			
	CEGL2	<i>Cerastium glomeratum</i>	36	0.2	0.2	5			
	ERBR14	<i>Erodium brachycarpum</i>	32	5	4	35			
	HOMA2	<i>Hordeum marinum</i>	29	0.3	0.2	3			
	HOVI	<i>Holocarpha virgata</i>	29	0.2	0.2	3			
	CRSE11	<i>Croton setigerus</i>	29	0.1	0.2	1			
	TRHI4	<i>Trifolium hirtum</i>	25	0.4	0.11	4			
	VUMY	<i>Vulpia myuros</i>	25	0.2	0.2	2			
	CRCO34	<i>Crassula connata</i>	25	0.2	0.2	2			
Non-vasc	2MOSS	Moss	39	2.4	1	20			

***Bromus hordeaceus*–*Hordeum spp.*–*Medicago polymorpha* Stand Type**

**Samples used to describe type:** 13

**Local Environmental Table:**

Elevation: range 56 - 335, average 136.9 m  
 Total vegetation cover: range 26 - 98%, average 60.2%  
 Tree cover: range 0 - 0%, average 0%  
 Shrub cover: range 0 - 0%, average 0%  
 Herb cover: range 26 - 98%, average 60.2%  
 Percent native cover relative to non-native cover: 9.1%

**Ecoregion Sections and Subsection Codes:** Central Valley Coast Ranges: M262Ad; Great Valley: 262Ag, 262As; Sierra Nevada Foothills: M261Fc M262Ad

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb									
	BRHO2	<i>Bromus hordeaceus</i>	100	17.6	0.2	60	X		
	HOMU	<i>Hordeum murinum</i>	85	15.5	0.2	70	X		
	MEPO3	<i>Medicago polymorpha</i>	62	4.2	0.2	40			
	HOMA2	<i>Hordeum marinum</i>	62	2	0.2	20			
	VUBR	<i>Vulpia bromoides</i>	62	2	0.2	15			
	CRSE11	<i>Croton setigerus</i>	62	0.9	0.2	8			
	LOPEM2	<i>Lolium perenne</i>	62	0.7	0.2	7			
	HYGL2	<i>Hypochaeris glabra</i>	62	0.6	0.2	3			
	VUMY	<i>Vulpia myuros</i>	62	0.2	0.2	1			
	CEGL2	<i>Cerastium glomeratum</i>	54	1.2	0.2	10			
	ERCI6	<i>Erodium cicutarium</i>	54	1.2	0.2	5			
	ERMO7	<i>Erodium moschatum</i>	46	1.6	0.2	13			
	BRRU2	<i>Bromus rubens</i>	46	1	0.2	6			
	AVBA	<i>Avena barbata</i>	38	0.9	0.2	7			
	BRDI3	<i>Bromus diandrus</i>	38	0.4	0.11	4			
	CABU2	<i>Capsella bursa-pastoris</i>	31	0.6	0.2	5			
	PLFU	<i>Plagiobothrys fulvus</i>	31	0.1	0.2	1			

***Bromus hordeaceus*–*Leontodon taraxacoides* Stand Type**

**Samples used to describe type:** 19

**Local Environmental Table:**

Elevation: range 24 - 154, average 100m  
 Total vegetation cover: range 40 - 90%, average 63.1%  
 Tree cover: range 0.2 - 1.2%, average 0.8%  
 Shrub cover: range 0 - 0%, average 0%  
 Herb cover: range 40 - 90%, average 62.9%  
 Percent native cover relative to non-native cover: 10.8%

**Ecoregion Sections and Subsection Codes:** Central California Coast: 261Aa; Great Valley: 262Ao; Sierra Nevada Foothills: M261Fb

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb	BRHO2	<i>Bromus hordeaceus</i>	100	13.6	1	25	X		
	LETA	<i>Leontodon taraxacoides</i>	100	12.2	1	26	X		
	ERBO	<i>Erodium botrys</i>	89	5.2	0.2	25	X		
	TRHI4	<i>Trifolium hirtum</i>	89	1.7	0.2	7	X		
	AICA	<i>Aira caryophylla</i>	89	0.7	0.2	5	X		
	BRMI2	<i>Briza minor</i>	89	0.3	0.2	1	X		
	HYGL2	<i>Hypochaeris glabra</i>	84	3.5	0.2	20	X		
	TRDU2	<i>Trifolium dubium</i>	84	2.9	0.2	20	X		
	TACA8	<i>Taeniatherum caput-medusae</i>	79	3.2	0.2	15	X		
	VUBR	<i>Vulpia bromoides</i>	68	2.4	0.2	20			
	TRMI4	<i>Trifolium microcephalum</i>	63	0.3	0.2	2			
	LOGA2	<i>Filago gallica</i>	58	0.1	0.2	0.4			
	JUBU	<i>Juncus bufonius</i>	53	0.6	0.2	3			
	AVBA	<i>Avena barbata</i>	47	1.7	0.2	15			
	HEFI	<i>Hemizonia fitchii</i>	47	1	0.2	15			
	CAAT25	<i>Castilleja attenuata</i>	47	0.4	0.2	5			
	BRDI2	<i>Brachypodium distachyon</i>	42	2.5	0.2	25			
	LEBI8	<i>Leptosiphon bicolor</i>	42	0.1	0.2	1			
	TRVA	<i>Trifolium variegatum</i>	42	0.1	0.2	1			
	AETR	<i>Aegilops triuncialis</i>	37	5.4	0.2	50			
	LOPEM2	<i>Lolium perenne</i>	37	2.4	0.2	20			
	SOSE2	<i>Soliva sessilis</i>	32	0.3	0.2	3			
	TRERE2	<i>Triphysaria eriantha</i> ssp. <i>eriantha</i>	32	0.3	0.11	3			
	AVFA	<i>Avena fatua</i>	32	0.2	0.2	2			
	CYEC	<i>Cynosurus echinatus</i>	26	2.1	0.2	40			
	GAPH2	<i>Gastridium ventricosum</i>	26	1	0.2	18			
	VUMY	<i>Vulpia myuros</i>	26	0.5	0.2	5			
	NATA3	<i>Navarretia tagetina</i>	26	0.2	0.2	2			
	CAPY2	<i>Carduus pycnocephalus</i>	26	0.1	0.2	2			
	TRDED	<i>Trifolium depauperatum</i> var. <i>depauperatum</i>	26	0.1	0.2	2			
Non-vasc	2MOSS	Moss	37	2.4	0.2	24			

## ***Hypochaeris glabra*–*Vulpia bromoides* Stand Type**

**Samples used to describe type:** 22

### **Local Environmental Table:**

Elevation: range 3 - 225, average 110.2 m

Total vegetation cover: range 20 - 100%, average 66.5%

Tree cover: range 0 - 0%, average 0%

Shrub cover: range 0 - 0%, average 0%

Herb cover: range 20 - 100%, average 66.5%

Percent native cover relative to non-native cover: 6.3%

**Ecoregion Sections and Subsection Codes:** Central California Coast: 261Ab; Great Valley: 262Ag, 262Ah, 262Ao; Sierra Nevada Foothills: M261Fa, M261Fb

### **Plant Constancy/Cover Summary Table:**

<b>Stratum</b>	<b>Code</b>	<b>Species Name</b>	<b>Con</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>	<b>C</b>	<b>D</b>	<b>cD</b>
Herb	BRHO2	<i>Bromus hordeaceus</i>	100	34.6	2	100	X		X
	HYGL2	<i>Hypochaeris glabra</i>	82	7	0.2	40	X		
	ERBO	<i>Erodium botrys</i>	68	4	0.2	35			
	BRDI3	<i>Bromus diandrus</i>	64	10.2	0.2	50			
	VUBR	<i>Vulpia bromoides</i>	64	9.1	0.2	42			
	LOPEM2	<i>Lolium perenne</i>	50	1	0.2	10			
	TRMI4	<i>Trifolium microcephalum</i>	41	0.7	0.2	7			
	CAAT25	<i>Castilleja attenuata</i>	36	0.2	0.2	1			
	VUMY	<i>Vulpia myuros</i>	32	5.3	0.2	40			
	HOMAG	<i>Hordeum marinum</i> ssp. <i>gussonianum</i>	32	1.8	0.2	15			
	AVBA	<i>Avena barbata</i>	32	1.1	0.2	12			
	JUBU	<i>Juncus bufonius</i>	32	0.3	0.2	3			
	CEGL2	<i>Cerastium glomeratum</i>	32	0.2	0.2	1			
	BRMI2	<i>Briza minor</i>	32	0.1	0.2	1			
	TRCI	<i>Trifolium ciliolatum</i>	32	0.1	0.2	1			
	ERCI6	<i>Erodium cicutarium</i>	27	0.5	0.2	10			

***Bromus carinatus* Provisional Alliance  
(California brome grasslands)**

*Bromus carinatus* is characteristically present to co-dominant in the herbaceous layer, often occurring with *Bromus hordeaceus*, *Achillea millefolium*, *Eschscholzia californica* and other herbs including other native perennial grasses. Herbs are <1m tall, and cover is intermittent to continuous. Stands occur in moist foothill and coastal slopes, often with clay loam soils.



**Samples used to describe type: 4**

**Local Environmental Table:**

Elevation: range 14 - 1360, average 467.3 m

Total vegetation cover: range 60 - 90%, average 70%

Tree cover: range 0 - 0%, average 0%

Shrub cover: range 0.2 - 0.2%, average 0.2%

Herb cover: range 60 - 90%, average 70%

Percent native cover relative to non-native cover: 65.1%

**Ecoregion Sections and Subsection Codes:** Central California Coast: 261Ac; Northern California Coast: 263Ag; Southern California Mountains and Valleys: M262Bb

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb									
	BRCA5	<b><i>Bromus carinatus</i></b>	100	12.5	8	20	X		
	BRHO2	<i>Bromus hordeaceus</i>	50	5	0.1	20			
	ACMI2	<i>Achillea millefolium</i>	50	1.8	1	6			
	BRDI3	<i>Bromus diandrus</i>	50	0.8	0.3	3			
	LASE	<i>Lactuca serriola</i>	50	0.3	0.3	1			
	ESCA2	<i>Eschscholzia californica</i>	50	0.3	0.2	1			
	AGGR	<i>Agoseris grandiflora</i>	50	0.1	0.2	0.3			
	POSE	<i>Poa secunda</i>	50	0.1	0.2	0.3			
	HOLA	<i>Holcus lanatus</i>	25	10.5	42	42			
	LUVE	<i>Lupinus versicolor</i>	25	7.4	30	29.7			
	LUNA3	<i>Lupinus nanus</i>	25	6.3	25	25			
	MAOR3	<i>Marah oreganus</i>	25	3	12	12			
	ELGL	<i>Elymus glaucus</i>	25	2.5	10	10			
	POBU	<i>Poa bulbosa</i>	25	2.5	10	10			
	ARMAC2	<i>Armeria maritima</i> ssp. <i>californica</i>	25	2.5	9.9	9.9			
	HOB2	<i>Hordeum brachyantherum</i>	25	2.5	9.9	9.9			
	CHPO3	<i>Chlorogalum pomeridianum</i>	25	2	8	8			
	PLCI	<i>Plectritis ciliosa</i>	25	2	8	8			
	CAPY2	<i>Carduus pycnocephalus</i>	25	1.8	7	7			
	LOPEM2	<i>Lolium perenn</i>	25	1.5	6	6			
	MECA2	<i>Melica californica</i>	25	1	4	4			
	CESO3	<i>Centaurea solstitialis</i>	25	0.5	2	2			
	NAPU4	<i>Nassella pulchra</i>	25	0.5	2	2			
	RUAC3	<i>Rumex acetosella</i>	25	0.5	2	2			
	CLPE	<i>Claytonia perfoliata</i>	25	0.3	1	1			
	LOMAT	<i>Lomatium</i> sp.	25	0.3	1	1			
	MIGRG4	<i>Microsteris gracilis</i> var. <i>gracilis</i>	25	0.3	1	1			

**Association(s) Defined: *Bromus carinatus* Provisional**

***Bromus carinatus* Provisional Association**

Since only one association was sampled of this alliance in the study area, its description is the same as the alliance information above.

***Bromus rubens*–*Schismus (arabicus, barbatus)* Semi-natural Stands  
(Red brome or Mediterranean grass grasslands)**

*Bromus rubens* and/or *Schismus* sp. is strongly dominant or co-dominant with other non-natives in the herbaceous layer, often occurring with *Erodium cicutarium*, *Lepidium nitidum*, and other forbs and grasses. Herbs are <75 cm, and cover is sparse to continuous. Stands occur in all topography settings and soil textures.



**Samples used to describe type:** 17

**Local Environmental Table:**

Elevation: range 70 - 758, average 317.9 m  
Total vegetation cover: range 0.2 - 83%, average 26.4%  
Tree cover: range 0 - 0%, average 0%  
Shrub cover: range 0 - 0%, average 0%  
Herb cover: range 0.2 - 83%, average 26.4%  
Percent native cover relative to non-native cover: 8%

**Ecoregion Sections and Subsection Codes:** Central Valley Coast Ranges: M262Ad, M262Ai; Great Valley: 262Ax, 262Ay

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb	BRRU2	<b><i>Bromus rubens</i></b>	94	10	0.2	55	X		
	ERCI6	<i>Erodium cicutarium</i>	76	5.4	0.2	70	X		
	HOMU	<i>Hordeum murinum</i>	65	3	0.2	35			
	SCBA	<b><i>Schismus sp.</i></b>	53	3.1	0.2	20			
	BRHO2	<i>Bromus hordeaceus</i>	35	0.6	0.2	5			
	PECTO	<i>Pectocarya sp.</i>	35	0.2	0.2	2			
	VUMY	<i>Vulpia myuros</i>	29	0.2	0.2	2			
	LENI	<i>Lepidium nitidum</i>	24	0.2	0.2	2			
Non-vasc	2MOSS	Moss	65	1.9	0.2	15			
	CRYPTO	Cryptogammic crust	47	4.6	0.2	30			

**Stand Types(s) Defined:**

***Bromus rubens***

***Schismus (arabicus, barbatus)***

## ***Bromus rubens* Stand Type**

**Samples used to describe type:** 9

### **Local Environmental Table:**

Elevation: range 70 - 611, average 409.6 m

Total vegetation cover: range 0 - 83%, average 42.7%

Tree cover: range 0 - 0%, average 0%

Shrub cover: range 0 - 0%, average 0%

Herb cover: range 0.2 - 83%, average 42.7%

Percent native cover relative to non-native cover: 4.5%

**Ecoregion Sections and Subsection Codes:** Central Valley Coast Ranges: M262Ad, M262Ai; Great Valley: 262Ay

### **Plant Constancy/Cover Summary Table:**

<b>Stratum</b>	<b>Code</b>	<b>Species Name</b>	<b>Con</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>	<b>C</b>	<b>D</b>	<b>cD</b>
Herb	BRRU2	<b><i>Bromus rubens</i></b>	100	18.8	0.2	55	X		X
	HOMU	<i>Hordeum murinum</i>	89	5.4	0.2	35	X		
	ERCI6	<i>Erodium cicutarium</i>	78	10	0.2	70	X		
	BRHO2	<i>Bromus hordeaceus</i>	67	1.2	0.2	5			
	VUMY	<i>Vulpia myuros</i>	56	0.3	0.2	2			
	LOWR2	<i>Lotus wrangelianus</i>	56	0.1	0.11	0.2			
	AVBA	<i>Avena barbata</i>	33	0.8	0.2	5			
	MICA2	<i>Microseris campestris</i>	33	0.6	0.2	5			
	TRLA4	<i>Trichostema lanceolatum</i>	33	0.3	0.2	2			
Non-vasc	2MOSS	Moss	67	2.8	0.2	15			
	CRYPTO	Cryptogammic crust	44	1.2	0.2	5			

***Schismus (arabicus, barbatus)* Stand Type**

Samples used to describe type: 8

**Local Environmental Table:**

Elevation: range 109 - 758, average 214.9 m  
 Total vegetation cover: range 0 - 30%, average 8%  
 Tree cover: range 0 - 0%, average 0%  
 Shrub cover: range 0 - 0%, average 0%  
 Herb cover: range 0.2 - 30%, average 8%  
 Percent native cover relative to non-native cover: 12%

**Ecoregion Sections and Subsection Codes:** Central Valley Coast Ranges: M262Ai; Great Valley: 262Ax

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb	SCBA	<b><i>Schismus sp.</i></b>	100	6.5	0.2	20	X	X	
	BRRU2	<i>Bromus rubens</i>	88	0.6	0.2	3	X		
	PECTO	<i>Pectocarya sp.</i>	75	0.5	0.2	2	X		
	ERCI6	<i>Erodium cicutarium</i>	75	0.2	0.2	0.2	X		
	CRCO34	<i>Crassula connata</i>	50	0.1	0.2	0.2			
	HOMU	<i>Hordeum murinum</i>	38	0.4	0.2	2			
	AMME	<i>Amsinckia menziesii</i>	38	0.2	0.2	1			
	ERIOG	<i>Eriogonum sp.</i>	38	0.2	0.2	1			
	PLAGI	<i>Plagiobothrys sp.</i>	25	0.4	0.2	3			
Non-vasc	2MOSS	Moss	63	0.8	0.2	3			
	CRYPTO	Cryptogammic crust	50	8.5	9	30			

***Centaurea (melitensis, solstitialis)* Semi-natural Stands  
(Yellow star-thistle fields)**

*Centaurea melitensis* or *C. solstitialis* are dominant or co-dominant in the herbaceous layer, often co-dominating with *Bromus* spp. and occurring with *Erodium cicutarium*, *Hordeum murinum*, and *Vulpia myuros*. Herbs are <2 m tall, and cover is intermittent to continuous. Stands occur in open disturbed sites, upland grasslands, rangeland, and on roadsides. Soils are clays to sandy loams.



**Samples used to describe type: 3**

**Local Environmental Table:**

Elevation: range 161 - 636, average 477.7 m

Total vegetation cover: range 40 - 70%, average 53%

Tree cover: range 0 - 0%, average 0%

Shrub cover: range 0 - 0%, average 0%

Herb cover: range 40 - 70%, average 53%

Percent native cover relative to non-native cover: 0.3%

**Ecoregion Sections and Subsection Codes:** Central Valley Coast Ranges: M262Ad, M262Aj

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb									
	CEME2	<b><i>Centaurea melitensis</i></b>	100	21.7	8	35	X		X
	BRRU2	<i>Bromus rubens</i>	100	19.7	4	40	X		X
	ERCI6	<i>Erodium cicutarium</i>	100	1.7	0.2	4	X		
	BRHO2	<i>Bromus hordeaceus</i>	100	1.4	0.2	3	X		
	VUMY	<i>Vulpia myuros</i>	100	0.7	0.2	1	X		
	AVFA	<i>Avena fatua</i>	67	0.1	0.2	0.2			
	HEHIC	<i>Herniaria hirsuta</i> ssp. <i>cinerea</i>	67	0.1	0.2	0.2			
	HOMU	<i>Hordeum murinum</i>	33	4.7	14	14			
	BRDI3	<i>Bromus diandrus</i>	33	2	6	6			
	SISYM	<i>Sisymbrium</i> sp.	33	2	6	6			
	AVBA	<i>Avena barbata</i>	33	1.3	4	4			

**Stand Type(s) Defined: *Centaurea melitensis* Provisional**

***Centaurea melitensis* Provisional Stand Type**

Since only one stand type was sampled in the study area, its description is the same as the information above.

***Centromadia (pungens)* Alliance**  
**(Tar plant fields)**

*Centromadia pungens* is characteristic to co-dominant in the herbaceous layer with other native forbs such as *Lepidium dictyotum*, *Crassula connata*, and *Plantago elongata*. Native and non-native grasses such as *Bromus* spp., *Hordeum depressum*, and *Vulpia* spp. also occur. Herbs are <0.5 m, and cover is open to intermittent. Stands occur in vernally wet habitats, including edges of alkaline vernal pools, bottoms of shallow pools, and alkaline flats and scalds subjected to periodic or intermittent water inundation. Soils are fine-textured alluvium, sometimes underlain by claypan or another impervious layer, poorly drained, and derived from sedimentary or volcanic substrates.



**Samples used to describe type:** 29

**Local Environmental Table:**

Elevation: range 45 - 75, average 63.3 m  
Total vegetation cover: range 0.2 - 65%, average 28%  
Tree cover: range 0 - 0%, average 0%  
Shrub cover: range 0.2 - 0.6%, average 0.3%  
Herb cover: range 0.2 - 65%, average 28%  
Percent native cover relative to non-native cover: 54.2%

**Ecoregion Sections and Subsection Codes:** Great Valley: 262As, 262Au, 262Ay

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb	LEDI2	<i>Lepidium dictyotum</i>	93	2.8	0.2	15	X		
	CEPUP6	<b><i>Centromadia pungens ssp. pungens</i></b>	90	2.4	0.2	12	X		
	VUMY	<i>Vulpia myuros</i>	72	0.7	0.1	6			
	CRCO34	<i>Crassula connata</i>	69	1.6	0.2	10			
	VUMI	<i>Vulpia microstachys</i>	59	0.4	0.2	4			
	HODE2	<i>Hordeum depressum</i>	55	1.1	0.1	5			
	ERCI6	<i>Erodium cicutarium</i>	55	0.7	0.2	12			
	PLEL	<i>Plantago elongata</i>	55	0.4	0.1	3			
	BRRU2	<i>Bromus rubens</i>	55	0.2	0.1	3			
	BRHO2	<i>Bromus hordeaceus</i>	52	1.9	0.2	12			
	HOMU	<i>Hordeum murinum</i>	45	0.9	0.1	20			
	ATRIP	<i>Atriplex sp.</i>	41	0.8	0.2	7			
	DEDA	<i>Deschampsia danthonioides</i>	41	0.3	0.1	6			
	LAGR10	<i>Lasthenia gracilis</i>	34	2	0.2	20			
	LEDI2	<i>Lepidium dictyotum</i>	34	0.6	0.2	8			
	DISP	<i>Distichlis spicata</i>	34	0.1	0.2	1			
	LACA7	<i>Lasthenia californica</i>	31	3.6	0.2	40			
	LENI	<i>Lepidium nitidum</i>	31	0.4	0.1	7			
	HOMA2	<i>Hordeum marinum</i>	28	1.6	0.2	20			
	VUBR	<i>Vulpia bromoides</i>	28	1.5	0.2	30			
	TRDED	<i>Trifolium depauperatum</i> var. <i>depauperatum</i>	24	0.5	0.2	10			
	SPAT	<i>Spergularia atrosperma</i>	21	0.5	0.2	5			
	GITR2	<i>Gilia tricolor</i>	21	0.2	0.1	3			
	CEGL2	<i>Cerastium glomeratum</i>	21	0.2	0.2	3			
	PLAC	<i>Plagiobothrys acanthocarpus</i>	21	0.1	0.1	3			
Non-vasc	2MOSS	Moss	41	2.3	0.2	21			
	CRYPTO	Cryptogammic crust	38	2.2	0.2	18			

**Association(s) Defined: *Centromadia pungens* – *Lepidium dictyotum***

***Centromadia pungens* – *Lepidium dictyotum* Association**

Since only one association was sampled of this alliance in the study area, its description is the same as the alliance information above.

***Distichlis spicata* Alliance**  
**(Salt grass flats)**

*Distichlis spicata* is co-dominant to dominant in the herbaceous layer, often occurring with *Bromus rubens*, *Erodium cicutarium*, *Hordeum murinum*, and others. Emergent *Isocoma acradenia* may be present at sparse cover in the shrub canopy. Herbs are <75 cm, and cover is open to continuous. Stands occur in coastal salt marshes, inland habitats including playas, swales, and alkaline terraces along washes that are typically intermittently flooded. Soils are often deep, alkaline or saline and often have an impermeable layer making them poorly drained. When the soil is dry, the surface usually has salt accumulations.



**Samples used to describe type: 17**

**Local Environmental Table:**

Elevation: range 70 - 791, average 439.9 m  
Total vegetation cover: range 12 - 85%, average 42.6%  
Tree cover: range 0 - 0%, average 0%  
Shrub cover: range 0.2 - 2%, average 0.7%  
Herb cover: range 12 - 85%, average 42.4%  
Percent native cover relative to non-native cover: 65.8%

**Ecoregion Sections and Subsection Codes:** Central Valley Coast Ranges: M262Ad, M262Ai; Great Valley: 262Ay, 262Az; Sierra Nevada: M261Er; Sierra Nevada Foothills: M261Fd; Southern California Mountains and Valleys: M262Bp

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Shrub									
	ISAC2	<i>Isocoma acradenia</i>	35	0.3	0.2	2			
Herb									
	DISP	<b><i>Distichlis spicata</i></b>	100	22.3	2	45.5	X	X	
	ERCI6	<i>Erodium cicutarium</i>	71	2.9	0.2	20			
	BRRU2	<i>Bromus rubens</i>	65	2	0.2	10			
	HOMU	<i>Hordeum murinum</i>	65	1	0.2	8			
	BRHO2	<i>Bromus hordeaceus</i>	53	2.2	0.2	25			
	BRDI3	<i>Bromus diandrus</i>	47	1.5	0.2	10			
	FRSA	<i>Frankenia salina</i>	24	0.2	0.2	2			
	POSE	<i>Poa secunda</i>	24	0.1	0.2	1			

**Association(s) Defined:**

***Distichlis spicata***

***Distichlis spicata*–Annual grasses**

## ***Distichlis spicata* Association**

**Samples used to describe type:** 13

### **Local Environmental Table:**

Elevation: range 70 - 791, average 459.5 m

Total vegetation cover: range 12 - 85%, average 43.4%

Tree cover: range 0 - 0%, average 0%

Shrub cover: range 0.2 - 2%, average 0.7%

Herb cover: range 12 - 85%, average 43.1%

Percent native cover relative to non-native cover: 74.8%

**Ecoregion Sections and Subsection Codes:** Central Valley Coast Ranges: M262Ai; Great Valley: 262Ay, 262Az; Sierra Nevada: M261Er; Sierra Nevada Foothills: M261Fd; Southern California Mountains and Valleys: M262Bp

### **Plant Constancy/Cover Summary Table:**

<b>Stratum</b>	<b>Code</b>	<b>Species Name</b>	<b>Con</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>	<b>C</b>	<b>D</b>	<b>cD</b>
Shrub									
	ISAC2	<i>Isocoma acradenia</i>	46	0.4	0.2	2			
Herb									
	DISP	<i>Distichlis spicata</i>	100	26	6	45.5	X	X	
	BRRU2	<i>Bromus rubens</i>	62	1.9	0.2	10			
	ERC16	<i>Erodium cicutarium</i>	62	1.2	0.2	4			
	BRDI3	<i>Bromus diandrus</i>	54	1.8	0.2	10			
	HOMU	<i>Hordeum murinum</i>	54	1	0.2	8			
	LASE	<i>Lactuca serriola</i>	54	0.1	0.2	0.2			
	BRHO2	<i>Bromus hordeaceus</i>	46	0.4	0.2	2			

***Distichlis spicata*–Annual grasses Association**

**Samples used to describe type:** 4

**Local Environmental Table:**

Elevation: range 148 - 586, average 376 m  
 Total vegetation cover: range 23 - 65%, average 40.3%  
 Tree cover: range 0 - 0%, average 0%  
 Shrub cover: range 0.2 - 0.2%, average 0.2%  
 Herb cover: range 23 - 65%, average 40.3%  
 Percent native cover relative to non-native cover: 36.4%

**Ecoregion Sections and Subsection Codes:** Central Valley Coast Ranges: M262Ad, M262Ai

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb									
	DISP	<i>Distichlis spicata</i>	100	10.5	2	20	X		
	ERIC6	<i>Erodium cicutarium</i>	100	8.3	1	20	X		
	HOMU	<i>Hordeum murinum</i>	100	1.3	0.2	2	X		
	BRRU2	<i>Bromus rubens</i>	100	2.8	0.2	6	X		
	BRHO2	<i>Bromus hordeaceus</i>	75	7.8	3	25	X		
	LAGR10	<i>Lasthenia gracilis</i>	50	1.8	2	5			
	POSE	<i>Poa secunda</i>	50	0.5	1	1			
	MICA2	<i>Microseris campestris</i>	50	0.3	0.2	1			
	HOMA2	<i>Hordeum marinum</i>	25	4.8	19	19			
	AVBA	<i>Avena barbata</i>	25	1.8	7	7			
	BRDI3	<i>Bromus diandrus</i>	25	0.5	2	2			
	DERE2	<i>Delphinium recurvatum</i>	25	0.5	2	2			
	HOMUL	<i>Hordeum murinum</i> ssp. <i>leporinum</i>	25	0.5	2	2			
	LACA7	<i>Lasthenia californica</i>	25	0.5	2	2			
	ELYMU	<i>Elymus</i> sp.	25	0.5	2	2			
	VUBR	<i>Vulpia bromoides</i>	25	0.5	2	2			
	LAPL	<i>Layia platyglossa</i>	25	0.3	1	1			
	MIGRG4	<i>Microsteris gracilis</i> var. <i>gracilis</i>	25	0.3	1	1			

***Elymus elymoides* Provisional Alliance**  
**(Big squirreltail patches)**

*Elymus elymoides* is characteristic and co-dominant in the herbaceous layer, occurring with *Poa secunda*, *Bromus tectorum*, *Corethrogyne filaginifolia*, *Koeleria macrantha*, and other perennial and annual herbs. Herbs are <1m, and cover is intermittent to continuous. Stands occur along north-facing foothill slopes and toeslopes on a variety of substrates from serpentinite to sandy alluvium.



**Samples used to describe type: 6**

**Local Environmental Table:**

Elevation: range 786 - 1428, average 1225.3 m  
Total vegetation cover: range 29 - 85%, average 56.2%  
Tree cover: range 0 - 0%, average 0%  
Shrub cover: range 0.1 - 0.1%, average 0.1%  
Herb cover: range 29 - 85%, average 56.2%  
Percent native cover relative to non-native cover: 50%

**Ecoregion Sections and Subsection Codes:** Central Valley Coast Ranges: M262Ak; Sierra Nevada Foothills: M261Fe; Southern California Mountains and Valleys: M262Bb, M262Bo

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb									
	ELEL5	<b><i>Elymus elymoides</i></b>	100	16.9	7	45	X		X
	POSE	<i>Poa secunda</i>	83	0.9	0.2	2.9	X		
	BRTE	<i>Bromus tectorum</i>	67	12	4.9	47			
	COFI2	<i>Corethrogyne filaginifolia</i>	50	1	0.2	4			
	ERCI6	<i>Erodium cicutarium</i>	50	0.9	0.1	4.8			
	ERIOG	<i>Eriogonum</i> sp.	50	0.5	0.2	2			
	ESCA2	<i>Eschscholzia californica</i>	50	0.2	0.1	0.9			
	BRDI3	<i>Bromus diandrus</i>	33	15.8	35	60			
	BRHO2	<i>Bromus hordeaceus</i>	33	2.5	5	10			
	KOMA	<i>Koeleria macrantha</i>	33	1.8	1	10			
	ELYMU	<b><i>Elymus</i> sp.</b>	33	0.7	2	2			
	AMME	<i>Amsinckia menziesii</i>	33	0.5	0.1	2.8			
	LEPA51	<i>Leptosiphon parviflorus</i>	33	0.4	0.1	2			
	WYETH	<i>Wyethia</i> sp.	33	0.4	0.1	2			
	VICIA	<i>Vicia</i> sp.	33	0.2	0.1	1			

**Association(s) Defined: *Elymus elymoides* Provisional**

***Elymus elymoides* Provisional Association**

Since only one association was sampled of this alliance in the study area, its description is the same as the alliance information above.

***Eriogonum (elongatum, nudum) Alliance***  
**(Longstem and naked buckwheat patches)**

In the four stands sampled during this project, *Eriogonum nudum* is characteristic and co-dominant with forbs and grasses including *Bromus* spp., *Avena barbata*, and *Clarkia* sp. In the state of California, *E. elongatum* and/or *E. nudum* are present as dominant or co-dominant species in stands. Herbs are <1.5 m, and cover is open to continuous. Stands occur on upland grass flats, toeslopes, hills and steep slopes intermixed with other grassland types. Soils are often exposed and/or rocky, and sites may be disturbed by small mammals, grazing animals, or erosion.



**Samples used to describe type: 4**

**Local Environmental Table:**

Elevation: range 176 - 835, average 437.8 m  
Total vegetation cover: range 13 - 83%, average 36.3%  
Tree cover: range 0 - 0%, average 0%  
Shrub cover: range 0 - 0%, average 0%  
Herb cover: range 13 - 83%, average 36.3%  
Percent native cover relative to non-native cover: 39.5%

**Ecoregion Sections and Subsection Codes:** Central Valley Coast Ranges: M262Af; Great Valley: 262Az; Sierra Nevada Foothills: M261Fc

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb	ERNU3	<i>Eriogonum nudum</i>	100	9	2	17	X		X
	BRMA3	<i>Bromus madritensis</i>	100	1.2	0.2	4	X		
	BRHO2	<i>Bromus hordeaceus</i>	75	1.8	0.2	6	X		
	AVBA	<i>Avena barbata</i>	75	0.6	0.2	2	X		
	BRDI3	<i>Bromus diandrus</i>	75	0.2	0.2	0.2	X		
	CLARK	<i>Clarkia</i>	75	0.2	0.2	0.2	X		
	ERCI6	<i>Erodium cicutarium</i>	50	19.5	8	70			
	ERBO	<i>Erodium botrys</i>	50	0.3	0.2	1			
	AICA	<i>Aira caryophyllea</i>	50	0.1	0.2	0.2			
	DAPU3	<i>Daucus pusillus</i>	50	0.1	0.2	0.2			
	HYGL2	<i>Hypochaeris glabra</i>	50	0.1	0.2	0.2			
	PLNO	<i>Plagiobothrys nothofulvus</i>	25	1.3	5	5			
	BRTE	<i>Bromus tectorum</i>	25	0.8	3	3			
	ASCA3	<i>Asclepias californica</i>	25	0.5	2	2			
	CASU19	<i>Calystegia subacaulis</i>	25	0.5	2	2			
	CEME2	<i>Centaurea melitensis</i>	25	0.5	2	2			
	VUBR	<i>Vulpia bromoides</i>	25	0.3	1	1			
	VUMI	<i>Vulpia microstachys</i>	25	0.3	1	1			
Non-vasc	2MOSS	Moss	25	4.5	18	18			

**Association(s) Defined: *Eriogonum nudum* Provisional**

***Eriogonum nudum* Provisional Association**

Since only one association was sampled of this alliance in the study area, its description is the same as the alliance information above.

***Eschscholzia (californica) Alliance***  
**(California poppy fields)**

*Eschscholzia californica* and/or *Lupinus bicolor* is characteristically present and can be seasonally dominant in the herbaceous layer with *Bromus rubens*, and *B. hordeaceus*. Herbs are <0.5 m tall, and cover is open to continuous. Stands occur on upland slopes or flats. Soils are well drained, sandy to loamy, derived from many substrates, including sandy alluvium, serpentinite, and sandstone. Sites are often gravelly or rocky, and often have high levels of bioturbation or other natural disturbance.



**Samples used to describe type:** 17

**Local Environmental Table:**

Elevation: range 166 - 1288, average 868.2 m

Total vegetation cover: range 24 - 76%, average 44.8%

Tree cover: range 0 - 0%, average 0%

Shrub cover: range 0.2 - 2.2%, average 0.9%

Herb cover: range 24 - 76%, average 44.9%

Percent native cover relative to non-native cover: 46.3%

**Ecoregion Sections and Subsection Codes:** Central Valley Coast Ranges: M262Ai, M262Ak; Great Valley: 262Az; Sierra Nevada Foothills: M261Fc, M261Fd, M261Fe; Southern

California Mountains and Valleys: M262Bb

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb									
	BRHO2	<i>Bromus hordeaceus</i>	88	2.1	0.2	20	X		
	BRRU2	<i>Bromus rubens</i>	76	7	0.2	20	X		
	ESCA2	<b><i>Eschscholzia californica</i></b>	76	6.6	0.2	24	X		
	VUMY	<i>Vulpia myuros</i>	71	5.1	0.2	37			
	ERCI6	<i>Erodium cicutarium</i>	71	3.9	0.2	17			
	BRDI3	<i>Bromus diandrus</i>	59	3.4	0.2	27			
	LUBI	<b><i>Lupinus bicolor</i></b>	59	3.2	0.2	25			
	THCU	<i>Thysanocarpus curvipes</i>	41	0.1	0.2	1			
	BRAR3	<i>Bromus arenarius</i>	35	2.4	0.2	17			
	CLPE	<i>Claytonia perfoliata</i>	29	1.2	0.2	12			
	MILI5	<i>Uropappus lindleyi</i>	29	0.1	0.2	1			
	LUSUS	<i>Lupinus microcarpus</i>	24	1.2	0.2	19			
	BRTE	<i>Bromus tectorum</i>	24	0.3	0.2	5			
	ERIOG	<i>Eriogonum</i>	24	0.2	0.2	2			
Non-vasc									
	2MOSS	Moss	24	1.2	1	15			

**Association(s) Defined:**

***Eschscholzia californica***  
***Lupinus bicolor* Provisional**

## ***Eschscholzia californica* Association**

**Samples used to describe type:** 11

### **Local Environmental Table:**

Elevation: range 678 - 1261, average 993.64 m

Total vegetation cover: range 25 - 76%, average 49%

Tree cover: range 0 - 0%, average 0%

Shrub cover: range 0.2 - 0.2%, average 0.2%

Herb cover: range 25 - 76%, average 49%

Percent native cover relative to non-native cover: 41.6%

**Ecoregion Sections and Subsection Codes:** Central Valley Coast Ranges: M262Ai, M262Ak; Great Valley: 262Az; Sierra Nevada Foothills: M261Fe; Southern California Mountains and Valleys: M262Bb

### **Plant Constancy/Cover Summary Table:**

<b>Stratum</b>	<b>Code</b>	<b>Species Name</b>	<b>Con</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>	<b>C</b>	<b>D</b>	<b>cD</b>
Herb	ESCA2	<i>Eschscholzia californica</i>	91	9.6	0.2	24	X		
	BRRU2	<i>Bromus rubens</i>	91	7.1	0.2	17	X		
	BRHO2	<i>Bromus hordeaceus</i>	91	3.1	0.2	20	X		
	ERCI6	<i>Erodium cicutarium</i>	82	3.4	0.2	15	X		
	BRDI3	<i>Bromus diandrus</i>	73	5.2	0.2	27			
	VUMY	<i>Vulpia myuros</i>	64	7.3	0.2	37			
	THCU	<i>Thysanocarpus curvipes</i>	45	0.2	0.2	1			
	MILI5	<i>Uropappus lindleyi</i>	45	0.2	0.2	1			
	CLPE	<i>Claytonia perfoliata</i>	36	1.8	0.2	12			
	ERIOG	<i>Eriogonum</i>	36	0.3	0.2	2			
	LUBI	<i>Lupinus bicolor</i>	36	0.1	0.2	1			
	BRAR3	<i>Bromus arenarius</i>	27	3.3	4	17			
	PLCA5	<i>Platystemon californicus</i>	27	2.5	2	15			
	BRTE	<i>Bromus tectorum</i>	27	0.5	0.2	5			
	ACMI2	<i>Achillea millefolium</i>	27	0.2	0.2	2			
	MIGRG4	<i>Microsteris gracilis</i> var. <i>gracilis</i>	27	0.2	0.2	1			
	AMME	<i>Amsinckia menziesii</i>	27	0.1	0.2	1			
	POSE	<i>Poa secunda</i>	27	0.1	0.2	1			
	STNI	<i>Stellaria nitens</i>	27	0.1	0.2	1			
	VUMI	<i>Vulpia microstachys</i>	27	0.1	0.2	1			
Non-vasc	2MOSS	Moss	36	1.9	1	15			

## ***Lupinus bicolor* Provisional Association**

**Samples used to describe type:** 6

### **Local Environmental Table:**

Elevation: range 166 - 1288, average 638.4 m  
Total vegetation cover: range 24 - 60%, average 37%  
Tree cover: range 0 - 0%, average 0%  
Shrub cover: range 1 - 2.2%, average 1.6%  
Herb cover: range 24 - 60%, average 37.3%  
Percent native cover relative to non-native cover: 55%

**Ecoregion Sections and Subsection Codes:** Sierra Nevada Foothills: M261Fc, M261Fd;  
Southern California Mountains and Valleys: M262Bb

### **Plant Constancy/Cover Summary Table:**

<b>Stratum</b>	<b>Code</b>	<b>Species Name</b>	<b>Con</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>	<b>C</b>	<b>D</b>	<b>cD</b>
Herb	LUBI	<i>Lupinus bicolor</i>	100	8.8	1	25	X		
	VUMY	<i>Vulpia myuros</i>	83	1.1	0.2	3	X		
	BRHO2	<i>Bromus hordeaceus</i>	83	0.3	0.2	1	X		
	BRRU2	<i>Bromus rubens</i>	50	6.8	4	20			
	ERCI6	<i>Erodium cicutarium</i>	50	4.8	1	17			
	ERBO	<i>Erodium botrys</i>	50	3.3	2	10			
	ESCA2	<i>Eschscholzia californica</i>	50	1.1	0.2	6			
	BRAR3	<i>Bromus arenarius</i>	50	0.7	0.2	4			
	LUSUS	<i>Lupinus microcarpus</i>	33	3.2	0.2	19			
	PHACE	<i>Phacelia</i> sp.	33	2.7	1	15			
	ERPL2	<i>Eriastrum pluriflorum</i>	33	2.3	5	9			
	SCAR	<i>Schismus arabicus</i>	33	0.3	1	1			
	LOUNU	<i>Lotus purshianus</i>	33	0.2	0.2	1			

***Frankenia salina* Alliance**  
**(Alkali heath marsh)**

*Frankenia salina* is characteristic to co-dominant with *Bromus hordeaceus*, *Distichlis spicata*, and *Hordeum murinum* in the herbaceous layer. Herbs are <60 cm, and cover is open to intermittent. Stands occur in coastal salt marshes, brackish marshes, alkaline meadows, and alkali pools and playas. Soils are saline, sandy to clayey alluvium.



**Samples used to describe type: 4**

**Local Environmental Table:**

Elevation: range 28 - 174, average 82.3 m

Total vegetation cover: range 2 - 55%, average 30.8%

Tree cover: range 0 - 0%, average 0%

Shrub cover: range 0 - 0%, average 0%

Herb cover: range 2 - 55%, average 30.8%

Percent native cover relative to non-native cover: 35.5%

**Ecoregion Sections and Subsection Codes:** Central Valley Coast Ranges: M262Ad; Great Valley: 262At, 262Au, 262Ay

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb	FRSA	<i>Frankenia salina</i>	100	8	1	25	X		
	DISP	<i>Distichlis spicata</i>	75	4.3	0.2	15	X		
	BRHO2	<i>Bromus hordeaceus</i>	75	1.1	0.2	2	X		
	HOMU	<i>Hordeum murinum</i>	75	1.1	0.2	3	X		
	HOMA2	<i>Hordeum marinum</i>	50	10	10	30			
	THPO7	<i>Elytrigia pontica</i>	25	5.5	22	22			
	ELMA5	<i>Eleocharis macrostachya</i>	25	1.3	5	5			
	BRRU2	<i>Bromus rubens</i>	25	0.3	1	1			
	HODE2	<i>Hordeum depressum</i>	25	0.3	1	1			
	MEIN2	<i>Melilotus indicus</i>	25	0.3	1	1			
Non-vasc	2MOSS	Moss	50	0.3	0.2	1			

**Association(s) Defined:**

*Frankenia salina*

*Frankenia salina–Distichlis spicata*

**Frankenia salina Association**

**Samples used to describe type:** 2

**Local Environmental Table:**

Elevation: range 28 - 71, average 49.5 m  
 Total vegetation cover: range 2 - 26%, average 14%  
 Tree cover: range 0 - 0%, average 0%  
 Shrub cover: range 0 - 0%, average 0%  
 Herb cover: range 2 - 26%, average 14%  
 Percent native cover relative to non-native cover: 21.5%

**Ecoregion Sections and Subsection Codes:** Great Valley: 262At, 262Ay

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb	FRSA	<i>Frankenia salina</i>	100	2	1	3	X		
	HOMU	<i>Hordeum murinum</i>	100	0.6	0.2	1	X		
	THPO7	<i>Elytrigia pontica</i>	50	11	22	22			
	BRHO2	<i>Bromus hordeaceus</i>	50	1	2	2			
	BRRU2	<i>Bromus rubens</i>	50	0.5	1	1			
	HODE2	<i>Hordeum depressum</i>	50	0.5	1	1			
	MEIN2	<i>Melilotus indicus</i>	50	0.5	1	1			
	AMSIN	<i>Amsinckia</i> sp.	50	0.1	0.2	0.2			
	BRNI	<i>Brassica nigra</i>	50	0.1	0.2	0.2			
	DISP	<i>Distichlis spicata</i>	50	0.1	0.2	0.2			
	ERCI6	<i>Erodium cicutarium</i>	50	0.1	0.2	0.2			
	LASE	<i>Lactuca serriola</i>	50	0.1	0.2	0.2			
	RUMEX	<i>Rumex</i> sp.	50	0.1	0.2	0.2			
	SOAS	<i>Sonchus asper</i>	50	0.1	0.2	0.2			
	VIVIV8	<i>Vicia villosa</i> ssp. <i>varia</i>	50	0.1	0.2	0.2			
Non-vasc	2MOSS	Moss	100	0.6	0.2	1	X	X	

**Frankenia salina–Distichlis spicata Association**

**Samples used to describe type: 2**

**Local Environmental Table:**

Elevation: range 56 - 174, average 115 m  
 Total vegetation cover: range 40 - 55%, average 47.5%  
 Tree cover: range 0 - 0%, average 0%  
 Shrub cover: range 0 - 0%, average 0%  
 Herb cover: range 40 - 55%, average 47.5%  
 Percent native cover relative to non-native cover: 49.5 %

**Ecoregion Sections and Subsection Codes:** Central Valley Coast Ranges: M262Ad; Great Valley: 262Au

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb									
	HOMA2	<i>Hordeum marinum</i>	100	20	10	30	X		X
	FRSA	<b><i>Frankenia salina</i></b>	100	14	3	25	X		
	DISP	<b><i>Distichlis spicata</i></b>	100	8.5	2	15	X		
	BRHO2	<i>Bromus hordeaceus</i>	100	1.1	0.2	2	X		
	ELMA5	<i>Eleocharis macrostachya</i>	50	2.5	5	5			
	HOMU	<i>Hordeum murinum</i>	50	1.5	3	3			
	CAMA3	<i>Callitriche marginata</i>	50	0.1	0.2	0.2			
	GNAPH	<i>Gnaphalium</i> sp.	50	0.1	0.2	0.2			
	JUBU	<i>Juncus bufonius</i>	50	0.1	0.2	0.2			
	LYHY3	<i>Lythrum hyssopifolia</i>	50	0.1	0.2	0.2			
	PLAGI	<i>Plagiobothrys</i>	50	0.1	0.2	0.2			
	TRDED	<i>Trifolium depauperatum</i> var. <i>depauperatum</i>	50	0.1	0.2	0.2			
	VEPE2	<i>Veronica peregrina</i>	50	0.1	0.2	0.2			

***Isocoma acradenia* Alliance**  
**(Alkali golden bush scrub)**

*Isocoma acradenia* is dominant and open to intermittent in the shrub canopy. The herbaceous layer is also open to intermittent with native and non-native grasses and forbs, including *Atriplex* sp., *Bromus* spp., *Hordeum depressum*, *Puccinellia simplex*, and *Vulpia myuros*. Shrubs and herbs are <1 m tall. Stands occur usually on flats and are often associated with alkali scalds and alkali rain pools on slightly elevated uplands.



**Samples used to describe type: 2**

**Local Environmental Table:**

Elevation: range 56 - 61, average 58.5 m  
Total vegetation cover: range 41 - 45%, average 43%  
Tree cover: range 0 - 0%, average 0%  
Shrub cover: range 6 - 8%, average 7%  
Herb cover: range 37 - 41%, average 39%  
Percent native cover relative to non-native cover: 28.5%

**Ecoregion Sections and Subsection Codes:** Great Valley: 262Au, 262Ay

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Shrub	ISAC2	<i>Isocoma acradenia</i>	100	7	6	8	X	X	
Herb	BRHO2	<i>Bromus hordeaceus</i>	100	10	10	10	X		
	VUMY	<i>Vulpia myuros</i>	100	7	7	7	X		
	MEIN2	<i>Melilotus indicus</i>	100	6	6	6	X		
	ATRIP	<i>Atriplex</i> sp.	100	2.2	1.2	3	X		
	HODE2	<i>Hordeum depressum</i>	100	2.1	0.2	4	X		
	BRRU2	<i>Bromus rubens</i>	100	2	2	2	X		
	MEPO3	<i>Medicago polymorpha</i>	100	1.5	1	2	X		
	CEPUP6	<i>Centromadia pungens</i> ssp. <i>pungens</i>	100	1.1	0.2	2	X		
	PUSI	<i>Puccinellia simplex</i>	100	1.1	0.2	2	X		
	ASTRA	<i>Astragalus</i> sp.	100	0.6	0.2	1	X		
	ERCI6	<i>Erodium cicutarium</i>	100	0.6	0.2	1	X		
	CEGL2	<i>Cerastium glomeratum</i>	100	0.2	0.2	0.2	X		
	ROCR3	<i>Koeleria phleoides</i>	100	0.2	0.2	0.2	X		
	LEDI2	<i>Lepidium dictyotum</i>	100	0.2	0.2	0.2	X		
	PLEL	<i>Plantago elongata</i>	100	0.2	0.2	0.2	X		
	VUMI	<i>Vulpia microstachys</i>	100	0.2	0.2	0.2	X		
	VUBR	<i>Vulpia bromoides</i>	50	2.5	5	5			
	TRGR2	<i>Trifolium gracilentum</i>	50	1	2	2			
	TRMI4	<i>Trifolium microcephalum</i>	50	1	2	2			
	BROMU	<i>Bromus</i> sp.	50	0.1	0.2	0.2			
	CAEX14	<i>Castilleja exserta</i>	50	0.1	0.2	0.2			
	CEME2	<i>Centaurea melitensis</i>	50	0.1	0.2	0.2			
	CRCO34	<i>Crassula connata</i>	50	0.1	0.2	0.2			
	DISP	<i>Distichlis spicata</i>	50	0.1	0.2	0.2			
	ERODI	<i>Erodium</i> sp.	50	0.1	0.2	0.2			
	FRSA	<i>Frankenia salina</i>	50	0.1	0.2	0.2			
	GILIA	<i>Gilia</i> sp.	50	0.1	0.2	0.2			
	HEHI7	<i>Herniaria hirsuta</i>	50	0.1	0.2	0.2			
	HOMU	<i>Hordeum murinum</i>	50	0.1	0.2	0.2			
	LAGR10	<i>Lasthenia gracilis</i>	50	0.1	0.2	0.2			
	LENI	<i>Lepidium nitidum</i>	50	0.1	0.2	0.2			
	LINAN2	<i>Linanthus</i> sp.	50	0.1	0.2	0.2			
	LOWR2	<i>Lotus wrangelianus</i>	50	0.1	0.2	0.2			
	MICRO6	<i>Microseris</i> sp.	50	0.1	0.2	0.2			
	SADE	<i>Sagina decumbens</i>	50	0.1	0.2	0.2			
	SPMAL	<i>Spergularia macrotheca</i> var. <i>leucantha</i>	50	0.1	0.2	0.2			
	STME2	<i>Stellaria media</i>	50	0.1	0.2	0.2			
Non-vasc	2MOSS	Moss	100	7.5	1	14	X	X	

**Association(s) Defined: *Isocoma acradenia***

### ***Isocoma acradenia* Association**

Since only one association was sampled of this alliance in the study area, its description is the same as the alliance information above.

***Juncus arcticus* (var. *balticus*, *mexicanus*) Alliance**  
**(Baltic and Mexican rush marshes)**

*Juncus arcticus* var. *balticus* (= *J. arcticus* var. *littoralis*) or *J. mexicanus* is characteristic in the herbaceous layer, often occurring with *Bromus diandrus*, *Leymus triticoides*, *Cynodon dactylon*, and others. Herbs are <1 m tall, and cover is open to continuous. Stands occur in wet and mesic meadows; along stream banks, rivers, lakes, ponds, fens and sloughs; and freshwater, brackish, and alkaline marshes. Soils are typically poorly drained, often with a thick, organic layer.



**Samples used to describe type: 7**

**Local Environmental Table:**

Elevation: range 757 - 1144, average 939.4 m

Total vegetation cover: range 15 - 75%, average 39.1%

Tree cover: range 1 - 1%, average 1%

Shrub cover: range 0.2 - 8%, average 4.1%

Herb cover: range 15 - 75%, average 38%

Percent native cover relative to non-native cover: 53.4%

**Ecoregion Sections and Subsection Codes:** Central Valley Coast Ranges: M262Aj; Great Valley: 262Az; Sierra Nevada: M261Er; Sierra Nevada Foothills: M261Fd, M261Fe

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb									
	JUARL	<i>Juncus arcticus</i> var. <i>littoralis</i>	57	18.1	20	50			
	JUNCU	<i>Juncus</i> sp.	43	5.5	3	20			
	BRDI3	<i>Bromus diandrus</i>	29	1.5	0.2	10			
	CYDA	<i>Cynodon dactylon</i>	29	1	3	4			
	LETR5	<i>Leymus triticoides</i>	29	0.6	1	3			
	ERCI6	<i>Erodium cicutarium</i>	29	0.5	0.2	3			
	HOMU	<i>Hordeum murinum</i>	29	0.3	0.2	2			

**Association(s) Defined: *Juncus arcticus* var. *balticus******Juncus arcticus* var. *balticus* Association**

Since only one association was sampled of this alliance in the study area, its description is the same as the alliance information above.

***Lasthenia californica*–*Plantago erecta*–*Vulpia microstachys* Alliance  
(California goldfields–Dwarf plantain–Six-weeks fescue flower fields)**

*Lasthenia californica*, *L. gracilis*, *L. minor*, *Plantago erecta*, and/or *Vulpia microstachys* are characteristically present to co-dominant in the herbaceous layer, often occurring with *Bromus hordeaceus*, *Layia* spp., *Plagiobothrys* spp., *Hypochaeris glabra*, *Trifolium depauperatum*, and others. Stands are often rich in species composition with a variety of native herbs. Herbs are <60 cm, and cover is open to continuous. Stands occur on all topographic settings from flats to slopes of all aspects and ridges. Soils are shallow loams and clays, especially on mixed alluvium, volcanic and serpentinite substrates.



**Samples used to describe type: 72**

**Local Environmental Table:**

Elevation: range 55 - 1188, average 444.6 m

Total vegetation cover: range 5 - 77%, average 40.4%

Tree cover: range 0.2 - 0.2%, average 0.2%

Shrub cover: range 0.2 - 0.2%, average 0.2%

Herb cover: range 5 - 77%, average 40.4%

Percent native cover relative to non-native cover: 47.2%

**Ecoregion Sections and Subsection Codes:** Central Valley Coast Ranges: M262Ad, M262Ai, M262Aj; Great Valley: 262Ag, 262Ao, 262Au, 262Ax, 262Ay, 262Az; Sierra Nevada: M261Ef, M261Eg, M261Ep; Sierra Nevada Foothills: M261Fc

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb									
	ERCI6	<i>Erodium cicutarium</i>	68	4.5	0.2	35			
	BRRU2	<i>Bromus rubens</i>	65	1.6	0.1	11			
	VUMI	<b><i>Vulpia microstachys</i></b>	63	2.7	0.2	25			
	BRHO2	<i>Bromus hordeaceus</i>	60	1.9	0.1	30			
	LAGR10	<b><i>Lasthenia gracilis</i></b>	56	2.7	0.1	70			
	PLER3	<b><i>Plantago erecta</i></b>	54	2.2	0.2	20			
	VUMY	<i>Vulpia myuros</i>	54	1.4	0.2	18			
	LENI	<i>Lepidium nitidum</i>	46	1	0.1	30			
	CRCO34	<i>Crassula connata</i>	43	1	0.2	15			
	HYGL2	<i>Hypochaeris glabra</i>	39	0.5	0.2	5			
	HOMU	<i>Hordeum murinum</i>	38	0.5	0.1	7			
	ERBO	<i>Erodium botrys</i>	28	1	0.1	15			
	TRGR2	<i>Trifolium gracilentum</i>	25	0.5	0.2	14			
	JUBU	<i>Juncus bufonius</i>	25	0.2	0.2	5			
	CRSE11	<i>Croton setigerus</i>	25	0.1	0.1	3			
	VUBR	<i>Vulpia bromoides</i>	22	0.7	0.2	15			
	MEPO3	<i>Medicago polymorpha</i>	22	0.6	0.2	12			
	TRDED	<i>Trifolium depauperatum</i> var. <i>depauperatum</i>	22	0.1	0.2	3			
	AVBA	<i>Avena barbata</i>	21	0.1	0.1	4			
Non-vasc									
	2MOSS	Moss	53	3.9	0.2	30			
	CRYPTO	Cryptogammic crust	36	6.9	0.2	60			
	2LICHN	Lichen	31	1.6	0.2	20			

**Association(s) Defined:**

***Erodium cicutarium*–*Vulpia microstachys***

***Lasthenia (californica, gracilis)***

***Lasthenia californica*–*Plagiobothrys acanthocarpa*–*Medicago polymorpha* Provisional**

***Lasthenia minor* Provisional**

***Layia pentachaeta*–*Plagiobothrys (canescens)* Provisional**

***Layia platyglossa* Provisional**

***Lepidium nitidum*–*Trifolium gracilentum*–*Vulpia microstachys***

***Pectocarya (linearis, penicillata)***

***Vulpia microstachys*–*Lasthenia californica*–*Sedella pumila***

***Vulpia microstachys*–*Plantago erecta***

## ***Erodium cicutarium*–*Vulpia microstachys* Association**

**Samples used to describe type: 2**

### **Local Environmental Table:**

Elevation: range 618 - 758, average 688 m  
 Total vegetation cover: range 35 - 60%, average 47.5%  
 Tree cover: range 0 - 0%, average 0%  
 Shrub cover: range 0 - 0%, average 0%  
 Herb cover: range 35 - 60%, average 47.5%  
 Percent native cover relative to non-native cover: 31.8%

**Ecoregion Sections and Subsection Codes:** Central Valley Coast Ranges: M262Ai

### **Plant Constancy/Cover Summary Table:**

<b>Stratum</b>	<b>Code</b>	<b>Species Name</b>	<b>Con</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>	<b>C</b>	<b>D</b>	<b>cD</b>
Herb									
	ERC16	<i>Erodium cicutarium</i>	100	30	25	35	X		X
	VUMI	<i>Vulpia microstachys</i>	100	11.5	1	22	X		
	POSE	<i>Poa secunda</i>	100	3.6	0.2	7	X		
	BRRU2	<i>Bromus rubens</i>	100	2.5	2	3	X		
	LENI	<i>Lepidium nitidum</i>	100	1.1	0.2	2	X		
	HOMU	<i>Hordeum murinum</i>	100	0.2	0.2	0.2	X		
	TRGR2	<i>Trifolium gracilentum</i>	100	0.2	0.2	0.2	X		
	DICA14	<i>Dichelostemma capitatum</i>	100	0.2	0.11	0.2	X		
	SCAR	<i>Schismus arabicus</i>	50	12.5	25	25			
	TRAL5	<i>Trifolium albopurpureum</i>	50	2.5	5	5			
	ALHO2	<i>Allium howellii</i>	50	0.1	0.2	0.2			
	AMMEI2	<i>Amsinckia menziesii</i> var. <i>intermedia</i>	50	0.1	0.2	0.2			
	AMTET	<i>Amsinckia tessellata</i> var. <i>tessellata</i>	50	0.1	0.2	0.2			
	ASDI3	<i>Astragalus didymocarpus</i>	50	0.1	0.2	0.2			
	ASLE8	<i>Astragalus lentiginosus</i>	50	0.1	0.2	0.2			
	AVFA	<i>Avena fatua</i>	50	0.1	0.2	0.2			
	BRHO2	<i>Bromus hordeaceus</i>	50	0.1	0.2	0.2			
	CRSE11	<i>Croton setigerus</i>	50	0.1	0.2	0.2			
	ERGR6	<i>Eriogonum gracillimum</i>	50	0.1	0.2	0.2			
	GULA4	<i>Guillenia lasiophylla</i>	50	0.1	0.2	0.2			
	HOLA2	<i>Hollisteria lanata</i>	50	0.1	0.2	0.2			
	LAGR10	<i>Lasthenia gracilis</i>	50	0.1	0.2	0.2			
	LOTUS	<i>Lotus</i>	50	0.1	0.2	0.2			
	MIDO	<i>Microseris douglasii</i>	50	0.1	0.2	0.2			
	MIEL	<i>Microseris elegans</i>	50	0.1	0.2	0.2			
	MIGRG4	<i>Microsteris gracilis</i> var. <i>gracilis</i>	50	0.1	0.2	0.2			
	MOLA3	<i>Monolopia lanceolata</i>	50	0.1	0.2	0.2			
	TRLA4	<i>Trichostema lanceolatum</i>	50	0.1	0.2	0.2			

***Lasthenia (californica, gracilis)* Association**

**Samples used to describe type:** 8

**Local Environmental Table:**

Elevation: range 72 - 1188, average 727.6 m  
 Total vegetation cover: range 5 - 70%, average 39%  
 Tree cover: range 0.2 - 0.2%, average 0.2%  
 Shrub cover: range 0.2 - 0.2%, average 0.2%  
 Herb cover: range 5 - 70%, average 39%  
 Percent native cover relative to non-native cover: 47.6%

**Ecoregion Sections and Subsection Codes:** Central Valley Coast Ranges: M262Ai, M262Aj; Great Valley: 262Ay, 262Az; Sierra Nevada Foothills: M261Fc

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb	LAGR10	<i>Lasthenia gracilis</i>	100	12.2	1.0	70	X		X
	ERCI6	<i>Erodium cicutarium</i>	100	8.4	0.2	31	X		
	BRRU2	<i>Bromus rubens</i>	75	1.8	0.2	7	X		
	VUMY	<i>Vulpia myuros</i>	63	2	0.2	15			
	LEDI2	<i>Lepidium dictyotum</i>	50	0.9	2	5			
	HOMU	<i>Hordeum murinum</i>	50	0.3	0.2	2			
	TRGR2	<i>Trifolium gracilentum</i>	50	0.1	0.2	0.2			
	BRHO2	<i>Bromus hordeaceus</i>	38	4.7	0.2	30			
	PLER3	<i>Plantago erecta</i>	38	0.8	0.2	3			
	POSE	<i>Poa secunda</i>	38	0.2	0.2	1			
	CLARK	<i>Clarkia</i> sp.	25	0.4	1	2			
	DISP	<i>Distichlis spicata</i>	25	0.3	0.2	2			
	LENI	<i>Lepidium nitidum</i>	25	0.3	0.2	2			
	MICA2	<i>Microseris campestris</i>	25	0.3	1	1			
	AVFA	<i>Avena fatua</i>	25	0.2	0.2	1			
	VUMI	<i>Vulpia microstachys</i>	25	0.2	0.2	1			
Non-vasc	2MOSS	Moss	50	3.3	0.2	20			
	CRYPTO	Cryptogammic crust	38	1	0.2	5			

***Lasthenia californica*–*Plagiobothrys acanthocarpa*–*Medicago polymorpha* Provisional Association**

Samples used to describe type: 11

**Local Environmental Table:**

Elevation: range 94 - 143, average 125.2 m  
 Total vegetation cover: range 22 - 65%, average 42.3%  
 Tree cover: range 0 - 0%, average 0%  
 Shrub cover: range 0 - 0%, average 0%  
 Herb cover: range 22 - 65%, average 42.3%  
 Percent native cover relative to non-native cover: 25.7%

**Ecoregion Sections and Subsection Codes:** Central Valley Coast Ranges: M262Ad; Great Valley: 262Ag

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb									
	PLAC	<b><i>Plagiobothrys acanthocarpus</i></b>	100	5.6	0.2	15	X		
	BRHO2	<i>Bromus hordeaceus</i>	100	4.7	0.2	12	X		
	MEPO3	<b><i>Medicago polymorpha</i></b>	100	3.6	0.2	12	X		
	HYGL2	<i>Hypochaeris glabra</i>	100	1.6	0.2	5	X		
	JUBU	<i>Juncus bufonius</i>	91	0.3	0.2	1	X		
	LOPEM2	<i>Lolium perenne</i>	91	0.3	0.2	1	X		
	HECR2	<i>Hedypnois cretica</i>	82	5.2	1	10	X		
	SOSE2	<i>Soliva sessilis</i>	82	3.9	0.2	10	X		
	PLER3	<i>Plantago erecta</i>	82	1	0.2	5	X		
	VUBR	<i>Vulpia bromoides</i>	82	0.8	0.2	5	X		
	CRSE11	<i>Croton setigerus</i>	73	0.4	0.2	2			
	HOVI	<i>Holocarpha virgata</i>	73	0.4	0.2	2			
	SADE	<i>Sagina decumbens</i>	73	0.1	0.2	0.2			
	LACA7	<b><i>Lasthenia californica</i></b>	64	2.8	0.2	10			
	HOMA2	<i>Hordeum marinum</i>	64	0.9	0.2	5			
	HOMU	<i>Hordeum murinum</i>	64	0.7	0.2	3			
	LEBI8	<i>Leptosiphon bicolor</i>	64	0.4	0.2	1			
	PSTE	<i>Psilocarphus tenellus</i>	64	0.1	0.2	0.2			
	LOGA2	<i>Filago gallica</i>	55	0.7	0.2	0.2			
	LOGA2	<i>Logfia gallica</i>	55	0.7	0.2	3			
	HEFI	<i>Hemizonia fitchii</i>	55	0.2	0.2	1			
	CEGL2	<i>Cerastium glomeratum</i>	55	0.1	0.2	0.2			
	MUMA2	<i>Muilla maritima</i>	55	0.1	0.2	0.2			
	TRDED	<i>Trifolium depauperatum</i> var. <i>depauperatum</i>	55	0.1	0.2	0.2			
	GAPH2	<i>Gastridium ventricosum</i>	45	1.2	0.2	5			
	VUMY	<i>Vulpia myuros</i>	45	0.2	0.2	1			
	CRCO34	<i>Crassula connata</i>	45	0.2	0.2	1			
	CRTI	<i>Crassula tillaea</i>	45	0.2	0.2	1			
	TRHI4	<i>Trifolium hirtum</i>	45	0.2	0.2	1			
	ERBO	<i>Erodium botrys</i>	36	1.9	0.2	15			
	HECA30	<i>Hesperervax caulescens</i>	36	1.9	0.2	15			
	HEAC8	<i>Hesperervax acaulis</i>	36	1	0.2	10			
	ERBR14	<i>Erodium brachycarpum</i>	36	0.9	0.2	5			

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
	ERCI6	<i>Erodium cicutarium</i>	36	0.5	0.2	5			
	SIGA	<i>Silene gallica</i>	36	0.1	0.2	1			
	TRDES	<i>Trifolium depauperatum</i> var. <i>truncatum</i>	36	0.1	0.2	1			
	TRMI4	<i>Trifolium microcephalum</i>	36	0.1	0.2	1			
	BRRU2	<i>Bromus rubens</i>	27	0.3	0.11	3			
	AVBA	<i>Avena barbata</i>	27	0.2	0.2	2			
	MICRO6	<i>Microseris</i>	27	0.1	0.2	1			
Non-vasc	2MOSS	Moss	82	11.4	0.2	25	X	X	
	2LICHN	Lichen	64	0.2	0.2	1			

## ***Lasthenia minor* Provisional Association**

**Samples used to describe type: 2**

### **Local Environmental Table:**

Elevation: range 600 - 600, average 600 m  
 Total vegetation cover: range 55 - 60%, average 57.5%  
 Tree cover: range 0 - 0%, average 0%  
 Shrub cover: range 0 - 0%, average 0%  
 Herb cover: range 55 - 60%, average 57.5%  
 Percent native cover relative to non-native cover: 55.9%

**Ecoregion Sections and Subsection Codes:** Central Valley Coast Ranges: M262Ai

### **Plant Constancy/Cover Summary Table:**

<b>Stratum</b>	<b>Code</b>	<b>Species Name</b>	<b>Con</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>	<b>C</b>	<b>D</b>	<b>cD</b>
Herb	LAMI5	<i>Lasthenia minor</i>	100	29	12	46	X		X
	ERCI6	<i>Erodium cicutarium</i>	100	20.5	16	25	X		X
	VUMI	<i>Vulpia microstachys</i>	100	4	3	5	X		
	BRRU2	<i>Bromus rubens</i>	100	2.6	0.2	5	X		
	VUMY	<i>Vulpia myuros</i>	100	2.6	0.2	5	X		
	HOMU	<i>Hordeum murinum</i>	100	2.5	2	3	X		
	PLCA2	<i>Plagiobothrys canescens</i>	100	1.6	0.2	3	X		
	LUBI	<i>Lupinus bicolor</i>	100	0.6	0.2	1	X		
	SCHIS	<i>Schismus</i> sp.	100	0.2	0.2	0.2	X		
	TRGR2	<i>Trifolium gracilentum</i>	100	0.2	0.2	0.2	X		
	MILI5	<i>Uropappus lindleyi</i>	100	0.2	0.2	0.2	X		
	MIDO	<i>Microseris douglasii</i>	50	1	2	2			
	AMSIN	<i>Amsinckia</i> sp.	50	0.1	0.2	0.2			
	CACI2	<i>Calandrinia ciliata</i>	50	0.1	0.2	0.2			
	CACA33	<i>Camissonia campestris</i>	50	0.1	0.2	0.2			
	CRSE11	<i>Croton setigerus</i>	50	0.1	0.2	0.2			
	LACO4	<i>Lastarriaea coriacea</i>	50	0.1	0.2	0.2			
	LAPL	<i>Layia platyglossa</i>	50	0.1	0.2	0.2			
	MICA2	<i>Microseris campestris</i>	50	0.1	0.2	0.2			
	PEPE26	<i>Pectocarya penicillata</i>	50	0.1	0.2	0.2			
	TRLA4	<i>Trichostema lanceolatum</i>	50	0.1	0.2	0.2			
	TRGR5	<i>Tropidocarpum gracile</i>	50	0.1	0.2	0.2			
Non-vasc	2ALGA	Alga	50	0.1	0.2	0.2			

***Layia pentachaeta*–*Plagiobothrys (canescens)* Provisional Association**

**Samples used to describe type: 6**

**Local Environmental Table:**

Elevation: range 83 - 600, average 192.2 m  
 Total vegetation cover: range 30 - 50%, average 41.3%  
 Tree cover: range 0 - 0%, average 0%  
 Shrub cover: range 0.2 - 0.2%, average 0.2%  
 Herb cover: range 30 - 50%, average 41.3%  
 Percent native cover relative to non-native cover: 59.8%

**Ecoregion Sections and Subsection Codes:** Central Valley Coast Ranges: M262Ai; Great Valley: 262Ax, 262Ay

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb									
	SCHIS	<i>Schismus</i> sp.	100	8.7	0.2	25	X		
	ERCI6	<i>Erodium cicutarium</i>	100	3.7	0.2	15	X		
	AMME	<i>Amsinckia menziesii</i>	100	3.4	0.2	10	X		
	BRRU2	<i>Bromus rubens</i>	100	1.9	0.2	7	X		
	HOMU	<i>Hordeum murinum</i>	100	1.4	0.11	4	X		
	VUMY	<i>Vulpia myuros</i>	83	0.3	0.2	1	X		
	PLCA2	<b><i>Plagiobothrys canescens</i></b>	67	6.9	0.2	28			
	LAPE	<b><i>Layia pentachaeta</i></b>	67	3	0.2	10			
	PEPE26	<i>Pectocarya penicillata</i>	67	0.9	0.2	3			
	MACO3	<i>Malacothrix coulteri</i>	67	0.3	0.11	1			
	LAGR10	<i>Lasthenia gracilis</i>	67	0.1	0.2	0.2			
	SEVU	<i>Senecio vulgaris</i>	67	0.1	0.11	0.2			
	CRCO34	<i>Crassula connata</i>	50	3.8	4	10			
	LENI	<i>Lepidium nitidum</i>	50	0.6	0.2	3			
	LAMI5	<i>Lasthenia minor</i>	50	0.4	0.2	1			
	GULA4	<i>Guillenia lasiophylla</i>	33	4.2	10	15			

***Layia platyglossa* Provisional Association**

**Samples used to describe type: 5**

**Local Environmental Table:**

Elevation: range 593 - 594, average 593.8 m

Total vegetation cover: range 27 - 75%, average 45.4%

Tree cover: range 0 - 0%, average 0%

Shrub cover: range 0 - 0%, average 0%

Herb cover: range 27 - 75%, average 45.4%

Percent native cover relative to non-native cover: 41.4%

**Ecoregion Sections and Subsection Codes:** Central Valley Coast Ranges: M262Ai

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb	LAPL	<i>Layia platyglossa</i>	100	17.4	2	40	X		X
	ERCI6	<i>Erodium cicutarium</i>	100	7.6	2	14	X		
	BRRU2	<i>Bromus rubens</i>	100	7.4	4	11	X		
	VUMY	<i>Vulpia myuros</i>	100	1.8	0.2	4	X		
	BRHO2	<i>Bromus hordeaceus</i>	100	0.9	0.2	2	X		
	LAGR10	<i>Lasthenia gracilis</i>	80	0.9	0.2	3	X		
	LASE	<i>Lactuca serriola</i>	80	0.7	0.2	2	X		
	HIIN3	<i>Hirschfeldia incana</i>	60	3.2	1	12			
	AMTE3	<i>Amsinckia tessellata</i>	60	0.5	0.2	2			
	STEPH	<i>Stephanomeria</i>	60	0.4	0.2	1			
	ACMO2	<i>Achyrachaena mollis</i>	60	0.1	0.2	0.2			
	VUMI	<i>Vulpia microstachys</i>	40	0.8	0.2	4			
	HOMU	<i>Hordeum murinum</i>	40	0.2	0.2	1			

***Lepidium nitidum*–*Trifolium gracilentum*–*Vulpia microstachys* Association**

**Samples used to describe type:** 6

**Local Environmental Table:**

Elevation: range 55 - 717, average 312 m  
 Total vegetation cover: range 27 - 55%, average 41.2%  
 Tree cover: range 0 - 0%, average 0%  
 Shrub cover: range 0 - 0%, average 0%  
 Herb cover: range 27 - 55%, average 41.2%  
 Percent native cover relative to non-native cover: 69.6%

**Ecoregion Sections and Subsection Codes:** Central Valley Coast Ranges: M262Ai; Great Valley: 262Au, 262Ax, 262Ay

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb									
	BRRU2	<i>Bromus rubens</i>	100	3	0.2	6	X		
	ERCI6	<i>Erodium cicutarium</i>	100	2.9	0.2	12	X		
	LENI	<b><i>Lepidium nitidum</i></b>	83	9.5	0.2	30	X		
	VUMI	<b><i>Vulpia microstachys</i></b>	83	6.5	0.2	25	X		
	LAGR10	<i>Lasthenia gracilis</i>	83	3.8	0.2	15	X		
	VUMY	<i>Vulpia myuros</i>	83	3.6	0.2	18	X		
	TRGR2	<b><i>Trifolium gracilentum</i></b>	50	4.5	4	14			
	CRCO34	<i>Crassula connata</i>	50	3.5	3	15			
	TRDES	<i>Trifolium depauperatum</i> var. <i>truncatum</i>	33	2	2	10			
	HOMU	<i>Hordeum murinum</i>	33	1.2	0.2	7			
	CASTI2	<i>Castilleja</i> sp.	33	1	0.2	6			
	AMTE3	<i>Amsinckia tessellata</i>	33	1	1	5			
	CEPUP6	<i>Centromadia pungens</i> ssp. <i>pungens</i>	33	0.2	0.2	1			
	POSE	<i>Poa secunda</i>	33	0.2	0.2	1			

***Pectocarya (linearis, penicillata) Association***

**Samples used to describe type: 3**

**Local Environmental Table:**

Elevation: range 603 - 603, average 603 m  
 Total vegetation cover: range 23 - 40%, average 31%  
 Tree cover: range 0 - 0%, average 0%  
 Shrub cover: range 0 - 0%, average 0%  
 Herb cover: range 23 - 40%, average 31%  
 Percent native cover relative to non-native cover: 51.4%

**Ecoregion Sections and Subsection Codes:** Central Valley Coast Ranges: M262Ai

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb	ERCI6	<i>Erodium cicutarium</i>	100	8.3	5	15	X		
	PECTO	<b><i>Pectocarya sp.</i></b>	100	7.7	7	9	X		
	BRMA3	<i>Bromus madritensis</i>	100	3.7	1	7	X		
	CACA33	<i>Camissonia campestris</i>	100	2.5	0.2	7	X		
	LUBI	<i>Lupinus bicolor</i>	100	2.4	0.2	6	X		
	VUMI	<i>Vulpia microstachys</i>	100	1.1	0.2	2	X		
	LAPL	<i>Layia platyglossa</i>	100	0.7	0.2	1	X		
	LARA	<i>Lagophylla ramosissima</i>	100	0.5	0.2	1	X		
	AMME	<i>Amsinckia menziesii</i>	100	0.3	0.2	0.4	X		
	CRCO34	<i>Crassula connata</i>	100	0.2	0.2	0.2	X		
	HOMU	<i>Hordeum murinum</i>	100	0.2	0.2	0.2	X		
	LACO4	<i>Lastarriaea coriacea</i>	67	1.3	2	2			
	MIDO	<i>Microseris douglasii</i>	67	0.1	0.2	0.2			
	URLI5	<i>Microseris lindleyi</i>	67	0.1	0.2	0.2			
	CHCO21	<i>Lastarriaea coriacea</i>	33	3.3	10	10			
Non-vasc	CRYPTO	Cryptogamic crust	100	7.7	1	15	X	X	
	2MOSS	Moss	67	0.1	0.2	0.2			

***Vulpia microstachys*–*Lasthenia californica*–*Sedella pumila* Association**

Samples used to describe type: 13

**Local Environmental Table:**

Elevation: range 94 - 720, average 579.1 m  
 Total vegetation cover: range 22 - 77%, average 47.5%  
 Tree cover: range 0 - 0%, average 0%  
 Shrub cover: range 0 - 0%, average 0%  
 Herb cover: range 22 - 77%, average 47.5%  
 Percent native cover relative to non-native cover: 57.7%

**Ecoregion Sections and Subsection Codes:** Great Valley: 262Ao; Sierra Nevada Foothills: M261Fc

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb	PAPU10	<b><i>Sedella pumila</i></b>	85	7.4	0.2	70	X		
	VUMI	<b><i>Vulpia microstachys</i></b>	85	6.7	0.2	17	X		
	PLER3	<i>Plantago erecta</i>	85	1.3	0.2	5	X		
	TRDE	<i>Trifolium depauperatum</i>	77	0.5	0.2	3	X		
	ERBO	<i>Erodium botrys</i>	69	1.9	0.1	12			
	LENI	<i>Lepidium nitidum</i>	69	0.4	0.2	3			
	TRER6	<i>Triphysaria eriantha</i>	62	0.6	0.1	7			
	HYGL2	<i>Hypochaeris glabra</i>	62	0.2	0.2	1			
	LAGR10	<b><i>Lasthenia gracilis</i></b>	54	2.2	0.2	10			
	JUBU	<i>Juncus bufonius</i>	54	0.9	0.2	5			
	BRHO2	<i>Bromus hordeaceus</i>	54	0.4	0.1	2			
	TRHY3	<i>Triteleia hyacinthina</i>	46	2.1	0.2	17			
	CRCO34	<i>Crassula connata</i>	46	1	0.2	9			
	SELAG	<i>Selaginella</i> sp.	38	7.7	1	50			
	BREL	<i>Brodiaea elegans</i>	38	1.1	0.2	10			
	DEDA	<i>Deschampsia danthonioides</i>	31	0.3	0.1	3			
	DICA14	<i>Dichelostemma capitatum</i>	31	0.2	0.2	1			
	LUBI	<i>Lupinus bicolor</i>	31	0.1	0.2	1			
Non-vasc	2MOSS	Moss	77	6.4	0.2	30	X		
	2LICHN	Lichen	69	6.3	1	17			
	CRYPTO	Cryptogammic crust	62	21.7	10	60			

## ***Vulpia microstachys*–*Plantago erecta* Association**

**Samples used to describe type:** 16

### **Local Environmental Table:**

Elevation: range 94 - 733, average 431.6 m  
 Total vegetation cover: range 20 - 65%, average 30.5%  
 Tree cover: range 0 - 0%, average 0%  
 Shrub cover: range 0.2 - 0.2%, average 0.2%  
 Herb cover: range 20 - 65%, average 30.5%  
 Percent native cover relative to non-native cover: 42.1%

**Ecoregion Sections and Subsection Codes:** Central Valley Coast Ranges: M262Ai, M262Aj; Great Valley: 262Ag, 262Ao; Sierra Nevada Foothills: M261Fc

### **Plant Constancy/Cover Summary Table:**

<b>Stratum</b>	<b>Code</b>	<b>Species Name</b>	<b>Con</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>	<b>C</b>	<b>D</b>	<b>cD</b>
Herb	PLER3	<i>Plantago erecta</i>	88	7	0.2	20	X		
	BRHO2	<i>Bromus hordeaceus</i>	88	1.9	0.2	8	X		
	VUMI	<i>Vulpia microstachys</i>	88	1.6	0.2	10	X		
	ERCI6	<i>Erodium cicutarium</i>	81	2.8	0.2	10	X		
	BRRU2	<i>Bromus rubens</i>	69	0.7	0.1	3			
	CRCO34	<i>Crassula connata</i>	56	0.7	0.2	7			
	VUMY	<i>Vulpia myuros</i>	50	2.6	0.2	14			
	AVBA	<i>Avena barbata</i>	50	0.3	0.1	4			
	CAAT25	<i>Castilleja attenuata</i>	50	0.2	0.1	1			
	LOWR2	<i>Lotus wrangelianus</i>	44	0.4	0.2	3			
	LAGR10	<i>Lasthenia gracilis</i>	44	0.2	0.1	2			
	HYGL2	<i>Hypochaeris glabra</i>	38	0.9	0.2	5			
	ERBR14	<i>Erodium brachycarpum</i>	31	1.6	0.2	10			
	TRER6	<i>Triphysaria eriantha</i>	31	0.4	0.2	4			
	TRLA4	<i>Trichostema lanceolatum</i>	31	0.3	0.1	4			
	CRSE11	<i>Croton setigerus</i>	31	0.2	0.1	3			
	TRMI4	<i>Trifolium microcephalum</i>	31	0.2	0.1	2			
	ERBO	<i>Erodium botrys</i>	25	0.8	0.1	8			
	LOPEM2	<i>Lolium perenne</i>	25	0.3	0.2	3			
	TRGR2	<i>Trifolium gracilentum</i>	25	0.2	0.2	3			
	BOCAC	<i>Bombycilaena californica</i> var. <i>californica</i>	25	0.2	0.2	1			
Non-vasc	2MOSS	Moss	69	2.5	0.2	10			
	CRYPTO	Cryptogammic crust	56	9.4	0.2	35			
	2LICHN	Lichen	31	0.6	1	3			

***Lasthenia fremontii*–*Distichlis spicata* Alliance**  
**(Fremont's goldfields–Saltgrass alkaline vernal pools)**

*Distichlis spicata* is characteristic in the herbaceous layer, often occurring with native diagnostic vernal pool species such as *Lasthenia fremontii*, *Lasthenia gracilis*, *Eryngium castrense*, and *Plagiobothrys* spp. as well as non-natives such as *Bromus hordeaceus*, *Hordeum marinum*, *Vulpia myuros*, *Erodium cicutarium*, and others. Herbs are <50 cm, and cover is sparse to continuous. Stands occur in alkaline or saline claypan vernal pools, and on recent alluvial deposits of <20,000 years old. Soils are alkaline with sodium-rich clay and low permeability. They are short-inundated and lose water mostly through evaporation.



**Samples used to describe type:** 13

**Local Environmental Table:**

Elevation: range 44 - 586, average 184.6 m  
Total vegetation cover: range 0.2 - 70%, average 38.3%  
Tree cover: range 0 - 0%, average 0%  
Shrub cover: range 0.2 - 0.2%, average 0.2%  
Herb cover: range 0.2 - 70%, average 38.3%  
Percent native cover relative to non-native cover: 48.7%

**Ecoregion Sections and Subsection Codes:** Central Valley Coast Ranges: M262Ad, M262Ai; Great Valley: 262As, 262Au

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb	BRHO2	<i>Bromus hordeaceus</i>	85	5.1	0.2	17	X		
	DISP	<b><i>Distichlis spicata</i></b>	77	5.6	1	30	X		
	VUBR	<i>Vulpia bromoides</i>	69	7.1	0.2	40			
	HOMA2	<i>Hordeum marinum</i>	69	2.7	0.2	12			
	VUMY	<i>Vulpia myuros</i>	62	1.1	0.2	10			
	ERCI6	<i>Erodium cicutarium</i>	62	0.5	0.2	4			
	VUMI	<i>Vulpia microstachys</i>	62	0.3	0.2	1			
	BRRU2	<i>Bromus rubens</i>	54	0.6	0.1	2			
	LENI	<i>Lepidium nitidum</i>	54	0.2	0.2	1			
	HOMU	<i>Hordeum murinum</i>	46	1	0.2	7			
	ERBR14	<i>Erodium brachycarpum</i>	38	0.1	0.2	1			
	TRDED	<i>Trifolium depauperatum</i> var. <i>depauperatum</i>	38	0.1	0.2	1			
	TRGR2	<i>Trifolium gracilentum</i>	31	0.9	0.2	5			
	LEDID	<i>Lepidium dictyotum</i> var. <i>dictyotum</i>	31	0.3	0.2	2			
	HODE2	<i>Hordeum depressum</i>	31	0.2	0.2	2			
	CRCO34	<i>Crassula connata</i>	31	0.1	0.2	1			
	CRSE11	<i>Croton setigerus</i>	31	0.1	0.2	1			
	JUBU	<i>Juncus bufonius</i>	31	0.1	0.2	1			
	PLAC	<i>Plagiobothrys acanthocarpus</i>	31	0.1	0.2	1			
	LAGR10	<i>Lasthenia gracilis</i>	23	1	0.2	12			
	SPAT	<i>Spergularia atrosperma</i>	23	0.4	0.2	5			
	PLEL	<i>Plantago elongata</i>	23	0.2	0.2	2			
	LEDI2	<i>Lepidium dictyotum</i>	23	0.2	0.2	2			
	CEPUP6	<i>Centromadia pungens</i> ssp. <i>pungens</i>	23	0.1	0.2	1			
Non-vasc	2MOSS	Moss	54	1.6	0.2	15			
	CRYPTO	Cryptogammic crust	38	2.6	0.2	10			

**Association(s) Defined:**

***Atriplex vallicola*–*Lasthenia ferrisiae*–*Lepidium jaredii*  
*Distichlis spicata*–*Eryngium castrense* Provisional  
*Hordeum (depressum, leporinum)***

***Atriplex vallicola*–*Lasthenia ferrisiae*–*Lepidium jaredii* Association**

**Samples used to describe type:** 3

**Local Environmental Table:**

Elevation: range 586 - 586, average 586 m  
 Total vegetation cover: range 0 - 60%, average 25%  
 Tree cover: range 0 - 0%, average 0%  
 Shrub cover: range 0.2 - 0.2%, average 0.2%  
 Herb cover: range 0.2 - 60%, average 25%  
 Percent native cover relative to non-native cover: 62.6%

**Ecoregion Sections and Subsection Codes:** Central Valley Coast Ranges: M262Ai

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb	LAFE	<b><i>Lasthenia ferrisiae</i></b>	67	12.3	12	25			
	SPSA5	<i>Spergularia marina</i>	67	10.1	0.2	30			
	ATVA	<b><i>Atriplex vallicola</i></b>	67	2.1	0.2	6			
	HOMU	<i>Hordeum murinum</i>	67	1.3	1	3			
	BRRU2	<i>Bromus rubens</i>	67	0.7	1	1			
	VUMI	<i>Vulpia microstachys</i>	67	0.4	0.2	1			
Non-vasc	2ALGA	Alga	33	0.3	1	1			
	2MOSS	Moss	33	0.3	1	1			

***Distichlis spicata*–*Eryngium castrense* Provisional Association**

Samples used to describe type: 3

**Local Environmental Table:**

Elevation: range 44 - 170, average 86.7 m  
 Total vegetation cover: range 25 - 50%, average 36%  
 Tree cover: range 0 - 0%, average 0%  
 Shrub cover: range 0 - 0%, average 0%  
 Herb cover: range 25 - 50%, average 36%  
 Percent native cover relative to non-native cover: 83.5%

**Ecoregion Sections and Subsection Codes:** Central Valley Coast Ranges: M262Ad; Great Valley: 262As

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb	DISP	<b><i>Distichlis spicata</i></b>	100	14.3	1	30	X		X
	BRHO2	<i>Bromus hordeaceus</i>	100	1	1	1	X		
	HOMA2	<i>Hordeum marinum</i>	100	0.2	0.2	0.2	X		
	VUBR	<i>Vulpia bromoides</i>	100	0.2	0.2	0.2	X		
	VUMY	<i>Vulpia myuros</i>	100	0.2	0.2	0.2	X		
	ERCA33	<b><i>Eryngium castrense</i></b>	67	7	6	15			
	CRSE11	<i>Croton setigerus</i>	67	0.1	0.2	0.2			
	ERCI6	<i>Erodium cicutarium</i>	67	0.1	0.2	0.2			
	HOMU	<i>Hordeum murinum</i>	67	0.1	0.2	0.2			
	LENI	<i>Lepidium nitidum</i>	67	0.1	0.2	0.2			
	ERYNG	<i>Eryngium</i>	33	8.3	25	25			
	LELAL3	<i>Lepidium latipes</i> var. <i>latipes</i>	33	1.7	5	5			
	ELAC	<i>Eleocharis acicularis</i>	33	0.7	2	2			
	PLLE	<i>Plagiobothrys leptocladus</i>	33	0.7	2	2			
Non-vasc	2MOSS	Moss	67	0.1	0.2	0.2			
	CRYPTO	Cryptogammic crust	33	3.3	10	10			

## *Hordeum (depressum, leporinum)* Association

Samples used to describe type: 7

### Local Environmental Table:

Elevation: range 45 - 59, average 54.6 m

Total vegetation cover: range 15 - 70%, average 45%

Tree cover: range 0 - 0%, average 0%

Shrub cover: range 0 - 0%, average 0%

Herb cover: range 15 - 70%, average 45%

Percent native cover relative to non-native cover: 27.9%

Ecoregion Sections and Subsection Codes: Great Valley: 262As, 262Au

### Plant Constancy/Cover Summary Table:

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb	VUBR	<i>Vulpia bromoides</i>	100	13.2	0.2	40	X		
	BRHO2	<i>Bromus hordeaceus</i>	100	9	2	17	X		
	DISP	<b><i>Distichlis spicata</i></b>	100	4.3	1	8	X		
	HOMA2	<b><i>Hordeum marinum</i></b>	86	5	1	12	X		
	TRDE	<i>Trifolium depauperatum</i>	86	0.9	0.2	3.2	X		
	LEDI2	<i>Lepidium dictyotum</i>	86	0.8	0.2	2	X		
	VUMI	<i>Vulpia microstachys</i>	86	0.4	0.2	1	X		
	VUMY	<i>Vulpia myuros</i>	71	1.9	0.2	10			
	ERCI6	<i>Erodium cicutarium</i>	71	0.8	0.2	4			
	BRRU2	<i>Bromus rubens</i>	71	0.8	0.11	2			
	ERBR14	<i>Erodium brachycarpum</i>	71	0.3	0.2	1			
	TRGR2	<i>Trifolium gracilentum</i>	57	1.7	0.2	5			
	HODE2	<b><i>Hordeum depressum</i></b>	57	0.4	0.2	2			
	LENI	<i>Lepidium nitidum</i>	57	0.3	0.2	1			
	CRCO34	<i>Crassula connata</i>	57	0.2	0.2	1			
	CEGL2	<i>Cerastium glomeratum</i>	57	0.1	0.2	0.2			
	LAGR10	<i>Lasthenia gracilis</i>	43	1.9	0.2	12			
	SPAT	<i>Spergularia atosperma</i>	43	0.8	0.2	5			
	PLEL	<i>Plantago elongata</i>	43	0.5	0.2	2			
	CEPUP6	<i>Centromadia pungens</i> ssp. <i>pungens</i>	43	0.2	0.2	1			
	JUBU	<i>Juncus bufonius</i>	43	0.2	0.2	1			
	PLAC	<i>Plagiobothrys acanthocarpus</i>	43	0.2	0.2	1			
	CRTR5	<i>Cressa truxillensis</i>	29	1.9	5	8			
	HOMU	<b><i>Hordeum murinum</i></b>	29	1.1	1	7			
	CRSE11	<i>Croton setigerus</i>	29	0.2	0.2	1			
Non-vasc	2MOSS	Moss	57	2.7	0.2	15			
	CRYPTO	Cryptogammic crust	43	3.3	3	10			

***Lasthenia fremontii*–*Downingia (bicornuta)* Alliance  
(Fremont's goldfields–*Downingia* vernal pools)**

*Lasthenia fremontii*, *Deschampsia danthonioides*, *Downingia* spp., *Navarretia leucocephala*, *Psilocarphus brevissimus*, and/or *Eryngium (castrense, vaseyi)* are typically present. Herbs are <60 cm, and cover is open to intermittent. Stands occur in shallow vernal pool bottoms and edges, mostly hardpan pools on older geomorphic surfaces but also on volcanic substrates. Soils have short periods of inundation.



**Samples used to describe type: 7**

**Local Environmental Table:**

Elevation: range 62 - 608, average 185.3 m  
Total vegetation cover: range 12 - 55%, average 23%  
Tree cover: range 0 - 0%, average 0%  
Shrub cover: range 0 - 0%, average 0%  
Herb cover: range 12 - 55%, average 23%  
Percent native cover relative to non-native cover: 83.2%

**Ecoregion Sections and Subsection Codes:** Great Valley: 262Ag, 262Ao, 262Au; Sierra Nevada Foothills: M261Fc

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb									
	HOMA2	<i>Hordeum marinum</i>	86	2.5	0.2	10	X		
	PSBR	<i>Psilocarphus brevissimus</i>	71	2.6	1	10			
	ERCA33	<b><i>Eryngium castrense</i></b>	57	1.6	0.2	5			
	PLAGI	<b><i>Plagiobothrys</i></b>	43	1.5	0.2	7			
	LACA7	<i>Lasthenia californica</i>	43	0.6	0.2	2			
	JUBU	<i>Juncus bufonius</i>	43	0.4	1	1			
	DOBI	<i>Downingia bicornuta</i>	43	0.2	0.2	1			
	PLCHU	<i>Plagiobothrys undulatus</i>	29	1.3	4	5			
	DEDA	<i>Deschampsia danthonioides</i>	29	1.1	1	7			
	PLST	<i>Plagiobothrys stipitatus</i>	29	0.3	0.2	2			
	RABO	<i>Ranunculus bonariensis</i>	29	0.3	0.2	2			

**Association(s) Defined: *Eryngium (vaseyi, castrense)***

***Eryngium (vaseyi, castrense)* Association**

Since only one association was sampled of this alliance in the study area, its description is the same as the alliance information above.

***Layia fremontii*–*Achyraea mollis* Alliance**  
**(Fremont's tidy-tips–Blow wives vernal pools)**

*Layia fremontii* and/or *Achyraea mollis* is characteristically present with *Bromus hordeaceus*, *Hypochaeris glabra*, *Triphysaria eriantha* spp. *eriantha*, *Juncus bufonis*, *Trifolium depauperatum*, and others in the herbaceous layer. Herbs are <60 cm, and cover is open to continuous. Stands occur in short-inundated, shallow, flashy vernal hardpan pools and moist meadows with subsurface waterflow in winter and early spring. Soils are often shallow and rocky.



**Samples used to describe type: 10**

**Local Environmental Table:**

Elevation: range 95 - 717, average 192.1 m  
Total vegetation cover: range 30 - 67%, average 49%  
Tree cover: range 0 - 0%, average 0%  
Shrub cover: range 0 - 0%, average 0%  
Herb cover: range 30 - 67%, average 49%  
Percent native cover relative to non-native cover: 43.2%

**Ecoregion Sections and Subsection Codes:** Great Valley: 262Ag, 262Ah; Sierra Nevada Foothills: M261Fb, M261Fc

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb									
	BRHO2	<i>Bromus hordeaceus</i>	90	5.3	0.2	25	X		
	HYGL2	<i>Hypochaeris glabra</i>	90	2.2	0.2	7	X		
	LAFR2	<b><i>Layia fremontii</i></b>	70	4.8	0.2	20			
	TRERE2	<i>Triphysaria eriantha</i> ssp. <i>eriantha</i>	70	4.4	0.2	17			
	JUBU	<i>Juncus bufonius</i>	70	2.6	0.2	15			
	TRDE	<i>Trifolium depauperatum</i>	70	1.9	0.2	6			
	LETA	<i>Leontodon taraxacoides</i>	60	7.8	4	23			
	ERBO	<i>Erodium botrys</i>	60	3.8	0.2	20			
	NATA3	<i>Navarretia tagetina</i>	60	3.3	0.2	12			
	LOPEM2	<i>Lolium perenne</i>	60	2.9	0.2	26			
	LENI	<i>Lepidium nitidum</i>	60	2.7	0.2	26			
	HEFI	<i>Hemizonia fitchii</i>	60	1.4	0.2	5			
	AICA	<i>Aira caryophyllea</i>	60	1.2	1	5			
	TRDU2	<i>Trifolium dubium</i>	60	0.5	0.2	2			
	BRMI2	<i>Briza minor</i>	60	0.3	0.2	1			
	VUBR	<i>Vulpia bromoides</i>	60	0.1	0.2	0.2			
	PLGR	<i>Plagiobothrys greenei</i>	50	0.7	0.2	3			
	TRVA	<i>Trifolium variegatum</i>	50	0.3	0.2	1			
	JUCA5	<i>Juncus capitatus</i>	50	0.1	0.2	0.2			
	POZI	<i>Pogogyne ziziphoroides</i>	50	0.1	0.2	0.2			
	LACA7	<i>Lasthenia californica</i>	40	3.3	0.2	19			
	HOMUL	<i>Hordeum murinum</i> ssp. <i>leporinum</i>	40	1.1	0.2	10			
	CEGL2	<i>Cerastium glomeratum</i>	40	0.4	0.2	3			
	POAN	<i>Poa annua</i>	40	0.2	0.1	1			
	CIQU3	<i>Cicendia quadrangularis</i>	40	0.2	0.2	1			
	GAPH2	<i>Gastridium ventricosum</i>	30	3.7	0.2	27			
	PLSTM	<i>Plagiobothrys stipitatus</i> var. <i>micranthus</i>	30	2.2	0.2	22			
	BRODI	<i>Brodiaea</i>	30	0.7	0.2	6			
	MEPO3	<i>Medicago polymorpha</i>	30	0.7	1	4			
	LEBI8	<i>Leptosiphon bicolor</i>	30	0.2	0.2	2			
	HECR2	<i>Hedypnois cretica</i>	20	0.9	2	7			
	ACMO2	<b><i>Achyrrachaena mollis</i></b>	20	0.8	0.2	8			
	CRTI	<i>Crassula tillaea</i>	20	0.4	0.2	4			
	SOSE2	<i>Soliva sessilis</i>	20	0.3	0.2	3			
	DICA14	<i>Dichelostemma capitatum</i>	20	0.2	0.2	2			
	HOMAG	<i>Hordeum marinum</i> ssp. <i>gussonianum</i>	20	0.2	0.2	2			
	AVBA	<i>Avena barbata</i>	20	0.1	0.2	1			
	BRAP	<i>Brodiaea appendiculata</i>	20	0.1	0.2	1			
	CHAN2	<i>Chlorogalum angustifolium</i>	20	0.1	0.2	1			
	MIAC	<i>Microseris acuminata</i>	20	0.1	0.2	1			
Non-vasc									
	2MOSS	Moss	60	5.9	1	30			
	CRYPTO	Cryptogammic crust	20	2	0.2	20			

**Association(s) Defined: *Layia fremontii*–*Achyrrachaena mollis***

***Layia fremontii*–*Achyrachaena mollis* Association**

Since only one association was sampled of this alliance in the study area, its description is the same as the alliance information above.

***Leymus cinereus* Alliance**  
**(Ashy ryegrass meadows)**

*Leymus cinereus* is dominant in the herbaceous layer often occurring with *Bromus hordeaceus*, *B. diandrus*, *Claytonia perfoliata*, and others. Emergent *Ericameria nauseosa* may be present at sparse cover in the shrub canopy. Herbs are up to 1–2 m, and cover is open to continuous. Stands occur in depressions, drainages, spring-fed slopes, and other moist areas.



**Samples used to describe type:** 10

**Local Environmental Table:**

Elevation: range 773 - 1950, average 1216.1 m

Total vegetation cover: range 30 - 65%, average 52.6%

Tree cover: range 0.4 - 0.4%, average 0.4%

Shrub cover: range 0.2 - 2.2%, average 1.1%

Herb cover: range 27 - 65%, average 52.2%

Percent native cover relative to non-native cover: 73.2%

**Ecoregion Sections and Subsection Codes:** Great Valley: 262Az; Mono: 341Df; Sierra Nevada Foothills: M261Fe; Southern California Mountains and Valleys: M262Bb

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Shrub	ERNA10	<i>Ericameria nauseosa</i>	30	0.1	0.1	1			
Herb	LECI4	<b><i>Leymus cinereus</i></b>	100	25.3	15	60	X	X	
	BRHO2	<i>Bromus hordeaceus</i>	80	4.8	0.2	25	X		
	LASE	<i>Lactuca serriola</i>	70	0.2	0.1	1			
	CLPE	<i>Claytonia perfoliata</i>	60	4	0.2	35			
	BRDI3	<i>Bromus diandrus</i>	60	3.2	0.2	20			
	VUMY	<i>Vulpia myuros</i>	60	1.3	0.2	5			
	BRTE	<i>Bromus tectorum</i>	60	1.2	0.1	10			
	ERCI6	<i>Erodium cicutarium</i>	50	0.4	0.2	2			
	BRAR3	<i>Bromus arenarius</i>	30	1.2	0.2	10			
	LARA	<i>Lagophylla ramosissima</i>	30	0.3	0.2	2			
	ERIOG	<i>Eriogonum</i>	30	0.2	0.2	1			
	LEPA51	<i>Linanthus parviflorus</i>	30	0.2	0.2	1			
	SIAL2	<i>Sisymbrium altissimum</i>	30	0.1	0.2	1			
	CLCYC2	<i>Clarkia cylindrica</i> ssp. <i>cylindrica</i>	20	0.2	0.2	2			
	MIGRG4	<i>Microsteris gracilis</i> var. <i>gracilis</i>	20	0.1	0.2	1			
Non-vasc	2MOSS	Moss	30	4.5	0.2	45			

**Association(s) Defined: *Leymus cinereus* Provisional**

***Leymus cinereus* Provisional Association**

Since only one association was sampled of this alliance in the study area, its description is the same as the alliance information above.

***Leymus triticoides* Alliance**  
**(Creeping rye grass turfs)**

*Leymus triticoides* is characteristic and often co-dominant in the herbaceous layer, occurring with *Bromus hordeaceus*, *Bromus diandrus*, and other grasses and forbs. Herbs are up to 1–2 m, and cover is open to continuous. Stands occur in poorly drained floodplains, drainage and valley bottoms, moist flats to slopes, and marsh margins. Soils are clays and loams.



**Samples used to describe type:** 16

**Local Environmental Table:**

Elevation: range 2 - 1297, average 737.4 m  
Total vegetation cover: range 14 - 90%, average 51.3%  
Tree cover: range 0.2 - 0.2%, average 0.2%  
Shrub cover: range 0.2 - 4%, average 1.5%  
Herb cover: range 11 - 90%, average 51%  
Percent native cover relative to non-native cover: 52.9%

**Ecoregion Sections and Subsection Codes:** Central California Coast: 261Ab; Central Valley Coast Ranges: M262Ai, M262Aj; Great Valley: 262Aj, 262Au, 262Az; Sierra Nevada Foothills: M261Fd, M261Fe; Southern California Mountains and Valleys: M262Bb

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb									
	LETR5	<i>Leymus triticoides</i>	100	22.9	7	70	X		X
	BRDI3	<i>Bromus diandrus</i>	88	13.9	0.2	55	X		
	BRHO2	<i>Bromus hordeaceus</i>	75	3.9	0.2	18	X		
	LASE	<i>Lactuca serriola</i>	56	0.3	0.2	3			
	HOMU	<i>Hordeum murinum</i>	50	1.5	0.2	15			
	BRRU2	<i>Bromus rubens</i>	38	0.7	0.2	4			
	ERCI6	<i>Erodium cicutarium</i>	31	0.2	0.2	2			
	VUMY	<i>Vulpia myuros</i>	25	4	0.2	50			
	TRGR2	<i>Trifolium gracilentum</i>	25	0.5	0.2	6			
	CEME2	<i>Centaurea melitensis</i>	25	0.1	0.2	1			
	DISP	<i>Distichlis spicata</i>	25	0.1	0.2	1			

**Association(s) Defined:**

*Leymus triticoides*

*Leymus triticoides* –*Bromus* spp.–*Avena* spp.

***Leymus triticoides* Association**

Samples used to describe type: 8

**Local Environmental Table:**

Elevation: range 735 - 1070, average 904.3 m

Total vegetation cover: range 14 - 75%, average 41.6%

Tree cover: range 0.2 - 0.2%, average 0.2%

Shrub cover: range 4 - 4%, average 4%

Herb cover: range 11 - 75%, average 41.1%

Percent native cover relative to non-native cover: 81.5%

**Ecoregion Sections and Subsection Codes:** Central Valley Coast Ranges: M262Ai, M262Aj; Great Valley: 262Az; Sierra Nevada Foothills: M261Fd, M261Fe

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb									
	LETR5	<i>Leymus triticoides</i>	100	34.8	8	70	X	X	
	BRDI3	<i>Bromus diandrus</i>	88	5.2	0.2	12	X		
	LASE	<i>Lactuca serriola</i>	63	0.1	0.2	0.2			
	BRHO2	<i>Bromus hordeaceus</i>	50	0.4	0.2	2			
	HOMU	<i>Hordeum murinum</i>	38	0.4	0.2	2			
	BRRU2	<i>Bromus rubens</i>	25	0.4	0.2	3			
	JUARL	<i>Juncus balticus</i>	25	0.3	0.2	2			

***Leymus triticoides* –*Bromus spp.*–*Avena spp.* Association**

Samples used to describe type: 8

**Local Environmental Table:**

Elevation: range 2 - 1297, average 570.6 m  
 Total vegetation cover: range 42 - 90%, average 60.9%  
 Tree cover: range 0 - 0%, average 0%  
 Shrub cover: range 0.2 - 0.2%, average 0.2%  
 Herb cover: range 42 - 90%, average 60.9%  
 Percent native cover relative to non-native cover: 24.4%

**Ecoregion Sections and Subsection Codes:** Central California Coast: 261Ab; Central Valley Coast Ranges: M262Ai; Great Valley: 262Au, 262Az; Sierra Nevada Foothills: M261Fe; Southern California Mountains and Valleys: M262Bb

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb	LETR5	<b><i>Leymus triticoides</i></b>	100	11	7	29	X		
	BRHO2	<b><i>Bromus hordeaceus</i></b>	100	7.4	0.2	18	X		
	BRDI3	<b><i>Bromus diandrus</i></b>	88	22.7	0.2	55	X		X
	HOMU	<i>Hordeum murinum</i>	63	2.5	0.2	15			
	VUMY	<i>Vulpia myuros</i>	50	7.9	0.2	50			
	TRGR2	<i>Trifolium gracilentum</i>	50	1.1	0.2	6			
	BRRU2	<i>Bromus rubens</i>	50	0.9	0.2	4			
	LASE	<i>Lactuca serriola</i>	50	0.6	0.2	3			
	ERCI6	<i>Erodium cicutarium</i>	50	0.3	0.2	2			
	VUBR	<i>Vulpia bromoides</i>	38	3.5	0.2	20			
	BROMU	<i>Bromus</i> sp.	38	0.6	0.2	4			
	CRSE11	<i>Croton setigerus</i>	38	0.2	0.2	1			
	DISP	<i>Distichlis spicata</i>	38	0.2	0.2	1			
	ERBR14	<i>Erodium brachycarpum</i>	38	0.2	0.2	1			
	SOOL	<i>Sonchus oleraceus</i>	38	0.1	0.2	0.4			
	FRSA	<i>Frankenia salina</i>	25	0.3	0.2	2			
	AVFA	<b><i>Avena fatua</i></b>	25	0.2	0.2	1			
	CEME2	<i>Centaurea melitensis</i>	25	0.2	0.2	1			
Non-vasc	2MOSS	Moss	38	0.2	0.2	1			

***Lupinus benthamii*–*Chorizanthe membranacea* Provisional Alliance  
(Spider lupine–Pink spineflower fields)**

*Lupinus benthamii* and/or *Chorizanthe membranacea* are characteristically present to co-dominant with a diverse mix of native and non-native forbs and grasses including *Bromus* spp., *Hypochaeris glabra*, *Phacelia cicutaria*, *Pterostegia drymarioides*, and others. Herbs are <1 m, and cover is open to continuous. Stands are typically on steep sandy to rocky hill slopes and rock outcrops.



**Samples used to describe type: 9**

**Local Environmental Table:**

Elevation: range 266 - 969, average 541.4 m

Total vegetation cover: range 24 - 57%, average 41.7%

Tree cover: range 2 - 2%, average 2%

Shrub cover: range 0.31 - 0.31%, average 0.3%

Herb cover: range 24 - 57%, average 41.7%

Percent native cover relative to non-native cover: 45.6%

**Ecoregion Sections and Subsection Codes:** Sierra Nevada Foothills: M261Fc

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb									
	HYGL2	<i>Hypochaeris glabra</i>	100	1.6	0.2	4	X		
	LUBE	<b><i>Lupinus benthamii</i></b>	89	8	2	19	X		
	CHME2	<b><i>Chorizanthe membranacea</i></b>	89	4	0.2	12	X		
	PHCI	<i>Phacelia cicutaria</i>	89	0.8	0.2	3	X		
	BRHO2	<i>Bromus hordeaceus</i>	78	1.7	0.2	6	X		
	PTDR	<i>Pterostegia drymarioides</i>	78	0.9	0.2	3	X		
	BRDI3	<i>Bromus diandrus</i>	78	0.8	0.2	3	X		
	GICA5	<i>Gilia capitata</i>	78	0.6	0.2	4	X		
	AVBA	<i>Avena barbata</i>	78	0.3	0.1	2	X		
	ERBO	<i>Erodium botrys</i>	67	3.9	0.2	13			
	PLNO	<i>Plagiobothrys nothofulvus</i>	67	1.4	0.2	5			
	BRRU2	<i>Bromus rubens</i>	56	0.8	0.1	5			
	ESCA	<i>Eschscholzia caespitosa</i>	56	0.4	0.2	1			
	TRMI4	<i>Trifolium microcephalum</i>	56	0.4	0.2	1			
	SIGA	<i>Silene gallica</i>	56	0.3	0.2	1			
	DAPU3	<i>Daucus pusillus</i>	56	0.2	0.2	1			
	AICA	<i>Aira caryophyllea</i>	56	0.1	0.2	0.2			
	DICA14	<i>Dichelostemma capitatum</i>	56	0.1	0.2	0.2			
	SEHA2	<i>Selaginella hansenii</i>	44	1.5	0.2	7			
	GITR2	<i>Gilia tricolor</i>	44	0.5	0.2	3			
	TRCI	<i>Trifolium ciliolatum</i>	44	0.5	0.2	3			
	VUBR	<i>Vulpia bromoides</i>	33	0.8	1	3			
	VUMY	<i>Vulpia myuros</i>	33	0.6	0.2	4			
	TRWI3	<i>Trifolium willdenovii</i>	33	0.5	0.1	4			
	ERCI6	<i>Erodium cicutarium</i>	33	0.5	0.2	3			
	STTO3	<i>Streptanthus tortuosus</i>	33	0.3	0.2	2			
	CAEXE	<i>Castilleja exserta</i> ssp. <i>exserta</i>	33	0.2	0.2	1			
	LUBI	<i>Lupinus bicolor</i>	33	0.2	0.2	1			
	PSHE	<i>Pseudobahia heermannii</i>	33	0.2	0.2	1			
	LUCIC	<i>Lupinus citrinus</i> var. <i>citrinus</i>	22	1.4	0.2	12			
	GICAA	<i>Gilia capitata</i> ssp. <i>abrotanifolia</i>	22	0.5	0.2	4			
	FEMIC	<i>Vulpia microstachys</i> var. <i>ciliata</i>	22	0.4	1	3			
	HOLOC	<i>Holocarpha</i>	22	0.2	0.2	2			
	MICA7	<i>Minuartia californica</i>	22	0.2	0.2	2			
	LOCA19	<i>Filago californica</i>	22	0.1	0.2	1			
Non-vasc									
	2LICHN	Lichen	78	17.7	2	42	X		X
	2MOSS	Moss	78	11.7	1	45	X		X
	CRYPTO	Cryptogammic crust	44	1.8	0.2	9			

**Association(s) Defined: *Lupinus benthamii*–*Chorizanthe membranacea* Provisional**

***Lupinus benthamii*–*Chorizanthe membranacea* Provisional Association**

Since only one association was sampled of this alliance in the study area, its description is the same as the alliance information above.

***Madia elegans* Alliance**  
**(Elegant madia fields)**

*Madia elegans* is characteristic in the herbaceous layer with a diverse mix of native and non-native forbs and grasses including *Amsinckia menziesii*, *Bromus* spp., *Clarkia* spp., *Lupinus bicolor*, *Plagiobothrys nothofulvus*, and *Trifolium* spp. Herbs are 1–2 m or less, and cover is open to continuous. Stands often occur adjacent to or in openings of oak woodlands along hillslopes of the southern Sierra Nevada foothills.



**Samples used to describe type:** 13

**Local Environmental Table:**

Elevation: range 269 - 1052, average 629.1 m

Total vegetation cover: range 25 - 85%, average 48.3%

Tree cover: range 0.2 - 0.4%, average 0.3%

Shrub cover: range 2.1 - 4.2%, average 3.2%

Herb cover: range 25 - 75%, average 47.5%

Percent native cover relative to non-native cover: 60.1%

**Ecoregion Sections and Subsection Codes:** Sierra Nevada Foothills: M261Fc

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb									
	MAEL	<i>Madia elegans</i>	100	11.7	0.2	43	X		
	BRDI3	<i>Bromus diandrus</i>	92	3.4	0.2	20	X		
	BRHO2	<i>Bromus hordeaceus</i>	85	4	0.1	15	X		
	AMME	<i>Amsinckia menziesii</i>	77	1	0.1	10	X		
	ERBO	<i>Erodium botrys</i>	69	3.2	0.2	27			
	PLNO	<i>Plagiobothrys nothofulvus</i>	69	0.9	0.2	6			
	DICA14	<i>Dichelostemma capitatum</i>	69	0.1	0.1	0.2			
	LUBI	<i>Lupinus bicolor</i>	62	1.2	0.2	6			
	AVBA	<i>Avena barbata</i>	62	0.9	0.1	8			
	CLARK	<i>Clarkia</i>	54	2.6	0.2	15			
	HYGL2	<i>Hypochaeris glabra</i>	54	0.6	0.2	3			
	AICA	<i>Aira caryophylla</i>	54	0.3	0.2	2			
	GEMO	<i>Geranium molle</i>	54	0.2	0.1	2			
	DAPU3	<i>Daucus pusillus</i>	54	0.2	0.1	1			
	THCU	<i>Thysanocarpus curvipes</i>	54	0.1	0.1	0.2			
	MAELV	<i>Madia elegans</i> ssp. <i>vernalis</i>	46	4.6	0.2	40			
	VUMY	<i>Vulpia myuros</i>	46	1.9	0.2	20			
	BOCAC	<i>Bombycilaena californica</i> var. <i>californica</i>	46	0.8	0.1	9			
	TRWI3	<i>Trifolium willdenovii</i>	46	0.4	0.1	2			
	TRMI4	<i>Trifolium microcephalum</i>	46	0.2	0.2	1			
	TRCI	<i>Trifolium ciliolatum</i>	38	1.9	0.1	10			
	TRIX	<i>Triteleia ixioides</i>	38	0.5	0.2	3			
	ERCI6	<i>Erodium cicutarium</i>	38	0.2	0.2	1			
	LEMO19	<i>Linanthus montanus</i>	31	4.2	3	28			
	SANIC	<i>Sanicula</i>	31	0.1	0.2	1			
	TRIFO	<i>Trifolium</i>	31	0.1	0.2	1			
	SELAG	<i>Selaginella</i>	23	2.1	0.2	25			
	VUBR	<i>Vulpia bromoides</i>	23	0.4	0.2	3			
	CAPY2	<i>Carduus pycnocephalus</i>	23	0.2	0.2	1			
	AMME	<i>Amsinckia menziesii</i>	23	0.1	0.2	1			
	ASCA3	<i>Asclepias californica</i>	23	0.1	0.2	1			
	GED1	<i>Geranium dissectum</i>	23	0.1	0.2	1			
	LOPEM2	<i>Lolium perenne</i>	23	0.1	0.2	1			
Non-vasc									
	2MOSS	Moss	85	12	0.2	60	X	X	

**Association(s) Defined: *Madia elegans***

***Madia elegans* Association**

Since only one association was sampled of this alliance in the study area, its description is the same as the alliance information above.

***Monolopia (lanceolata)*–*Leptosyne (calliopsidea)* Alliance**  
**(Monolopia–Leafy-stemmed tickseed fields)**

*Leptosyne calliopsidea* (= *Coreopsis calliopsidea*), *Monolopia* spp., *Mentzelia pectinata*, *Camissonia boothii* ssp. *decorticans* is/are seasonally dominant or co-dominant in the herbaceous layer. A variety of other native herbs such as *Amsinckia tessellata*, *Astragalus didymocarpus*, *Caulanthus inflatus*, and *Malacothrix coulteri* are often present. Herbs are <1 m tall, and cover is open to continuous. Stands occur on steep, dry, often south-facing slopes, and soils are derived from siltstone, gypsum, or other sedimentary rock substrates.



**Samples used to describe type: 5**

**Local Environmental Table:**

Elevation: range 591 - 992, average 814.6 m  
Total vegetation cover: range 25 - 75%, average 47.4%  
Tree cover: range 0 - 0%, average 0%  
Shrub cover: range 0 - 0%, average 0%  
Herb cover: range 25 - 75%, average 47.4%  
Percent native cover relative to non-native cover: 60%

**Ecoregion Sections and Subsection Codes:** Central Valley Coast Ranges: M262Ai, M262Ak; Great Valley: 262Az

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb									
	ERCI6	<i>Erodium cicutarium</i>	100	13.4	0.2	35	X		
	BRRU2	<i>Bromus rubens</i>	100	6.8	0.2	15	X		
	MOLA3	<b><i>Monolopia lanceolata</i></b>	80	20.4	7	50	X		X
	ASDI3	<i>Astragalus didymocarpus</i>	60	0.5	0.2	2			
	ERIOG	<i>Eriogonum</i>	60	0.4	0.2	1			
	BRTE	<i>Bromus tectorum</i>	40	2	0.2	10			
	PHACE	<i>Phacelia</i>	40	1.4	0.2	7			
	POSE	<i>Poa secunda</i>	40	0.4	0.2	2			
	LAGL5	<i>Layia glandulosa</i>	20	2.6	13	13			
	CHST	<i>Chaenactis stevioides</i>	20	1.8	9	9			
	CABOD	<i>Camissonia boothii</i> ssp. <i>decorticans</i>	20	1.6	8	8			
	AMSIN	<i>Amsinckia</i>	20	0.2	1	1			
	BROMU	<i>Bromus</i>	20	0.2	1	1			
	BRHO2	<i>Bromus hordeaceus</i>	20	0.2	1	1			
	ESCHS	<i>Eschscholzia</i>	20	0.2	1	1			

**Association(s) Defined:**

***Leptosyne calliopsidea–Mentzelia pectinata***  
***Monolopia lanceolata***

***Leptosyne calliopsidea*–*Mentzelia pectinata* Association**

**Samples used to describe type: 1**

**Local Environmental Table:**

Elevation: 907 m

Total vegetation cover: 25%

Tree cover: 0%

Shrub cover: 0%

Herb cover: 25%

Percent native cover relative to non-native cover: 75.4%

**Ecoregion Sections and Subsection Codes:** Great Valley: 262Az

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb									
	CHST	<i>Chaenactis stevioides</i>	100	9	9	9	X		X
	CABOD	<i>Camissonia boothii</i> ssp. <i>decorticans</i>	100	8	8	8	X		
	ERC16	<i>Erodium cicutarium</i>	100	5	5	5	X		
	ASDI3	<i>Astragalus didymocarpus</i>	100	2	2	2	X		
	BRRU2	<i>Bromus rubens</i>	100	1	1	1	X		
	ERIOG	<i>Eriogonum</i> sp.	100	1	1	1	X		
	AMTE3	<i>Amsinckia tessellata</i>	100	0.2	0.2	0.2	X		
	AVFA	<i>Avena fatua</i>	100	0.2	0.2	0.2	X		
	BRDI3	<i>Bromus diandrus</i>	100	0.2	0.2	0.2	X		
	BRTE	<i>Bromus tectorum</i>	100	0.2	0.2	0.2	X		
	ESLE	<i>Eschscholzia lemmonii</i>	100	0.2	0.2	0.2	X		
	HOMU	<i>Hordeum murinum</i>	100	0.2	0.2	0.2	X		
	LUSUS	<i>Lupinus microcarpus</i>	100	0.2	0.2	0.2	X		
	LUSU3	<i>Lupinus succulentus</i>	100	0.2	0.2	0.2	X		

## ***Monolopia lanceolata* Association**

**Samples used to describe type:** 4

### **Local Environmental Table:**

Elevation: range 591 - 992, average 791.5 m

Total vegetation cover: range 40 - 75%, average 53%

Tree cover: range 0 - 0%, average 0%

Shrub cover: range 0 - 0%, average 0%

Herb cover: range 40 - 75%, average 53%

Percent native cover relative to non-native cover: 56.1%

**Ecoregion Sections and Subsection Codes:** Central Valley Coast Ranges: M262Ai, M262Ak

### **Plant Constancy/Cover Summary Table:**

<b>Stratum</b>	<b>Code</b>	<b>Species Name</b>	<b>Con</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>	<b>C</b>	<b>D</b>	<b>cD</b>
Herb									
	MOLA3	<b><i>Monolopia lanceolata</i></b>	100	25.5	7	50	X		X
	ERCI6	<i>Erodium cicutarium</i>	100	15.6	0.2	35	X		
	BRRU2	<i>Bromus rubens</i>	100	8.3	0.2	15	X		
	PHACE	<i>Phacelia</i> sp.	50	1.8	0.2	7			
	POSE	<i>Poa secunda</i>	50	0.6	0.2	2			
	ERIOG	<i>Eriogonum</i> sp.	50	0.3	0.2	1			
	ASDI3	<i>Astragalus didymocarpus</i>	50	0.1	0.2	0.2			
	THCU	<i>Thysanocarpus curvipes</i>	50	0.1	0.2	0.2			
	MILI5	<i>Uropappus lindleyi</i>	50	0.1	0.2	0.2			
	LAGL5	<i>Layia glandulosa</i>	25	3.3	13	13			
	BRTE	<i>Bromus tectorum</i>	25	2.5	10	10			
	AMSIN	<i>Amsinckia</i> sp.	25	0.3	1	1			
	BROMU	<i>Bromus</i> sp.	25	0.3	1	1			
	BRHO2	<i>Bromus hordeaceus</i>	25	0.3	1	1			
	ESCHS	<i>Eschscholzia</i>	25	0.3	1	1			

***Nassella cernua* Alliance  
(Nodding needle grass grassland)**

*Nassella cernua* is a characteristic perennial grass in the herbaceous layer. Other native and non-native species, including *Bromus hordeaceus*, *B. rubens*, and *Eschscholzia californica*, intermix with variable cover. Herbs are <1 m, and cover is open to continuous. Stands occur on rolling hills and foothill slopes, and are often on rocky and sandy substrates.



**Samples used to describe type:** 14

**Local Environmental Table:**

Elevation: range 131 - 1502, average 784.6 m  
Total vegetation cover: range 12 - 94%, average 44.5%  
Tree cover: range 0 - 0%, average 0%  
Shrub cover: range 0.2 - 0.2%, average 0.2%  
Herb cover: range 12 - 94%, average 44.6%  
Percent native cover relative to non-native cover: 39%

**Ecoregion Sections and Subsection Codes:** Central Valley Coast Ranges: M262Ad, M262Af, M262Ai, M262Ak; Mojave Desert: 322Ag; Sierra Nevada Foothills: M261Fc, M261Fe

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb	NACE	<b><i>Nassella cernua</i></b>	86	11	2	20	X		
	BRRU2	<i>Bromus rubens</i>	86	5.9	0.2	30	X		
	BRHO2	<i>Bromus hordeaceus</i>	79	7.2	0.2	30	X		
	ERCI6	<i>Erodium cicutarium</i>	79	3.9	0.1	10	X		
	BRDI3	<i>Bromus diandrus</i>	50	2.1	0.2	18			
	VUMY	<i>Vulpia myuros</i>	43	2.3	1	15			
	AVBA	<i>Avena barbata</i>	43	1.7	0.2	10			
	LOWR2	<i>Lotus wrangelianus</i>	36	0.9	0.2	10			
	BRTE	<i>Bromus tectorum</i>	29	0.4	0.1	4			
	VUBR	<i>Vulpia bromoides</i>	29	0.1	0.2	1			
	VUMI	<i>Vulpia microstachys</i>	29	0.1	0.2	1			
	ESCA2	<i>Eschscholzia californica</i>	21	1.1	0.1	9			
	BRAR3	<i>Bromus arenarius</i>	21	0.5	0.2	6			
	AMTE3	<i>Amsinckia tessellata</i>	21	0.1	0.2	1			
	ASDI3	<i>Astragalus didymocarpus</i>	21	0.1	0.2	1			
	AVFA	<i>Avena fatua</i>	21	0.1	0.2	1			
	LELI14	<i>Linanthus liniflorus</i>	21	0.1	0.2	1			
Non-vasc	2MOSS	Moss	29	0.8	0.2	10			

**Association(s) Defined: *Nassella cernua***

***Nassella cernua* Association**

Since only one association was sampled of this alliance in the study area, its description is the same as the alliance information above.

***Nassella pulchra* Alliance**  
**(Purple needle grass grassland)**

*Nassella pulchra* is characteristic and often co-dominant in the herbaceous layer, occurring with *Bromus hordeaceus*, *Dichelostemma capitatum*, *Erodium botrys* and *Sisyrinchium bellum*, among others. Herbs are <1 m, and cover is open to continuous. Stands occur within valleys and foothills on all topographic locations. Inland soils are often deeper with high clay content, and soils near the coast are shallower and rocky. *N. pulchra* is tolerant of grazing and fire and these disturbances appear important in maintaining some stands that have become invaded by non-native annuals.



**Samples used to describe type: 9**

**Local Environmental Table:**

Elevation: range 26 - 843, average 229.3 m  
Total vegetation cover: range 40 - 80%, average 55.1%  
Tree cover: range 0 - 0%, average 0%  
Shrub cover: range 0.5 - 2.8%, average 1.6%  
Herb cover: range 40 - 80%, average 55.1%  
Percent native cover relative to non-native cover: 52.6%

**Ecoregion Sections and Subsection Codes:** Central California Coast: 261Aj, 261Ak;  
Central Valley Coast Ranges: , M262Aa, M262Ac; Great Valley: 262Ah, 262Ao, 262Au; Sierra  
Nevada Foothills: M261Fb; Southern California Coast: 261Bf, 261B

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb									
	NAPU4	<i>Nassella pulchra</i>	100	17	2	40	X		X
	BRHO2	<i>Bromus hordeaceus</i>	56	6.4	2	20			
	HYGL2	<i>Hypochaeris glabra</i>	44	2.4	0.2	15			
	ERBO	<i>Erodium botrys</i>	44	2.2	0.1	12			
	SIBE	<i>Sisyrinchium bellum</i>	44	1.2	0.1	10			
	VUMY	<i>Vulpia myuros</i>	44	0.6	0.2	2			
	ERC16	<i>Erodium cicutarium</i>	44	0.5	0.3	2			
	AVFA	<i>Avena fatua</i>	44	0.4	0.1	2.97			
	CAPY2	<i>Carduus pycnocephalus</i>	44	0.4	0.1	3			
	CRCO34	<i>Crassula connata</i>	44	0.2	0.2	1			
	AVBA	<i>Avena barbata</i>	33	4.7	0.2	40			
	VUBR	<i>Vulpia bromoides</i>	33	3.5	0.1	30			
	DICA14	<i>Dichelostemma capitatum</i>	33	1.9	0.8	14.9			
	LOPEM2	<i>Lolium perenne</i>	33	1.4	0.1	9.9			
	LOWR2	<i>Lotus wrangelianus</i>	33	1.1	0.2	9			
	BRRU2	<i>Bromus rubens</i>	33	0.7	0.4	4			
	SIGA	<i>Silene gallica</i>	33	0.5	0.2	2			
	BRD12	<i>Brachypodium distachyon</i>	22	0.6	0.1	4.95			
	CRSE11	<i>Croton setigerus</i>	22	0.5	0.2	4			
	TRGR2	<i>Trifolium gracilentum</i>	22	0.2	0.2	2			
	TRHI4	<i>Trifolium hirtum</i>	22	0.2	0.2	2			
	CEME2	<i>Centaurea melitensis</i>	22	0.1	0.4	0.81			
	DACA3	<i>Danthonia californica</i>	22	0.1	0.1	0.95			

**Association(s) Defined: *Nassella pulchra***

***Nassella pulchra* Association**

Since only one association was sampled of this alliance in the study area, its description is the same as the alliance information above.

***Plagiobothrys nothofulvus* Alliance**  
**(Popcorn flower fields)**

*Plagiobothrys nothofulvus* is characteristically present to co-dominant in the herbaceous layer, often occurring with non-natives *Hypochaeris glabra*, *Erodium botrys*, *Bromus hordeaceus*, *B. rubens* and other natives. Herbs are <1 m, and cover is open to continuous. Stands occur on upland slopes and flats. Soils are loamy, derived from many substrates, and often subject to high levels of bioturbation.



**Samples used to describe type:** 49

**Local Environmental Table:**

Elevation: range 66 - 882, average 338.3 m  
Total vegetation cover: range 12 - 89%, average 50.3%  
Tree cover: range 0 - 0%, average 0%  
Shrub cover: range 0.2 - 2%, average 1.1%  
Herb cover: range 12 - 89%, average 50.1%  
Percent native cover relative to non-native cover: 43.1%

**Ecoregion Sections and Subsection Codes:** Central Valley Coast Ranges: M262Aa, M262Ab, M262Ad; Great Valley: 262Ag, 262Ao, 262Ay; Sierra Nevada Foothills: M261Fb, M261Fc, M261Fd

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb	PLNO	<i>Plagiobothrys nothofulvus</i>	94	5.3	0.1	30	X		
	BRHO2	<i>Bromus hordeaceus</i>	92	9.9	0.2	50	X		
	HYGL2	<i>Hypochaeris glabra</i>	88	2.7	0.1	15	X		
	ERBO	<i>Erodium botrys</i>	80	3.9	0.2	20	X		
	BRDI3	<i>Bromus diandrus</i>	76	1.8	0.2	24	X		
	TRMI4	<i>Trifolium microcephalum</i>	73	2.1	0.2	35			
	DAPU3	<i>Daucus pusillus</i>	55	0.6	0.2	7			
	VUBR	<i>Vulpia bromoides</i>	53	2.7	0.2	25			
	AICA	<i>Aira caryophyllea</i>	53	0.7	0.2	15			
	TRCI	<i>Trifolium ciliolatum</i>	49	0.5	0.2	4			
	AVBA	<i>Avena barbata</i>	47	1.3	0.1	20			
	ERCI6	<i>Erodium cicutarium</i>	47	1.2	0.2	25			
	BRRU2	<i>Bromus rubens</i>	43	0.6	0.1	10			
	LUBI	<i>Lupinus bicolor</i>	41	0.4	0.1	8			
	TRHI4	<i>Trifolium hirtum</i>	39	3.4	0.2	35			
	CAAT25	<i>Castilleja attenuata</i>	39	0.2	0.2	2			
	VUMY	<i>Vulpia myuros</i>	37	0.2	0.2	5			
	GAPA5	<i>Galium parisiense</i>	37	0.2	0.2	5			
	SIGA	<i>Silene gallica</i>	35	0.6	0.2	18			
	TRDU2	<i>Trifolium dubium</i>	27	0.2	0.2	5			
	GITR2	<i>Gilia tricolor</i>	24	0.5	0.1	10			
	HOLOC	<i>Holocarpa</i>	20	0.7	0.2	15			
	FEMIP	<i>Vulpia microstachys</i> var. <i>pauciflora</i>	20	0.5	0.2	8			
	LETA	<i>Leontodon taraxacoides</i>	20	0.4	0.2	8			
	CLPUQ	<i>Clarkia purpurea</i> ssp. <i>quadrivulnera</i>	20	0.1	0.1	3			
	TRLA4	<i>Trichostema lanceolatum</i>	20	0.1	0.2	2			
	AMMEM2	<i>Amsinckia menziesii</i> var. <i>menziesii</i>	20	0.1	0.1	2			
Non-vasc	2MOSS	Moss	57	3.1	0.2	30			
	2LICHN	Lichen	20	0.3	0.2	9			

**Association(s) Defined:**

***Plagiobothrys nothofulvus*–*Castilleja exserta*–*Lupinus nanus* Provisional**  
***Plagiobothrys nothofulvus*–*Daucus pusillus*–*Trifolium microcephalum***

***Plagiobothrys nothofulvus*–*Castilleja exserta*–*Lupinus nanus* Provisional Association**

Samples used to describe type: 7

**Local Environmental Table:**

Elevation: range 124 - 882, average 518.6 m  
 Total vegetation cover: range 33 - 80%, average 56.4%  
 Tree cover: range 0 - 0%, average 0%  
 Shrub cover: range 0 - 0%, average 0%  
 Herb cover: range 33 - 80%, average 56.4%  
 Percent native cover relative to non-native cover: 49%

**Ecoregion Sections and Subsection Codes:** Central Valley Coast Ranges: M262Ad; Great Valley: 262Ay; Sierra Nevada Foothills: M261Fd

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb									
	ERC16	<i>Erodium cicutarium</i>	100	5.8	0.2	25	X		
	BRRU2	<i>Bromus rubens</i>	100	5.5	0.2	20	X		
	CAEX14	<b><i>Castilleja exserta</i></b>	100	4.2	0.1	12	X		
	PLNO	<b><i>Plagiobothrys nothofulvus</i></b>	86	6.9	0.2	15	X		
	AVBA	<i>Avena barbata</i>	86	4.1	0.2	20	X		
	HYGL2	<i>Hypochaeris glabra</i>	86	1.9	0.2	7	X		
	CRCO34	<i>Crassula connata</i>	86	0.4	0.2	1	X		
	ERBR14	<i>Erodium brachycarpum</i>	71	9.1	1	30			
	PLAR	<i>Plagiobothrys arizonicus</i>	71	1.2	0.11	5			
	LOWR2	<i>Lotus wrangelianus</i>	71	0.4	0.2	2			
	LUNA3	<b><i>Lupinus nanus</i></b>	57	7.3	0.2	30			
	BRDI3	<i>Bromus diandrus</i>	57	2.3	0.2	13			
	BRHO2	<i>Bromus hordeaceus</i>	57	1.6	0.2	10			
	VUMY	<i>Vulpia myuros</i>	57	0.5	0.2	2			
	TRMI4	<i>Trifolium microcephalum</i>	57	0.2	0.2	1			
	DICA14	<i>Dichelostemma capitatum</i>	57	0.2	0.11	1			
	GITR2	<i>Gilia tricolor</i>	43	1.3	0.11	7			
	MEPO3	<i>Medicago polymorpha</i>	43	1.3	1	6			
	HOHE	<i>Holocarpha heermannii</i>	29	0.5	0.2	3			
	CAAT25	<i>Castilleja attenuata</i>	29	0.2	0.2	1			

***Plagiobothrys nothofulvus*–*Daucus pusillus*–*Trifolium microcephalum* Association**

**Samples used to describe type:** 42

**Local Environmental Table:**

Elevation: range 66 - 754, average 308.2 m  
 Total vegetation cover: range 12 - 89%, average 49.3%  
 Tree cover: range 0 - 0%, average 0%  
 Shrub cover: range 0.2 - 2%, average 1.1%  
 Herb cover: range 12 - 89%, average 49%  
 Percent native cover relative to non-native cover: 42.2%

**Ecoregion Sections and Subsection Codes:** Great Valley: 262Ag, 262Ao, 262Ay; Sierra Nevada Foothills: M261Fb, M261Fc

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb	BRHO2	<i>Bromus hordeaceus</i>	98	11.3	0.2	50	X		
	PLNO	<b><i>Plagiobothrys nothofulvus</i></b>	95	5.1	0.11	30	X		
	ERBO	<i>Erodium botrys</i>	93	4.5	0.2	20	X		
	HYGL2	<i>Hypochaeris glabra</i>	88	2.8	0.11	15	X		
	BRDI3	<i>Bromus diandrus</i>	79	1.7	0.2	24	X		
	TRMI4	<b><i>Trifolium microcephalum</i></b>	76	2.5	0.2	35	X		
	DAPU3	<b><i>Daucus pusillus</i></b>	64	0.7	0.2	7			
	AICA	<i>Aira caryophyllea</i>	62	0.9	0.2	15			
	VUBR	<i>Vulpia bromoides</i>	60	3.1	0.2	25			
	TRCI	<i>Trifolium ciliolatum</i>	57	0.6	0.2	4			
	TRHI4	<i>Trifolium hirtum</i>	45	4	0.2	35			
	GAPA5	<i>Galium parisiense</i>	43	0.3	0.2	5			
	AVBA	<i>Avena barbata</i>	40	0.8	0.11	9			
	SIGA	<i>Silene gallica</i>	40	0.6	0.2	18			
	LUBI	<i>Lupinus bicolor</i>	40	0.5	0.2	8			
	CAAT25	<i>Castilleja attenuata</i>	40	0.2	0.2	2			
	ERCI6	<i>Erodium cicutarium</i>	38	0.4	0.2	3			
	BRRU2	<i>Bromus rubens</i>	36	0.3	0.11	4			
	VUMY	<i>Vulpia myuros</i>	33	0.2	0.2	5			
	CRSE11	<i>Croton setigerus</i>	33	0.1	0.11	1			
	TRDU2	<i>Trifolium dubium</i>	31	0.3	0.2	5			
Non-vasc	2MOSS	Moss	67	3.7	0.2	30			

***Poa secunda* Alliance  
(Curly blue grass grassland)**

*Poa secunda* is characteristic in the herbaceous layer, occurring with *Erodium cicutarium*, *Bromus rubens*, *Bromus hordeaceus*, and other native grasses and forbs. Emergent shrubs may be present at sparse cover. Herbs are <75 cm, and cover is open to continuous. Stands occur in valley bottoms with shallow water tables, on lower portions of alluvial slopes, mesic north-facing hillslopes, and other uplands. Soils are typically fine silty or clayey alluvium.



**Samples used to describe type:** 39

**Local Environmental Table:**

Elevation: range 147 - 1457, average 913.9 m  
Total vegetation cover: range 2 - 97%, average 42.3%  
Tree cover: range 0.2 - 0.2%, average 0.2%  
Shrub cover: range 0.2 - 2%, average 0.7%  
Herb cover: range 2 - 97%, average 42.3%  
Percent native cover relative to non-native cover: 61.2%

**Ecoregion Sections and Subsection Codes:** Central Valley Coast Ranges: M262Ad, M262Ai, M262Aj, M262Ak; Great Valley: 262Az; Sierra Nevada Foothills: M261Fd, M261Fe; Southern California Mountains and Valleys: M262Bb

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb	POSE	<b><i>Poa secunda</i></b>	92	8.3	0.2	30	X		
	ERCI6	<i>Erodium cicutarium</i>	82	3.6	0.2	35	X		
	BRRU2	<i>Bromus rubens</i>	72	2.5	0.2	40			
	BRHO2	<i>Bromus hordeaceus</i>	54	2.7	0.2	15			
	BRDI3	<i>Bromus diandrus</i>	46	4.5	0.2	48			
	VUMI	<i>Vulpia microstachys</i>	44	1.4	0.2	15			
	BRTE	<i>Bromus tectorum</i>	36	1.8	0.2	28			
	VUMY	<i>Vulpia myuros</i>	36	0.2	0.2	3			
	THCU	<i>Thysanocarpus curvipes</i>	36	0.1	0.2	1			
	LASE	<i>Lactuca serriola</i>	33	0.2	0.2	4			
	CLCY	<i>Clarkia cylindrica</i>	28	0.8	0.2	10			
	CLPE	<i>Claytonia perfoliata</i>	28	0.4	0.2	9			
	ERIOG	<i>Eriogonum</i> sp.	23	1.4	0.2	40			
	BRAR3	<i>Bromus arenarius</i>	23	0.8	0.2	14			
	CLARK	<i>Clarkia</i> sp.	23	0.6	0.2	12			
	ACMI2	<i>Achillea millefolium</i>	23	0.4	0.2	8			
	TRWI3	<i>Trifolium willdenovii</i>	23	0.2	0.2	4			
	AMTE3	<i>Amsinckia tessellata</i>	23	0.1	0.2	2			
	ELMU3	<i>Elymus multisetus</i>	21	0.7	0.2	10			
	MIGRG4	<i>Microsteris gracilis</i> var. <i>gracilis</i>	21	0.1	0.1	1			
Non-vasc	2MOSS	Moss	36	0.7	0.2	15			

**Association(s) Defined:**

***Monolopia stricta*–*Poa secunda***  
***Poa secunda*–(*Elymus* sp.)–*Clarkia cylindrica***  
***Poa secunda*–*Bromus rubens***

***Monolopia stricta*–*Poa secunda* Association**

**Samples used to describe type: 7**

**Local Environmental Table:**

Elevation: range 586 - 748, average 633. 3 m

Total vegetation cover: range 9 - 60%, average 39.3%

Tree cover: range 0 - 0%, average 0%

Shrub cover: range 0 - 0%, average 0%

Herb cover: range 9 - 60%, average 39.3%

Percent native cover relative to non-native cover: 73.2%

**Ecoregion Sections and Subsection Codes:** Central Valley Coast Ranges: M262Ai

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb									
	POSE	<b><i>Poa secunda</i></b>	100	13.3	2	26	X		X
	ERCI6	<i>Erodium cicutarium</i>	100	9.6	0.2	35	X		
	BRRU2	<i>Bromus rubens</i>	86	3.3	0.2	14	X		
	MOST	<b><i>Monolopia stricta</i></b>	71	1.9	0.2	12			
	CAAN25	<i>Guillenia lemmonii</i>	57	0.5	0.11	3			
	LOWR2	<i>Lotus wrangelianus</i>	57	0.4	0.2	2			
	LAMU2	<i>Layia munzii</i>	43	0.2	0.2	1			
	MOLA3	<i>Monolopia lanceolata</i>	29	2.6	3	15			
	AMMEI2	<i>Amsinckia menziesii</i> var. <i>intermedia</i>	29	0.5	0.2	3			
	CLPE	<i>Claytonia perfoliata</i>	29	0.5	0.2	3			
	ERIOG	<i>Eriogonum</i> sp.	29	0.3	0.2	2			
	PHCI2	<i>Phacelia ciliata</i>	29	0.3	0.2	2			
	ASDI3	<i>Astragalus didymocarpus</i>	29	0.2	0.2	1			
	MIGRG4	<i>Microsteris gracilis</i> var. <i>gracilis</i>	29	0.2	0.2	1			

***Poa secunda*–(*Elymus* sp.)–*Clarkia cylindrica* Association**

Samples used to describe type: 22

**Local Environmental Table:**

Elevation: range 862 - 1457, average 1122.9 m  
 Total vegetation cover: range 24 - 76%, average 47%  
 Tree cover: range 0.2 - 0.2%, average 0.2%  
 Shrub cover: range 0.2 - 2%, average 0.9%  
 Herb cover: range 23 - 76%, average 47%  
 Percent native cover relative to non-native cover: 58%

**Ecoregion Sections and Subsection Codes:** Central Valley Coast Ranges: M262Aj, M262Ak; Great Valley: 262Az; Sierra Nevada Foothills: M261Fe; Southern California Mountains and Valleys: M262Bb

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb	POSE	<b><i>Poa secunda</i></b>	86	6.6	0.2	30	X		
	BRDI3	<i>Bromus diandrus</i>	77	7.9	0.2	48	X		
	BRHO2	<i>Bromus hordeaceus</i>	77	3.5	0.2	13	X		
	VUMI	<i>Vulpia microstachys</i>	77	2.7	0.2	15	X		
	CLCY	<b><i>Clarkia cylindrica</i></b>	73	3.4	0.2	15			
	BRRU2	<i>Bromus rubens</i>	68	1	0.2	5			
	ERCI6	<i>Erodium cicutarium</i>	68	0.7	0.2	5			
	BRTE	<i>Bromus tectorum</i>	59	3	0.2	28			
	THCU	<i>Thysanocarpus curvipes</i>	55	0.2	0.2	1			
	LASE	<i>Lactuca serriola</i>	50	0.4	0.2	4			
	BRAR3	<i>Bromus arenarius</i>	41	1.3	0.2	14			
	CLPE	<i>Claytonia perfoliata</i>	41	0.6	0.2	9			
	ACMI2	<i>Achillea millefolium</i>	41	0.6	0.2	8			
	VUMY	<i>Vulpia myuros</i>	41	0.4	0.2	3			
	MILI5	<i>Uropappus lindleyi</i>	41	0.1	0.2	1			
	ELMU3	<b><i>Elymus multisetus</i></b>	36	1.2	0.2	10			
	TRWI3	<i>Trifolium willdenovii</i>	36	0.4	0.2	4			
	ERIOG	<i>Eriogonum</i> sp.	32	2.4	0.2	40			
	GITR2	<i>Gilia tricolor</i>	32	0.5	0.2	6			
	AMTE3	<i>Amsinckia tessellata</i>	32	0.2	0.2	2			
	ELEL5	<b><i>Elymus elymoides</i></b>	27	1	0.2	14			
	LEPA51	<i>Linanthus parviflorus</i>	27	0.7	0.2	6			
	LARA	<i>Lagophylla ramosissima</i>	27	0.2	0.2	1			
Non-vasc	2MOSS	Moss	45	1.2	0.2	15			
	2LICHN	Lichen	27	0.4	0.2	5			

***Poa secunda*–*Bromus rubens* Association**

**Samples used to describe type:** 10

**Local Environmental Table:**

Elevation: range 147 - 1346, average 650.4 m  
 Total vegetation cover: range 2 - 97%, average 34.1%  
 Tree cover: range 0 - 0%, average 0%  
 Shrub cover: range 0.2 - 0.2%, average 0.2%  
 Herb cover: range 2 - 97%, average 34.1%  
 Percent native cover relative to non-native cover: 60%

**Ecoregion Sections and Subsection Codes:** Central Valley Coast Ranges: M262Ad, M262Ai; Sierra Nevada Foothills: M261Fd; Southern California Mountains and Valleys: M262Bb

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb	POSE	<b><i>Poa secunda</i></b>	100	8.6	0.2	20	X		X
	ERCI6	<i>Erodium cicutarium</i>	100	5.7	0.2	23.34	X		
	BRRU2	<b><i>Bromus rubens</i></b>	80	5.8	0.2	40	X		
	BRHO2	<i>Bromus hordeaceus</i>	40	2.8	1	15			
	VUMI	<i>Vulpia microstachys</i>	30	0.3	0.2	3			
Non-vasc	CRYPTO	Cryptogammic crust	50	0.4	0.2	3			
	2MOSS	Moss	40	0.2	0.2	1			

***Salvia carduacea* Provisional Alliance**  
**(Thistle sage patches)**

*Salvia carduacea* is co-dominant to dominant in the herbaceous layer, often occurring with *Erodium cicutarium*, *Bromus rubens*, *Lotus wrangelianus*, *Hordeum murinum*, *Amsinckia tessellate*, and others. Herbs <1 m, and cover is open to intermittent. Stands occur on moist alluvial toeslopes and terraces adjacent to washes with well-drained sandy soils and alluvium.



**Samples used to describe type: 4**

**Local Environmental Table:**

Elevation: range 154 - 656, average 530.3 m

Total vegetation cover: range 25 - 45%, average 35.5%

Tree cover: range 0 - 0%, average 0%

Shrub cover: range 0 - 0%, average 0%

Herb cover: range 25 - 45%, average 35.5%

Percent native cover relative to non-native cover: 44.8%

**Ecoregion Sections and Subsection Codes:** Central Valley Coast Ranges: M262Ai; Great Valley: 262Ax

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb	SACA8	<i>Salvia carduacea</i>	100	13.5	2	25	X		X
	ERCI6	<i>Erodium cicutarium</i>	100	8.8	0.2	20	X		
	BRRU2	<i>Bromus rubens</i>	100	4.8	1	7	X		
	SCHIS	<i>Schismus</i> sp.	100	4.5	1	7	X		
	LOWR2	<i>Lotus wrangelianus</i>	100	0.9	0.2	3	X		
	AMTE3	<i>Amsinckia tessellata</i>	100	0.4	0.2	1	X		
	HOMU	<i>Hordeum murinum</i>	75	0.6	0.2	1	X		
	ERGR6	<i>Eriogonum gracillimum</i>	75	0.4	0.2	1	X		
	CAEX14	<i>Castilleja exserta</i>	75	0.2	0.2	0.2	X		
	MACO3	<i>Malacothrix coulteri</i>	75	0.2	0.2	0.2	X		
	PECTO	<i>Pectocarya</i> sp.	75	0.2	0.2	0.2	X		
	ASLEN	<i>Astragalus lentiginosus</i> var. <i>nigricalycis</i>	50	0.1	0.2	0.2			
	DISP	<i>Distichlis spicata</i>	50	0.1	0.2	0.2			
	ESCA2	<i>Eschscholzia californica</i>	50	0.1	0.2	0.2			
	LAMI5	<i>Lasthenia minor</i>	50	0.1	0.2	0.2			
	LELI14	<i>Linanthus liniflorus</i>	50	0.1	0.2	0.2			
	MILI5	<i>Uropappus lindleyi</i>	50	0.1	0.2	0.2			
	VUMY	<i>Vulpia myuros</i>	50	0.1	0.2	0.2			
	ERMO7	<i>Erodium moschatum</i>	25	1.3	5	5			
	CEME2	<i>Centaurea melitensis</i>	25	0.3	1	1			
	POSE	<i>Poa secunda</i>	25	0.3	1	1			
	TRGR2	<i>Trifolium gracilentum</i>	25	0.3	1	1			
Non-vasc	CRYPTO	Cryptogammic crust	25	0.3	1	1			

**Association(s) Defined: *Salvia carduacea***

***Salvia carduacea* Association**

Since only one association was sampled of this alliance in the study area, its description is the same as the alliance information above.

***Sporobolus airoides* Alliance**  
**(Alkali sacaton grassland)**

*Sporobolus airoides* is dominant in the herbaceous layer with *Distichlis spicata* as well as other annual native and non-native grasses and forbs. Herbs are <1.5 m tall, and cover is open to continuous. Stands occur in alluvial flats, basins, stream terraces, swales, valley bottoms, and lower portions of alluvial slopes. Soils are non-saline to moderately saline, and usually alkaline.



**Samples used to describe type: 6**

**Local Environmental Table:**

Elevation: range 54 - 745, average 175 m  
Total vegetation cover: range 22 - 85%, average 49.3%  
Tree cover: range 0 - 0%, average 0%  
Shrub cover: range 1.2 - 6.2%, average 3.9%  
Herb cover: range 22 - 85%, average 48.7%  
Percent native cover relative to non-native cover: 62%

**Ecoregion Sections and Subsection Codes:** Great Valley; 262As, 262Au, 262Ay; Sierra Nevada Foothills: M261Fd

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb	SPAI	<b><i>Sporobolus airoides</i></b>	100	16.7	3	28	X	X	
	DISP	<i>Distichlis spicata</i>	100	3.8	0.2	17	X		
	BRHO2	<i>Bromus hordeaceus</i>	67	13.5	1	45			
	HOMU	<i>Hordeum murinum</i>	67	2.7	0.2	12			
	BRRU2	<i>Bromus rubens</i>	67	0.7	0.2	2			
	ERCI6	<i>Erodium cicutarium</i>	67	0.5	0.2	1			
	MEPO3	<i>Medicago polymorpha</i>	50	1.3	1	6			
	CRSE11	<i>Croton setigerus</i>	50	0.2	0.2	1			
	ATRIP	<i>Atriplex</i> sp.	50	0.1	0.2	0.2			
	CEPUP6	<i>Centromadia pungens</i> ssp. <i>pungens</i>	50	0.1	0.2	0.2			
	PHNO2	<i>Phyla nodiflora</i>	33	4	4	20			
	VUMY	<i>Vulpia myuros</i>	33	3.4	0.2	20			
	TRGR2	<i>Trifolium gracilentum</i>	33	0.7	0.2	4			
	BRDI3	<i>Bromus diandrus</i>	33	0.2	0.2	1			
	SCBA	<i>Schismus barbatus</i>	33	0.2	0.2	1			
Non-vasc	2MOSS	Moss	50	0.9	0.2	5			
	CRYPTO	Cryptogammic crust	33	0.4	0.2	2			

**Association(s) Defined:**

***Sporobolus airoides***  
***Sporobolus airoides/Allenrolfea occidentalis***

## ***Sporobolus airoides* Association**

**Samples used to describe type:** 5

### **Local Environmental Table:**

Elevation: range 54 - 745, average 199 m

Total vegetation cover: range 22 - 70%, average 42.2%

Tree cover: range 0 - 0%, average 0%

Shrub cover: range 4.2 - 6.2%, average 5.2%

Herb cover: range 22 - 70%, average 41.4%

Percent native cover relative to non-native cover: 71.7%

**Ecoregion Sections and Subsection Codes:** Great Valley: 262As, 262Ay; Sierra Nevada Foothills: M261Fd

### **Plant Constancy/Cover Summary Table:**

<b>Stratum</b>	<b>Code</b>	<b>Species Name</b>	<b>Con</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>	<b>C</b>	<b>D</b>	<b>cD</b>
Herb	SPAI	<b><i>Sporobolus airoides</i></b>	100	19.4	7	28	X	X	
	DISP	<i>Distichlis spicata</i>	100	4.5	0.2	17	X		
	ERCI6	<i>Erodium cicutarium</i>	80	0.6	0.2	1	X		
	BRHO2	<i>Bromus hordeaceus</i>	60	7.2	1	30			
	HOMU	<i>Hordeum murinum</i>	60	0.9	0.2	4			
	PHNO2	<i>Phyla nodiflora</i>	40	4.8	4	20			
	MEPO3	<i>Medicago polymorpha</i>	40	1.4	1	6			
	BRRU2	<i>Bromus rubens</i>	40	0.4	0.2	2			
	BRDI3	<i>Bromus diandrus</i>	40	0.2	0.2	1			
	CRSE11	<i>Croton setigerus</i>	40	0.2	0.2	1			
	SCBA	<i>Schismus barbatus</i>	40	0.2	0.2	1			
Non-vasc	2MOSS	Moss	60	1.1	0.2	5			

## ***Sporobolus airoides*/Allenrolfea occidentalis Association**

**Samples used to describe type: 1**

### **Local Environmental Table:**

Elevation: 55 m

Total vegetation cover 85%

Tree cover: 0 %

Shrub cover: 1.2%

Herb cover: 85%

Percent native cover relative to non-native cover: 13.5%

**Ecoregion Sections and Subsection Codes:** Great Valley: 262Au

### **Plant Constancy/Cover Summary Table:**

<b>Stratum</b>	<b>Code</b>	<b>Species Name</b>	<b>Con</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>	<b>C</b>	<b>D</b>	<b>cD</b>
Shrub	ALOC2	<b><i>Allenrolfea occidentalis</i></b>	100	1	1	1	X	X	
Herb	BRHO2	<i>Bromus hordeaceus</i>	100	45	45	45	X		X
	VUMY	<i>Vulpia myuros</i>	100	20	20	20	X		
	HOMU	<i>Hordeum murinum</i>	100	12	12	12	X		
	TRGR2	<i>Trifolium gracilentum</i>	100	4	4	4	X		
	SPAI	<b><i>Sporobolus airoides</i></b>	100	3	3	3	X		
	HODE2	<i>Hordeum depressum</i>	100	2	2	2	X		
	MEPO3	<i>Medicago polymorpha</i>	100	1	1	1	X		
	BRAR3	<i>Bromus arenarius</i>	100	0.2	0.2	0.2	X		
	BRRU2	<i>Bromus rubens</i>	100	0.2	0.2	0.2	X		
	CEPUP6	<i>Centromadia pungens</i> ssp. <i>pungens</i>	100	0.2	0.2	0.2	X		
	CEGL2	<i>Cerastium glomeratum</i>	100	0.2	0.2	0.2	X		
	CRCO34	<i>Crassula connata</i>	100	0.2	0.2	0.2	X		
	CRSE11	<i>Croton setigerus</i>	100	0.2	0.2	0.2	X		
	DISP	<i>Distichlis spicata</i>	100	0.2	0.2	0.2	X		
	ERBR14	<i>Erodium brachycarpum</i>	100	0.2	0.2	0.2	X		
	FRSA	<i>Frankenia salina</i>	100	0.2	0.2	0.2	X		
	HEHI7	<i>Herniaria hirsuta</i>	100	0.2	0.2	0.2	X		
	LEDI2	<i>Lepidium dictyotum</i>	100	0.2	0.2	0.2	X		
	LENI	<i>Lepidium nitidum</i>	100	0.2	0.2	0.2	X		
	LOWR2	<i>Lotus wrangelianus</i>	100	0.2	0.2	0.2	X		
	MEIN2	<i>Melilotus indicus</i>	100	0.2	0.2	0.2	X		
	PUSI	<i>Puccinellia simplex</i>	100	0.2	0.2	0.2	X		
	STME2	<i>Stellaria media</i>	100	0.2	0.2	0.2	X		
	TRDED	<i>Trifolium depauperatum</i> var. <i>depauperatum</i>	100	0.2	0.2	0.2	X		
	TRDES	<i>Trifolium depauperatum</i> var. <i>truncatum</i>	100	0.2	0.2	0.2	X		
	TRMI4	<i>Trifolium microcephalum</i>	100	0.2	0.2	0.2	X		
	TRWI3	<i>Trifolium willdenovii</i>	100	0.2	0.2	0.2	X		
Non-vasc	CRYPTO	Cryptogammic crust	100	0.2	0.2	0.2	X	X	

***Trifolium variegatum* Alliance  
(White-tip clover swales)**

*Trifolium variegatum* is characteristically present to seasonally co-dominant in the herbaceous layer with *Juncus bufonius*, *Bromus hordeaceus*, *Hypochaeris glabra*, *Vulpia bromoides*, and others. Herbs are <75 cm, and cover is intermittent to continuous. Stands occur in vernal moist edges of pools, swales and seeps. Soils are sandy to clay loam or clay and generally fine-grained.



**Samples used to describe type:** 26

**Local Environmental Table:**

Elevation: range 66 - 559, average 165.3 m  
Total vegetation cover: range 29 - 85%, average 61.5%  
Tree cover: range 0 - 0%, average 0%  
Shrub cover: range 0 - 0%, average 0%  
Herb cover: range 29 - 85%, average 61.5%  
Percent native cover relative to non-native cover: 41.9%

**Ecoregion Sections and Subsection Codes:** Great Valley: 262Ag, 262Ao; Sierra Nevada Foothills: M261Fb, M261Fc

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb	JUBU	<i>Juncus bufonius</i>	100	11.8	0.2	37	X		
	TRVA	<b><i>Trifolium variegatum</i></b>	96	13.6	0.2	60	X		
	BRHO2	<i>Bromus hordeaceus</i>	92	2.9	0.2	18	X		
	HYGL2	<i>Hypochaeris glabra</i>	92	2.4	0.2	15	X		
	VUBR	<i>Vulpia bromoides</i>	88	1.8	0.2	12	X		
	BRMI2	<i>Briza minor</i>	81	0.5	0.2	4	X		
	LOPEM2	<i>Lolium perenne</i>	65	5.3	0.2	25			
	ERBO	<i>Erodium botrys</i>	58	0.7	0.2	7			
	CAAT25	<i>Castilleja attenuata</i>	58	0.2	0.2	1			
	LETA	<i>Leontodon taraxacoides</i>	54	8.1	0.2	34			
	TRDU2	<i>Trifolium dubium</i>	54	2.1	0.2	14			
	AICA	<i>Aira caryophylla</i>	50	1.5	0.2	14			
	TRERE2	<i>Triphysaria eriantha</i> ssp. <i>eriantha</i>	50	1.4	0.2	15			
	HEFI	<i>Hemizonia fitchii</i>	50	1.4	0.2	12			
	TRMI4	<i>Trifolium microcephalum</i>	50	0.1	0.1	1			
	HOMA2	<i>Hordeum marinum</i>	46	5.4	1	45			
	POAN	<i>Poa annua</i>	42	0.8	0.2	12			
	LYHY3	<i>Lythrum hyssopifolia</i>	54	1.5	0.2	10			
	TACA8	<i>Taeniatherum caput-medusae</i>	35	1.5	0.2	15			
	LOUNU	<i>Lotus purshianus</i>	35	0.9	0.2	20			
	CRSE11	<i>Croton setigerus</i>	35	0.1	0.2	1			
	SOSE2	<i>Soliva sessilis</i>	27	0.9	0.2	15			
	TRHI4	<i>Trifolium hirtum</i>	27	0.2	0.2	2			
	CYDA	<i>Cynodon dactylon</i>	23	1.1	0.2	25			
	ELMA5	<i>Eleocharis macrostachya</i>	23	0.8	0.2	17			
	NATA3	<i>Navarretia tagetina</i>	23	0.4	0.2	6			
	CIQU3	<i>Cicendia quadrangularis</i>	23	0.2	0.2	4			
	GAPH2	<i>Gastridium ventricosum</i>	23	0.2	0.2	3			
Non-vasc	2MOSS	Moss	54	5.4	0.2	40			

**Association(s) Defined:**

***Trifolium variegatum*–*Juncus bufonius*  
(*Trifolium variegatum*–*Vulpia bromoides*)–*Hypochaeris glabra*–*Leontodon taraxacoides***

***Trifolium variegatum*–*Juncus bufonius* Association**

Samples used to describe type: 22

**Local Environmental Table:**

Elevation: range 68 - 559, average 177.7 m  
 Total vegetation cover: range 29 - 85%, average 64%  
 Tree cover: range 0 - 0%, average 0%  
 Shrub cover: range 0 - 0%, average 0%  
 Herb cover: range 29 - 85%, average 64%  
 Percent native cover relative to non-native cover: 46.7%

**Ecoregion Sections and Subsection Codes:** Great Valley: 262Ag, 262Ao; Sierra Nevada Foothills: M261Fb, M261Fc

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb	JUBU	<i>Juncus bufonius</i>	100	13.5	1	37	X		
	TRVA	<i>Trifolium variegatum</i>	95	15.9	0.2	60	X		
	BRHO2	<i>Bromus hordeaceus</i>	91	3	0.2	18	X		
	HYGL2	<i>Hypochaeris glabra</i>	91	2.3	0.2	15	X		
	VUBR	<i>Vulpia bromoides</i>	86	1.4	0.2	10	X		
	LOPEM2	<i>Lolium perenne</i>	77	6.2	0.2	25	X		
	BRMI2	<i>Briza minor</i>	77	0.5	0.2	4	X		
	ERBO	<i>Erodium botrys</i>	55	0.6	0.2	7			
	CAAT25	<i>Castilleja attenuata</i>	55	0.1	0.2	1			
	HOMA2	<i>Hordeum marinum</i>	50	5.7	1	45			
	HEFI	<i>Hemizonia fitchii</i>	50	1.6	0.2	12			
	LETA	<i>Leontodon taraxacoides</i>	45	6.2	0.2	25			
	TRDU2	<i>Trifolium dubium</i>	45	1.9	0.2	14			
	POAN	<i>Poa annua</i>	45	1	0.2	12			
	TRMI4	<i>Trifolium microcephalum</i>	45	0.1	0.11	1			
	AICA	<i>Aira caryophyllea</i>	41	1.6	0.2	14			
	TRERE2	<i>Triphysaria eriantha</i> ssp. <i>eriantha</i>	41	1	0.2	15			
	LYHY3	<i>Lythrum hyssopifolia</i>	36	1.3	0.2	9			
	LYHY3	<i>Lythrum hyssopifolium</i>	36	1.3	0.2	1			
	CRSE11	<i>Croton setigerus</i>	36	0.1	0.2	1			
	TACA8	<i>Taeniatherum caput-medusae</i>	32	1.4	0.2	15			
	LOUNU	<i>Lotus purshianus</i>	32	1	0.2	20			
	MOFO	<i>Montia fontana</i>	32	0.1	0.2	1			
	CYDA	<i>Cynodon dactylon</i>	27	1.3	0.2	25			
	SOSE2	<i>Soliva sessilis</i>	27	1	0.2	15			
	ELMA5	<i>Eleocharis macrostachya</i>	27	0.9	0.2	17			
Non-vasc	2MOSS	Moss	45	3.5	0.2	30			

**(*Trifolium variegatum*–*Vulpia bromoides*)–*Hypochaeris glabra*–*Leontodon taraxacoides* Association**

Samples used to describe type: 4

**Local Environmental Table:**

Elevation: range 66 - 122, average 97 m  
 Total vegetation cover: range 35 - 70%, average 47.5%  
 Tree cover: range 0 - 0%, average 0%  
 Shrub cover: range 0 - 0%, average 0%  
 Herb cover: range 35 - 70%, average 47.5%  
 Percent native cover relative to non-native cover: 15.7%

**Ecoregion Sections and Subsection Codes:** Great Valley: 262Ao; Sierra Nevada Foothills: M261Fb

**Plant Constancy/Cover Summary Table:**

Stratum	Code	Species Name	Con	Avg	Min	Max	C	D	cD
Herb									
	LETA	<i>Leontodon taraxacoides</i>	100	18.6	0.2	34	X		X
	VUBR	<i>Vulpia bromoides</i>	100	4.1	0.2	12	X		
	TRERE2	<i>Triphysaria eriantha</i> ssp. <i>eriantha</i>	100	3.6	0.2	13	X		
	HYGL2	<i>Hypochaeris glabra</i>	100	3.1	0.2	6	X		
	BRHO2	<i>Bromus hordeaceus</i>	100	2.9	0.2	6	X		
	TRDU2	<i>Trifolium dubium</i>	100	2.8	0.2	6	X		
	JUBU	<i>Juncus bufonius</i>	100	2.3	0.2	4	X		
	AICA	<i>Aira caryophylla</i>	100	1.1	0.2	3	X		
	TRVA	<i>Trifolium variegatum</i>	100	0.9	0.2	2	X		
	BRMI2	<i>Briza minor</i>	100	0.4	0.2	1	X		
	ERBO	<i>Erodium botrys</i>	75	1.3	1	3	X		
	TRHI4	<i>Trifolium hirtum</i>	75	0.6	0.2	2	X		
	CAAT25	<i>Castilleja attenuata</i>	75	0.6	0.2	1	X		
	CRTI	<i>Crassula tillaea</i>	75	0.2	0.2	0.2	X		
	JUCA5	<i>Juncus capitatus</i>	75	0.2	0.2	0.2	X		
	TRMI4	<i>Trifolium microcephalum</i>	75	0.2	0.2	0.2	X		
	TACA8	<i>Taeniatherum caput-medusae</i>	50	1.6	0.2	6			
	BRODI	<i>Brodiaea</i> sp.	50	0.3	0.2	1			
	CIQU3	<i>Cicendia quadrangularis</i>	50	0.3	0.2	1			
	HEFI	<i>Hemizonia fitchii</i>	50	0.3	0.2	1			
	NATA3	<i>Navarretia tagetina</i>	50	0.3	0.2	1			
	CEGL2	<i>Cerastium glomeratum</i>	50	0.1	0.2	0.2			
	DICAC5	<i>Dichelostemma capitatum</i> ssp. <i>capitatum</i>	50	0.1	0.2	0.2			
	LOGA2	<i>Filago gallica</i>	50	0.1	0.2	0.2			
	GAPH2	<i>Gastidium ventricosum</i>	50	0.1	0.2	0.2			
	LEBI8	<i>Leptosiphon bicolor</i>	50	0.1	0.2	0.2			
	LOUNU	<i>Lotus purshianus</i>	50	0.1	0.2	0.2			
	SIGA	<i>Silene gallica</i>	50	0.1	0.2	0.2			
	HOMA2	<i>Hordeum marinum</i>	25	3.8	15	15			
	LYHY3	<i>Lythrum hyssopifolia</i>	25	2.5	10	10			
	LOPE	<i>Lolium perenne</i>	25	2	8	8			
	DEDA	<i>Deschampsia danthonioides</i>	25	0.5	2	2			

<b>Stratum</b>	<b>Code</b>	<b>Species Name</b>	<b>Con</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>	<b>C</b>	<b>D</b>	<b>cD</b>
	NAIN2	<i>Navarretia intertexta</i>	25	0.5	2	2			
	TRDE	<i>Trifolium depauperatum</i>	25	0.5	2	2			
Non-vasc	2MOSS	Moss	100	16.1	0.2	40	X	X	
	CRYPTO	Cryptogammic crust	25	0.3	1	1			
	2LICHN	Lichen	25	0.3	1	1			