

Carrizo Plain National Monument Vegetation Classification and Mapping Project



By

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I. INTRODUCTION

In 2010, the Bureau of Land Management (BLM) allocated grant funds to the California Native Plant Society (CNPS) to (1) collect vegetation data and categorize the variation of habitat types and (2) to map vegetation and other related attributes in the Carrizo Plain National Monument (CPNM). The study area encompasses a wide range of plant communities from playas and alkali herbaceous flats to steep shrubby hillsides and woodland copses.

Baseline vegetation surveys were conducted at the Carrizo Plain National Monument across more than 245,000 acres. These surveys represent a joint field effort by CNPS and the California Department of Fish and Game (CDFG). In total, 1019 surveys were conducted (638 in 2010, 267 in 2008, and 114 in 2005-07) to evaluate vegetation resources and establish a comprehensive floristic classification. The CNPS-CDFG Combined Vegetation Rapid Assessment and Relevé protocol was implemented for these field surveys. Additionally, 45 detailed monitoring plots were established to detect long-term change over time, and more than 1,000 reconnaissance points were recorded to inform the mapping stage of this project. Our goal was to representatively sample the floristic variation in the region, partly through a gradsect sampling method (using climatic, topographic and lithological characteristics) and partly through opportunistic sampling. Staff visually determined homogeneous stands of repeating vegetation patterns in the landscape and sampled these patterns across the ecological variation in the region.

A hierarchical classification of vegetation alliances and associations was developed, based on consistent patterns of dominant and characteristic/indicator plant species of the 1,000+ surveys. Four tree alliances were identified, including juniper and oak as well as riparian woodlands. The majority of the vegetation types (30+) were shrub-dominated, including several chaparral and semi-desert scrubs. Thirteen herbaceous alliances were defined including wetland and perennial types as well as numerous showy annual forblands and grasslands. Of the 51 vegetation alliances currently identified within the Carrizo National Monument, three are newly described types (with at least 10 samples) and three are new provisional types (with fewer than 10 samples).

This classification was translated into a mapping classification, so that fine-scale mapping of the natural vegetation features could be produced. The map will serve as a basis for future climate-change monitoring, environmental assessment, fire/fuels modeling, rare and invasive species management, and a host of other valuable analyses.

II. OBJECTIVES

The primary objective of this study is to establish baseline knowledge about natural and semi-natural vegetation within the Carrizo Plain National Monument (CPNM). To produce a floristic classification of this region, CNPS has completed the following tasks: 1) review existing field surveys and GIS data for the region, 2) implement vegetation sampling and mapping protocols, 3) conduct new field surveys to confirm vegetation types, 4) enter, compile and classify data to define vegetation alliances and associations and 5) generate a field key to the vegetation types within this methods report.

Establishing a vegetation sampling array, including long-term monitoring plots, provides a scientific baseline for assessing and monitoring the vegetation and associated species in the region. This project will inform BLM's management plan including the detection and mitigation of changes in vegetation communities that may result from climate change.

III. METHODS

Study area

The study area is within the CPNM – a region covering more than 245,000 acres of the southern Coast Range in California (Figure 1). It encompasses both private properties and public lands—including those owned at the county, state and federal level. The National Monument is jointly managed by partners (BLM, CDFG, and The Nature Conservancy) to protect and enhance the natural, undeveloped character and biotic resources of the region.

Field Sampling and Classification

The sampling protocol was based on standardized vegetation protocols developed by CNPS's Vegetation Committee (see Appendix A). These protocols comply with state and national standards for vegetation classification and habitat assessment, as defined by the CDFG, CNPS and the National Vegetation Classification. The relevé method is plot-based and can be used to classify vegetation and assist in mapping of vegetation at a fine-scale. The rapid assessment method is a plot-less survey, though both methods use vegetation stands as the basic sampling 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 stratified approach was used to determine plot locations; initial areas were pre-selected using soils, geology and hydrology variables known to correlate with vegetation patterns. Field ecologists then subjectively placed plots within the different zones to represent homogeneous stands of vegetation. Field data included recording of the date of sampling, GPS location, environmental characteristics of the stand (microtopography, substrate, soil texture, slope, aspect, ground surface characteristics, disturbance type and intensity), vegetation structure (tree, shrub and herb cover and height, total vegetation cover), species composition and cover, site history, and field-assessed alliance and association names. Additionally, at least four digital photos were taken in the cardinal directions from each sample location. Any unknown plant specimens collected during the field season were identified using the Jepson Manual and other

currently accepted taxonomic keys. The vegetation data were then entered into a custom MS Access database and all field photos were digitally archived.

After consultation with partners and a review of existing monitoring literature, a long-term vegetation monitoring protocol was developed. This protocol describes the layout and sampling of permanently marked plots in a nested design (Appendix B). A main plot of 400 m² includes one nested 100 m² subplot and eight nested 1 m² subplots arranged in an overall 20 by 20 m² design. CNPS worked together with BLM and partners to identify at least 40 locations for long-term monitoring plots, these plots were implemented across an array of different vegetation types within the Monument in order to monitor changes in vegetation over time.

Carrizo Plain National Monument Vegetation Mapping Project Location of CNPS and DFG Field Surveys

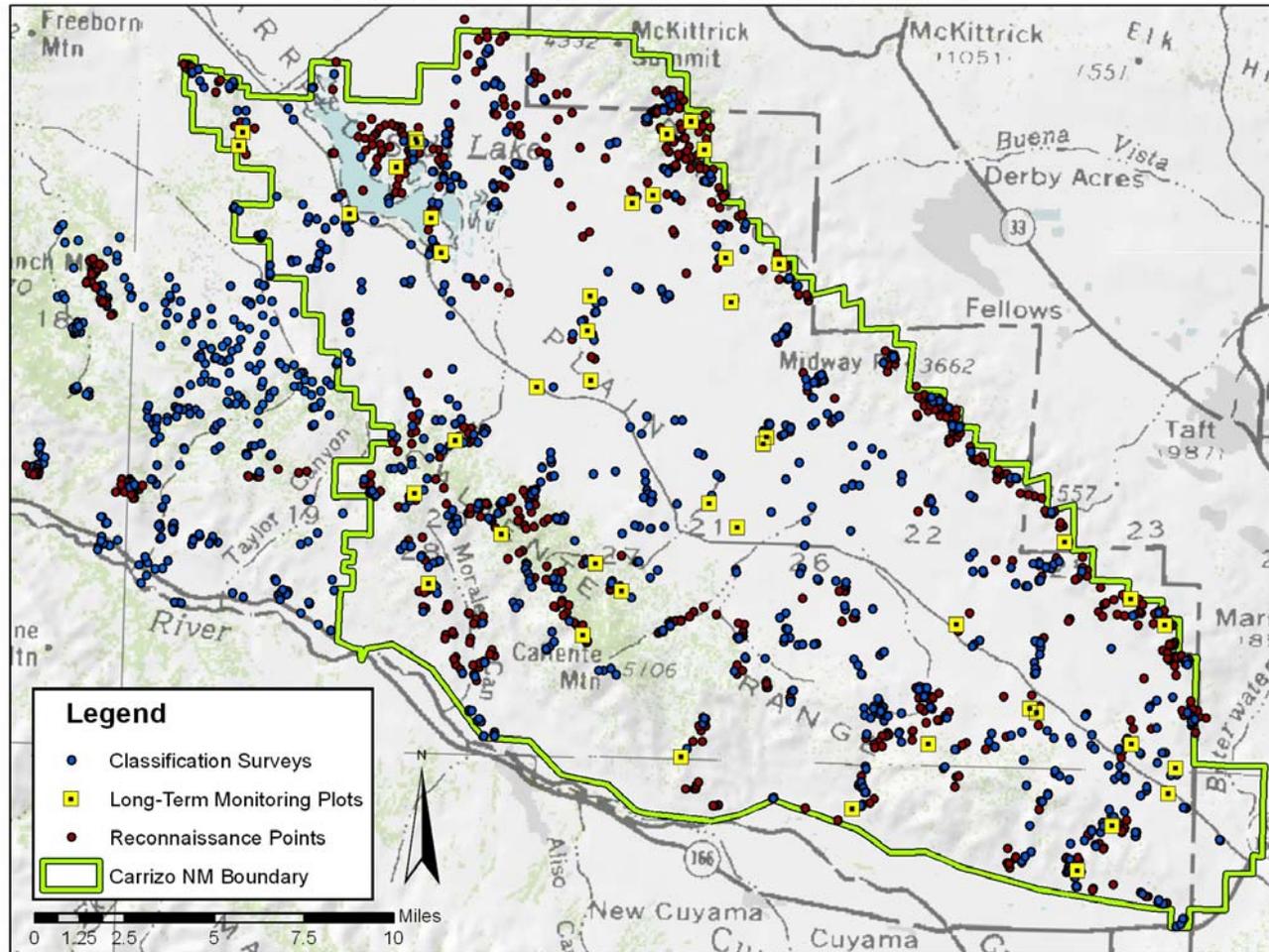


Figure 1. Project study area depicting surveys used for the floristic vegetation classification as well as locations of long-term monitoring plots and reconnaissance points to inform vegetation mapping.

In addition to BLM-funded surveys collected in 2010, CNPS compiled data from other projects in the region, including an initial season of vegetation sampling by CNPS and CDFG in 2008, as well as surveys collected by CNPS in 2010 using funds from The Nature Conservancy and from the National Resource Conservation Service which focused on herbaceous plant communities. CDFG also continued field data collection in 2010 and all data were quality controlled, merged, and standardized prior to vegetation classification analysis. The data compilation totaled 1,019 surveys from the Carrizo Plain region.

A CNPS ecologist analyzed species cover data using PC-Ord cluster analysis software. The final analysis used the Sorensen distance measure and a flexible beta linkage method at -0.25 (McCune and Grace 2002). This cluster analysis technique was based on abundance (percent 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 cluster groups were first split into four major vegetation divisions which corresponded roughly to tree, shrub, herb and wet alkaline vegetation types. These four groups were then analyzed and interpreted separately using the techniques described below.

Prior to the cluster analysis runs, outlier analyses were performed using PC-ORD. Plots with Sorensen distances more than two standard deviations away from the mean were removed from the final analyses. To reduce heterogeneity within each data set, rare species in fewer than 3 or 4 plots were removed from the various datasets.

After groups were generated in the cluster analyses, Indicator Species Analysis (ISA) was employed to objectively decide what number of “group” or cut levels to explicitly interpret the cluster dendrograms (McCune and Grace 2002). Further, ISA was used to determine which species were characteristic indicators for the different groups. ISA produced indicator values for each species in each of the group levels within the dendrogram, and the statistical significance of the indicator species was evaluated using a Monte Carlo test with 1000 randomizations (Dufrene and Legendre 1997). All analyses were evaluated to determine the total number of significant indicator species (p -value ≤ 0.5) and the mean p -value for all species within each group level. The group level with the highest number of significant indicators and lowest overall mean p -value was selected for the final evaluations of the community classification (McCune and Grace 2002). At this grouping level, plant community names within floristic classes (e.g., association names) were applied to each field survey.

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

1. Run cover category Cluster Analysis to display a specific arrangement of plots based on species presence and abundance.
2. Run Indicator Species Analysis (ISA) at each of the successive group levels for each of the Cluster Analysis dendrograms from 2 groups up to the maximum number of groups (all groups with at least 2 samples).

3. Settle on the final representative grouping level of each Cluster Analysis to use in the preliminary labeling.
4. Preliminarily label alliance and association for each of the samples, and denote indicator species from the ISA.
5. Develop decision rules for each association and alliance based on review of species cover on a sample-by-sample basis.
6. Re-label final alliance labels for each sample and arrange in a database table.

Attributes that distinguish each vegetation type, including species composition, structure and cover, were used to develop a diagnostic key for field identification. The resulting floristic classification and key of alliances and associations follows the hierarchical National Vegetation Classification System (Jennings et al. 2009) and as published in the Manual of California (Sawyer et al. 2009). However, ecologists are currently working to define the upper levels of the national classification hierarchy through an extensive peer review process whereby updates will be made to the names in the hierarchy, and they will be making modifications to how alliances and associations are nested within it. Thus, the table displaying the CPNM vegetation types within the hierarchy will be modified later in subsequent reports using the latest information available.

IV. RESULTS

Basic Species Data

Compiled field sampling efforts across 2008-2010 resulted in 1019 surveys collected in the Carrizo Plain region (Figure 1). Of these 1019 surveys, 45 plots were permanently marked long-term monitoring plots. The majority of the surveys were completed during peak spring bloom, between mid-March and May. Weather conditions during the winter months of 2009-10 resulted in amazing wildflower displays, which were documented during our 2010 sampling.

The compiled surveys documented 417 plant taxa within the Carrizo Plain region, 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., Lichen, Moss). Appendix C provides a complete list of scientific and common names for all taxa identified in the vegetation surveys.

Out of the more than 417 taxa identified, 42 species were identified as not native to California. Of these species, 11 are ranked as moderate and two are ranked as high (*Bromus rubens* and *B. tectorum*) per the California Invasive Plant Council (CAL-IPC) Invasive Plant Inventory. This ranking system takes into account the 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. Appendix D lists the ranked invasive species and their respective Cal-IPC ranks.

Vegetation Classification Analysis

More than 1,000 surveys were compiled from a number of sources to develop a classification of the Carrizo Plain region. Data from the compiled dataset were classified into 56 alliances, of which 45 were identified in the National Monument boundary. Of these alliances, 82 finer-level associations were defined, of which 67 were identified in the National Monument. Table 1 contains a summary of the classification and illustrates the habitat diversity occurring within Carrizo Plain region.

This classification defines 6 new alliances not previously published in the Manual of California Vegetation (Sawyer, et al. 2009) or other sources. Three of the new alliances are represented with less than 10 samples and therefore are considered provisional. These are indicated by "Provisional" following the vegetation type name. Photos of new alliances and associations defined from this project are included in Appendix E.

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 the knowledge of vegetation within this region.

A diagnostic key for field identification of alliances and associations was developed. This key highlights attributes that distinguish each vegetation type, including species composition, structure and cover (Appendix F).

Table 1. Draft Vegetation Classification of Alliances and Associations Nested within the National Vegetation Classification Hierarchy of Macrogroups and Groups for the Carrizo Plain National Monument (CPNM). Bolded types are those being mapped in CPNM, and asterisks denote those Alliances occurring in Chimineas Ranch and other adjacent DFG lands, but not sampled/mapped in CPNM. Sample sizes are provided for those types sampled in the CPNM, and values in parentheses denote surveys located outside of and adjacent to the CPNM boundary.

California Forest and Woodland [oak, pine and cypress] Macrogroup

Californian evergreen coniferous forest and woodland Group

1121 *Juniperus californica* Alliance

Juniperus californica / *Ericameria linearifolia* / herbaceous n=25 (7)

Juniperus californica / *Salvia leucophylla* n=5 (17)

Juniperus californica / herbaceous n=4 (1)

Californian broadleaf forest and woodland Group

1111 *Quercus agrifolia* Alliance* n=0 (1)

1131 *Quercus douglasii* Alliance

Quercus douglasii / *Ericameria linearifolia** n=0 (19)

Quercus douglasii–*Juniperus californica*/*Ericameria linearifolia* n=2 (2)

Quercus douglasii / herbaceous* n=0 (13)

Quercus douglasii–*Juniperus californica*/*Ceanothus montanus** n=0 (2)

Southwestern North American riparian, Flooded and Swamp Forest Macrogroup

Southwestern North American riparian broadleaf evergreen & deciduous woodland

1211 *Populus fremontii* Alliance

Populus fremontii / *Salix exigua* n=1 (1)

Populus fremontii n=2 (0)

4113 *Salix laevigata* Alliance n=1 (0)

Warm Interior Chaparral Macrogroup

Western Mojave/Sonoran borderland chaparral Group

2111 *Quercus john-tuckeri* Alliance

Quercus john-tuckeri–*Ericameria linearifolia* / *Juniperus californica* n=18 (7)

Quercus john-tuckeri n=1 (4)

California Chaparral Macrogroup

Californian mesic chaparral Group

2211 *Quercus berberidifolia* Alliance*

Quercus berberidifolia–*Ceanothus cuneatus** n=0 (1)

2212 *Cercocarpus montanus* Alliance* n=0 (1)

Californian xeric chaparral Group

2223 *Adenostoma fasciculatum* Alliance*

*Adenostoma fasciculatum** n=0 (7)

Adenostoma fasciculatum–*Eriogonum fasciculatum** n=0 (2)

2226 *Adenostoma fasciculatum*–*Salvia mellifera* Alliance*

Adenostoma fasciculatum–*Salvia mellifera** n=0 (1)

2231 *Arctostaphylos glauca* Alliance

Adenostoma fasciculatum–*Arctostaphylos glauca** n=0 (4)

Arctostaphylos glauca n=5 (1)

Arctostaphylos glauca–*Quercus john-tuckeri* Provisional n=2 (1)

2227 *Ceanothus cuneatus* Alliance*

Adenostoma fasciculatum–*Ceanothus cuneatus** n=0 (5)

California Coastal Scrub Macrogroup

Central and south coastal Californian coastal sage scrub Group

2312 *Artemisia californica* Alliance

Artemisia californica n=5 (3)

2314 *Artemisia californica*–*Eriogonum fasciculatum* Alliance

Artemisia californica–*Eriogonum fasciculatum* n=2 (6)

2317 *Eriogonum fasciculatum* Alliance

Eriogonum fasciculatum n=14 (10)

Eriogonum fasciculatum–*Ephedra californica* n=5 (0)

Eriogonum fasciculatum–*Hesperoyucca whipplei* n=14 (11)

2325 *Salvia leucophylla* Alliance

Salvia leucophylla n=7 (5)

Salvia leucophylla–*Artemisia californica* n=1 (5)

Salvia leucophylla–*Eriogonum fasciculatum* n=1 (12)

2328 *Salvia mellifera* Alliance

Salvia mellifera–*Eriogonum fasciculatum* / *Bromus rubens* n=2 (3)

Central and south coastal Californian seral scrub Group

2335 *Ericameria linearifolia*–*Isomeris arborea* Alliance

Ericameria linearifolia n=25 (11)

Isomeris arborea n=11 (4)

Eastwoodia elegans n=36 (4)

Eastwoodia elegans–*Krascheninnikovia lanata* n=19 (0)

2321 *Gutierrezia californica* Alliance

Gutierrezia californica / *Poa secunda* n=15 (1)

2324 *Lupinus albifrons* Alliance

Lupinus albifrons n=7 (2)

Mojavean–Sonoran Desert Scrub Macrogroup

Lower Bajada and Fan Mojavean–Sonoran desert scrub Group

2411 *Atriplex polycarpa* Alliance

Atriplex polycarpa / annual herbaceous n=39 (5)

2413 *Atriplex canescens* Alliance

Atriplex canescens / herbaceous n=7 (2)

2416 *Ambrosia salsola* Alliance

Ambrosia salsola n=11 (0)

Cool semi-desert wash and disturbance scrub Macrogroup

Intermontane seral shrubland Group

2511 *Ericameria nauseosa* Alliance

Ericameria nauseosa n=4 (1)

Inter-Mountain Dry Shrubland and Grassland

Intermontane deep or well-drained soil scrub Group

2521 *Krascheninnikovia lanata* Alliance

Krascheninnikovia lanata n=6 (0)

2522 *Lycium andersonii* Alliance

Lycium andersonii n=2 (0)

2525 *Ephedra viridis* Alliance

Ephedra viridis–*Ericameria linearifolia*/*Monolopia lanceolata* n=6 (0)

Provisional

Western Cordilleran Montane Shrubland and Grassland Macrogroup

Western Cordilleran montane deciduous scrub Group

2611 *Ribes quercetorum* Provisional Alliance

n=7 (0)

<u>Southwestern North American Riparian, Flooded and Swamp Forest Macrogroup</u>		
Southwestern North American riparian/wash scrub Group		
4111 <i>Baccharis salicifolia</i> Alliance*		
<i>Baccharis salicifolia</i> *		n=0 (4)
<i>Baccharis salicifolia</i> – <i>Pluchea sericea</i> *		n=0 (1)
4114 <i>Forestiera pubescens</i> Alliance		
<i>Forestiera pubescens</i>		n=1 (0)
Sonoran-Coloradan semi-desert wash scrub Group		
4221 <i>Pluchea sericea</i> Alliance*		n=0 (2)
<u>North American Warm-desert Xero-Riparian Macrogroup</u>		
Warm Semi-Desert Shrub & Herb Wash-Arroyo Group		
4211 <i>Ephedra californica</i> Alliance		
<i>Ephedra californica</i> / annual-perennial herb		n=18 (1)
<i>Ephedra californica</i> – <i>Ambrosia salsola</i>		n=2 (0)
2323 <i>Isocoma acradenia</i> Provisional Alliance		
<i>Isocoma acradenia</i> Provisional		n=6 (0)
4213 <i>Lepidospartum squamatum</i> Alliance		
<i>Lepidospartum squamatum</i> – <i>Artemisia californica</i> *		n=0 (2)
<i>Lepidospartum squamatum</i> / mixed ephemeral annuals		n=1 (1)
4215 <i>Prunus fasciculata</i> Alliance		
<i>Prunus fasciculata</i>		n=1 (0)
<u>Warm Semi-Desert/Mediterranean Alkaline–Saline Wetland Macrogroup</u>		
Southwestern North American salt basin and high marsh Group		
4311 <i>Allenrolfea occidentalis</i> Alliance		
<i>Allenrolfea occidentalis</i> / <i>Lasthenia (gracilis)</i>		n=8 (0)
4312 <i>Atriplex spinifera</i> Alliance		
<i>Atriplex spinifera</i> / herbaceous		n=25 (0)
4317 <i>Frankenia salina</i> Alliance		
<i>Frankenia salina</i> – <i>Psilocarphus brevissimus</i> Provisional		n=2 (0)
4314 <i>Suaeda moquinii</i> Alliance		
<i>Suaeda moquinii</i> / <i>Lepidium dictyotum</i> Provisional		n=5 (0)
Southwestern North American alkali marsh/seep vegetation Group		
6111 <i>Schoenoplectus americanus</i> Alliance*		
<i>Schoenoplectus americanus</i> *		
<i>Scirpus pungens</i> – <i>Schoenoplectus americanus</i> Provisional*		n=0 (2)
<u>Western North America Wet Meadow and Low Shrub Carr Macrogroup</u>		
Californian warm temperate marsh/seep Group		
6211 <i>Juncus arcticus</i> (var. <i>balticus</i> , <i>mexicanus</i>) Alliance		
<i>Juncus arcticus</i> var. <i>balticus</i>		n=2 (1)
6213 <i>Leymus triticoides</i> Alliance		
<i>Leymus triticoides</i>		n=9 (0)
<u>Western North American Freshwater Marsh Macrogroup (6400)</u>		
Arid West freshwater emergent marsh Group		
<u>Western North America Vernal Pool Macrogroup</u>		
CA. mixed annual/perennial freshwater vernal pool / swale bottomland Group		
6311 <i>Eleocharis acicularis</i> Alliance*		n=0 (1)
6312 <i>Eleocharis macrostachya</i> Alliance*		
<i>Eleocharis macrostachya</i>		n=0 (5)
6313 <i>Lasthenia fremontii</i>–<i>Distichlis spicata</i> Alliance		
<i>Atriplex vallicola</i> – <i>Lasthenia ferrisiae</i> – <i>Lepidium jaredii</i>		n=16 (0)

6317 <i>Layia fremontii</i> – <i>Achyrachaena mollis</i> Alliance	
<i>Achyrachaena mollis</i>	n=2 (0)
<i>Layia platyglossa</i>	n=2 (0)

no macrogroup (North American Pacific coastal salt marsh / alkaline and Cool Semi-Desert Alkali-Saline Wetland)

Temperate Pacific tidal salt and brackish meadow Group

6411 *Distichlis spicata* Alliance

<i>Distichlis spicata</i>	n=5 (0)
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California Annual and Perennial Grassland Macrogroup (5100)

California annual herb/grass Group

5111 *Amsinckia (menziesii, tessellata)* Alliance

<i>Amsinckia tessellata</i> - <i>Erodium cicutarium</i>	n=37 (9)
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<i>Phacelia ciliata</i> Provisional	n=8 (0)
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<i>Phacelia tanacetifolia</i> Provisional	n=5 (4)
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5113 *Eschscholzia (californica)* Alliance

<i>Eschscholzia californica</i>	n=5 (1)
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<i>Lupinus bicolor</i> Provisional	n=2 (4)
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5114 *Lasthenia californica*-*Plantago erecta*-*Vulpia microstachys* Alliance

<i>Erodium cicutarium</i> – <i>Vulpia microstachys</i>	n=13 (0)
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<i>Lasthenia gracilis</i>	n=11 (0)
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<i>Lasthenia gracilis</i> – <i>Plantago erecta</i> – <i>Plagiobothrys canescens</i>	n=8 (5)
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<i>Lasthenia minor</i> Provisional	n=3 (0)
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<i>Lepidium nitidum</i> – <i>Trifolium gracilentum</i> – <i>Vulpia microstachys</i>	n=27 (0)
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<i>Pectocarya (linearis, penicillata)</i>	n=14 (0)
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5115 *Monolopia (lanceolata)*-*Coreopsis (calliopsidea)* Alliance

<i>Coreopsis calliopsidea</i> – <i>Mentzelia pectinata</i>	n=10 (0)
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<i>Monolopia lanceolata</i>	n=22 (1)
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<i>Monolopia stricta</i> Provisional	n=6 (0)
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5116 *Salvia carduacea* Provisional Alliance

<i>Salvia carduacea</i>	n=10 (1)
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California perennial grassland Group

5131 *Corethrogyne filaginifolia* Provisional Alliance

<i>Corethrogyne filaginifolia</i> Provisional	n=5 (0)
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5132 *Eriogonum (elongatum, nudum)* Alliance

<i>Eriogonum elongatum</i> Provisional	n=6 (0)
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<i>Eriogonum nudum</i> Provisional	n=2 (0)
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5121 *Nassella cernua* Provisional Alliance

<i>Nassella cernua</i> Provisional	n=8 (1)
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Mediterranean CA naturalized annual and perennial grassland Group

5211 <i>Bromus rubens</i> - <i>Schismus (arabicus, barbatus)</i> Semi-natural Stands	n=5 (1)
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Western North American Temperate Grassland and Meadow Macrogroup

Western dry upland perennial grassland Group

5122 *Poa secunda* Alliance

<i>Monolopia stricta</i> – <i>Poa secunda</i>	n=20 (0)
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<i>Poa secunda</i> – <i>Bromus rubens</i>	n=16 (0)
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VII. APPENDICES

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.

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

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

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.

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 120th longitude, zone 11 is for California east of 120th 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 cryptogamic crust on substrate surfaces including downed logs, rocks and soil, but not on standing or inclined trees or vertical rock surfaces.

% Total Vasc Veg cover: The total cover of all vascular vegetation taking into consideration the porosity, or the holes, in the vegetation. 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.

LT 111

CNPS and CDFG Combined Vegetation Rapid Assessment and Relevé Field Form

Relevé or Rapid Assessment (circle one)

(Revised March 22, 2010)

Project Code:

For Office Use:	Final database #:	Final vegetation type name:	Alliance Association
ENVIRONMENTAL DESCRIPTION			
CARR0592	Air photo:	Date: 5/21/10	Name(s) of surveyors (circle recorder): (ALE) ROK
GPS wpyt #:	GPS name: <u>Mex</u>	Datum: _____ or NAD83.	Bearing, left axis at SW pt _____ (degrees) of <u>Long / Short</u> side
UTME <u>269031</u>	UTMN <u>3874283</u>	Zone: 10 / <u>(11)</u> (circle one)	Error: ± <u>3.1</u> ft / m / <u>gdop</u>
GPS within stand?	<u>Yes</u> / No If No, cite from waypoint to stand, distance _____ (meters) & bearing _____ (degrees)		
Elevation: <u>1063</u> ft / m	Camera Name/Photograph #'s: <u>CAR-F12 (N) 295-298 299→NE</u>		
Stand Size (acres): <1, <u>(1-5)</u> >5	Plot Size (m ²): 10 / 100 / <u>(400)</u> / 1000	Plot Shape <u>20 x 20</u> ft / m	or Circle Radius _____ ft / m
Exposure, Actual °: <u>170</u> NE NW <u>(SE)</u> SW	Flat Variable All	Steepness, Actual °: <u>18</u> 0° 1-5° <u>(5-25°)</u> >25	
Topography: Macro: top upper mid <u>(lower)</u> bottom	Micro: convex flat <u>(concave)</u> undulating	Geology code: _____ Soil Texture code: _____ <u>(Upland)</u> or Wetland/Riparian (circle one)	
% Surface cover:	(Incl. outcrops) (>60cm diam) (25-60cm) (7.5-25cm) (2mm-7.5cm) (Incl sand, mud)		
H20: <u>0</u> BA Stems: <u>1</u> Litter: <u>7</u> Bedrock: <u>0</u> Boulder: <u>0</u> Stone: <u>0</u> Cobble: <u>0</u> Gravel: <u>35</u> Fines: <u>57</u> =100%			
% Current year bioturbation <u>1</u>	Past bioturbation present? <u>(yes)</u> No	% Hoof punch <u>+</u>	
Fire evidence: Yes <u>(No)</u> Unknown (circle one)	If yes, describe in Site history section, including date of fire, if known.		
Site history, stand age, comments: <u>Stand occurs on slope below sparsely wooded hills dense herb layer, some dead shrubs, above Kadroni Canyon wash where shrubs are more dense, steep hills above wash that runs to Carrizo River. Small stands in NW corner, has been grazed this year. South facing slope</u>			
Disturbance code / Intensity (L,M,H): <u>05 / H</u> <u>04 / K</u> _____ "Other" _____			
II. HABITAT AND VEGETATION DESCRIPTION			
Tree DBH: T1 (<1" dbh), T2 (1-6" dbh), T3 (6-11" dbh), T4 (11-24" dbh), T5 (>24" dbh), T6 multi-layered (T3 or T4 layer under T5, >60% cover)			
Shrub: S1 seedling (<3 yr. old), S2 young (<1% dead), <u>(S3 mature)</u> (1-25% dead), S4 decedent (>25% dead)			
Herbaceous: <u>(H1)</u> (<12" plant ht.), H2 (>12" ht.) % Non-Vasc cover: <u>+</u> Total % Vasc Veg cover: <u>52</u>			
% Cover - Conifer tree / Hardwood tree: <u>+</u> Regenerating Tree: <u>-</u> Shrub: <u>17</u> Herbaceous: <u>45</u>			
Height Class - Conifer tree / Hardwood tree: <u>+</u> Regenerating Tree: <u>-</u> Shrub: <u>02</u> Herbaceous: <u>01</u>			
Height classes: 01=<1/2m 02=1/2-1m 03=1-2m 04=2-5m 05=5-10m 06=10-15m 07=15-20m 08=20-35m 09=35-50m 10=>50m			
Species, Stratum, and % cover. Stratum categories: T=Tree, S= Shrub, H= Herb, E= SEedling, A= SApling, N= Non-vascular.			
% cover intervals for reference: <1%, 1-5%, >5-15%, >15-25%, >25-50%, >50-75%, 75%.			
Strata	Species	% cover	C Strata Species % cover C
S	<i>Atriplex polycarpa</i>	15	H <i>Bromus rubens</i> 12
	<i>Eriogonum fasciculatum</i>	2	<i>Amsinckia tessellata</i> 3
			<i>Vulpia myuros</i> 1
H	<i>Eriogonum parvifolium</i>	10	<i>Bromus hordeaceus</i> +
	<i>Schizanthus arabicus</i>	10	<i>Lotus wrangelianus</i> +
			<i>Vulpia microstachya</i> +
	<i>Monolopia lanceolata</i>	1	<i>Phacelia circutaria</i> +
	<i>Astragalus dedismocarpus</i>	+	<i>Lasthenia gracilis</i> +
	<i>Erodium cicutarium</i>	14	
Unusual species: _____			
III. INTERPRETATION OF STAND			
Field-assessed vegetation alliance name: <u>Atriplex polycarpa</u>			
Field-assessed association name (optional): _____			
Adjacent alliances/direction: <u>CARR 0598</u> W <u>CARR 0599</u> SE			
Confidence in alliance identification: L M <u>(H)</u> Explain: _____			
Phenology (E,P,L): Herb <u>+</u> Shrub <u>+</u> Tree _____ Other identification or mapping information: _____			
Is poly >1 type: Yes / No If yes, explain: _____			

Appendix B. CNPS Long-Term Monitoring Protocol and Field Forms

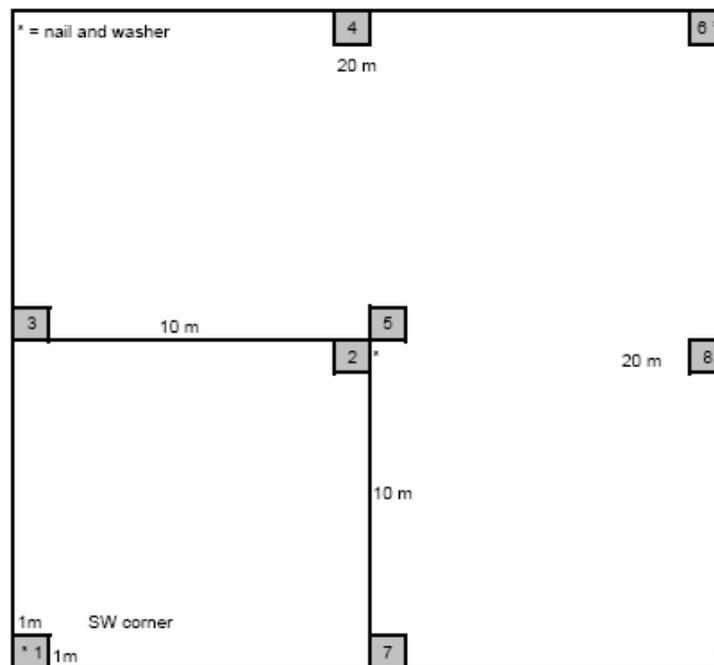
CALIFORNIA NATIVE PLANT SOCIETY PROTOCOL FOR LONG-TERM MONITORING PLOTS (April 20, 2010)

This protocol describes the methodology for vegetation sampling techniques in long-term monitoring plots. This document is a supplement to the most current relevé protocol which can be found at www.cnps.org.

A permanently marked plot will be established at each long-term monitoring location. The plot will consist of one 400 m² main plot with 1 nested 100 m² subplot and 8 nested 1 m² subplots arranged in an overall 20 by 20 m nested plot design (see figure below). Transect tapes will delineate the larger plots and a 1 m² PVC frame will be used to sample each smaller subplot. Plots will be marked by pounding in 8 or 12 inch nails with washers at each plot corner, in addition to GPS coordinates. The tops of each nail and washer will be spray-painted orange for future relocation. An accurate GPS device and a metal detector should be used for future monitoring to help relocate plots.

At each plot and sub-plot level, the following categories of ocular percent cover will be estimated: relative cover of all vascular vegetation, and absolute cover of non-vascular plants. Plant species composition and absolute percent cover will be collected in both the 100 and 400 m² plots. The 400 m² plot will include a count of the number of visibly active giant kangaroo rat precincts as well as photos from each corner facing diagonally into the plot. A full CNPS relevé will be sampled at the 100m² sub-plot. Plant species composition (richness) will be determined in the 8-1 m² subplots at each sample location, as well as a notation if the plot falls within a clipped or disturbed portion of a giant kangaroo rat precinct.

For the initial sampling, a soil sample (2 cups) will be taken from the SW corner of the 400m² plot (from the first 4 inches of soil) and stored in a bag labeled with the plot ID and date. All data collected at each sample location will be considered as baseline, future sampling will allow the detection of changes in species composition and structure over time.



CNPS Monitoring Field Form (April 21, 2010)

Plot ID:	Date:									
Camera Name:	Photo #	at corner:	SW	NW	NE	SE				
Surveyor Name:	400m2 (%)	100m2 (%)	1m2							
Quad ID	n/a	n/a								
Tree cover (%)										
Shrub cover (%)										
Graminoid cover (%)										
Forb cover (%)										
Non-vascular (%)										
K-rat precinct? #	n/a									
Amsinckia _____										
Atriplex _____										
Atriplex _____										
Avena _____										
Bromus diandrus										
Bromus hordeaceus										
Bromus madritensis ssp. rubens										
Camissonia _____										
Castilleja _____										
Caulanthus _____										
Clarkia _____										
Claytonia perfoliata										
Coreopsis _____										
Crassula connata										
Cryptantha _____										
Delphinium _____										
Dichelostemma capitatum										
Distichlis spicata										
Eremocarpus setigerus										
Ericameria linearifolia										
Eriogonum fasciculatum										
Erodium botrys										
Erodium brachycarpum										
Erodium _____										
Eschscholzia _____										
Filago _____										
Gilia _____										
Guillenia _____										
Gutierrezia californica										
Hemizonia _____										
Holocarpha _____										
Hordeum marinum										
Hordeum murinum										
Lasthenia _____										
Layia _____										
Lepidium dictyotum										
Lepidium nitidum										
Linanthus _____										
Lolium multiflorum										
Lomatium _____										
Lotus _____										
Lupinus _____										
Microseris _____										
Monolopia _____										
Nasella _____										
Pectocarya _____										
Phacelia _____										
Plagiobothrys _____										
Plantago _____										
Poa _____										
Schismus _____										
Senecio vulgaris										
Spergularia _____										
Trifolium _____										
Trifolium _____										
Vulpia bromoides										
Vulpia microstachys										
Vulpia myuros										

CNPS Monitoring Field Form (April 21, 2010)

Plot ID: <u>Carro592</u>		Date: <u>5/21/10</u>									
Camera Name: <u>CARF-12</u>		Photo # at corner: SW <u>300</u> NW <u>301</u> NE <u>302</u> SE <u>303</u>									
Surveyor Name: <u>MLE, (RAK)</u>		400m2 (%)	100m2 (%)	1m2							
<u>MAX</u>	Quad ID	n/a	n/a	1	2	3	4	5	6	7	8
Tree cover (%)											
Shrub cover (%)		17	28	0	15	0	0	3	0	10	0
Graminoid cover (%)		23	33	10	10	5	10	4	35	20	15
Forb cover (%)		29	22	10	12	6	15	5	23	15	45
Non-vascular (%)		0	0	0	0	0	0	0	0	0	0
K-rat precinct? #		0	n/a	0	0	0	0	0	0	0	0
<u>Amsinckia tessellata</u>		3	1	✓	✓	✓	✓	✓	✓	✓	✓
<u>Atriplex polycarpa</u>		15	28	✓	✓			✓		✓	✓
<u>Atriplex</u>											
<u>Avena</u>											
<u>Bromus diandrus</u>											
<u>Bromus hordeaceus</u>		+	+								
<u>Bromus madritensis ssp. rubens</u>		12	1		✓	✓	✓	✓		✓	✓
<u>Camissonia</u>											
<u>Castilleja</u>											
<u>Caulanthus</u>											
<u>Clarkia</u>											
<u>Claytonia perfoliata</u>											
<u>Coreopsis</u>											
<u>Crassula connata</u>											
<u>Cryptantha</u>											
<u>Delphinium</u>											
<u>Dichelostemma capitatum</u>											
<u>Distichlis spicata</u>											
<u>Eremocarpus setigerus</u>											
<u>Ericameria linearifolia</u>											
<u>Eriogonum fasciculatum</u>		2	R								
<u>Erodium botrys</u>											
<u>Erodium brachycarpum</u>											
<u>Erodium cicutarium</u>		14	20	✓	✓	✓	✓	✓	✓	✓	✓
<u>Eschscholzia</u>											
<u>Filago</u>											
<u>Gilia</u>											
<u>Guillenia</u>											
<u>Gutierrezia californica</u>											
<u>Hemizonia</u>											
<u>Holocarpha</u>											
<u>Hordeum marinum</u>											
<u>Hordeum murinum</u>											
<u>Lasthenia gracilis</u>		+	+	✓							
<u>Layia</u>											
<u>Lepidium dictyotum</u>											
<u>Lepidium nitidum</u>											
<u>Linaranthus</u>											
<u>Lolium multiflorum</u>											
<u>Lomatium</u>											
<u>Lotus wrangelianus</u>		+	+	✓	✓	✓	✓	✓			
<u>Lupinus</u>											
<u>Microseris</u>											
<u>Monolopia lanceolata</u>		1	+	✓	✓	✓					
<u>Nasella</u>											
<u>Pectocarya</u>											
<u>Phacelia cicutaria</u>		+				✓					
<u>Plagiobothrys</u>											
<u>Plantago erecta</u>						✓					
<u>Poa</u>											
<u>Schismus sp</u>		10	30	✓	✓	✓		✓	✓	✓	✓
<u>Senecio vulgaris</u>											
<u>Spergularia</u>											
<u>Trifolium</u>											
<u>Vulpia bromoides</u>											
<u>Myerous</u>		+	1	✓							
<u>Vulpia microstachys</u>		+	+	✓							

Appendix C. List of Species in Carrizo Plain NM from the Classification Analysis Dataset

*denotes non-native species

Acanthomintha obovata
Achillea millefolium
Achnatherum speciosum
Achyrachaena mollis
Agoseris sp.
Agoseris grandiflora
Allenrolfea occidentalis
Allium crispum
Allium fimbriatum
Allium howellii
Allium lacunosum
Allium peninsulare
Ambrosia salsola
Amsinckia eastwoodiae
Amsinckia lycopsoides
Amsinckia menziesii
Amsinckia tessellata
Amsinckia vernicosa
Ancistrocarphus filagineus
Androsace elongata ssp. *acuta*
Anisocoma acaulis
*Anthriscus caucalis**
Apiastrum angustifolium
Arctomecon sp.
Arctostaphylos glauca
Artemisia californica
Artemisia douglasiana
Artemisia dracuncululus
Astragalus sp.
Astragalus didymocarpus
Astragalus lentiginosus
Astragalus macrodon
Astragalus oxyphysus
Athyسانus pusillus
Atriplex sp.
Atriplex canescens
Atriplex cordulata
Atriplex fruticulosa
Atriplex lentiformis
Atriplex polycarpa
*Atriplex rosea**
Atriplex spinifera
Atriplex vallicola
*Avena barbata**
*Avena fatua**
Avena sp.*
Baccharis salicifolia
Bloomeria crocea
Bowlesia incana
*Brassica nigra**
Brickellia nevinii
*Bromus arenarius**
*Bromus diandrus**
*Bromus hordeaceus**
*Bromus rubens**
*Bromus tectorum**
*Bromus trinii**
Calandrinia ciliata
California macrophylla
Calochortus sp.
Calochortus argillosus
Calochortus clavatus
Calochortus splendens
Calochortus venustus
Calyptidium monandrum
Calystegia occidentalis ssp. *occidentalis*
Camissonia boothii ssp. *decorticans*
Camissonia californica
Camissonia campestris
Camissonia contorta
Camissonia intermedia Raven
Camissonia strigulosa
*Capsella bursa-pastoris**
Castilleja affinis
Castilleja attenuata
Castilleja brevistyla
Castilleja densiflora
Castilleja exserta ssp. *exserta*
Castilleja foliolosa
Castilleja lineariloba
Castilleja plagiotoma
Castilleja subinclusa
Caulanthus inflatus
Caulanthus lemmonii
*Centaurea melitensis**
Chaenactis fremontii
Chaenactis glabriuscula
Chaenactis stevioides
Chaenactis xantiana
Chenopodium californicum
Chorizanthe polygonoides var. *polygonoides*
Chorizanthe uniaristata
Chorizanthe xanti var. *xanti*
Clarkia cylindrica
Clarkia purpurea
Clarkia tembloriensis
Clarkia unguiculata
Claytonia exigua
Claytonia parviflora
Claytonia perfoliata
Collinsia bartsiiifolia
Collinsia heterophylla

<i>Collinsia sparsiflora</i>	<i>Eriogonum fasciculatum</i>
<i>Cordylanthus rigidus</i>	<i>Eriogonum gracile</i>
<i>Coreopsis californica</i>	<i>Eriogonum gracillimum</i>
<i>Coreopsis calliopsidea</i>	<i>Eriogonum heermannii</i>
<i>Corethrogyne filaginifolia</i>	<i>Eriogonum maculatum</i>
<i>Crassula connata</i>	<i>Eriogonum nudum</i>
<i>Cressa truxillensis</i>	<i>Eriogonum ordii</i>
<i>Croton setigerus</i>	<i>Eriogonum roseum</i>
<i>Cryptantha circumscissa</i>	<i>Eriogonum temblorense</i>
<i>Cryptantha clokeyi</i>	<i>Eriogonum trichopes</i> var. <i>hooveri</i>
<i>Cryptantha decipiens</i>	<i>Eriogonum viridescens</i>
<i>Cryptantha intermedia</i>	<i>Eriophyllum confertiflorum</i>
<i>Cryptantha muricata</i>	<i>Eriophyllum lanatum</i>
<i>Cryptantha nemaclada</i>	<i>Eriophyllum multicaule</i>
<i>Cryptantha nevadensis</i>	<i>Eriophyllum pringlei</i>
<i>Cryptantha oxygona</i>	<i>Eriophyllum stoechadifolium</i>
<i>Cryptantha pterocarya</i>	<i>Erodium botrys</i> *
<i>Cryptogammic crust</i>	<i>Erodium brachycarpum</i> *
<i>Cuscuta californica</i>	<i>Erodium cicutarium</i> *
<i>Cuscuta salina</i>	<i>Erodium moschatum</i> *
<i>Daucus pusillus</i>	<i>Erysimum capitatum</i>
<i>Deinandra pallida</i>	<i>Eschscholzia californica</i>
<i>Deinandra pentactis</i>	<i>Eschscholzia lemmonii</i> ssp. <i>lemmonii</i>
<i>Delphinium gypsophilum</i>	<i>Eucrypta chrysanthemifolia</i>
<i>Delphinium parryi</i>	<i>Forestiera pubescens</i>
<i>Delphinium recurvatum</i>	<i>Frankenia salina</i>
<i>Delphinium umbraculorum</i>	<i>Galium andrewsii</i>
<i>Deschampsia danthonioides</i>	<i>Galium angustifolium</i>
<i>Descurainia pinnata</i>	<i>Galium aparine</i>
<i>Descurainia sophia</i> *	<i>Galium porrigens</i>
<i>Dichelostemma capitatum</i>	<i>Garrya flavescens</i>
<i>Distichlis spicata</i>	<i>Gilia achilleifolia</i> ssp. <i>achilleifolia</i>
<i>Dodecatheon clevelandii</i>	<i>Gilia australis</i>
<i>Dudleya lanceolata</i>	<i>Gilia austrooccidentalis</i>
<i>Eastwoodia elegans</i>	<i>Gilia capitata</i>
<i>Elymus elymoides</i>	<i>Gilia latiflora</i> ssp. <i>cuyamensis</i>
<i>Elymus glaucus</i>	<i>Gilia malior</i>
<i>Elymus multisetus</i>	<i>Gilia minor</i>
<i>Emmenanthe penduliflora</i>	<i>Gilia tricolor</i>
<i>Ephedra californica</i>	<i>Grayia spinosa</i>
<i>Ephedra nevadensis</i>	<i>Guillenia lasiophylla</i>
<i>Ephedra viridis</i>	<i>Guillenia lemmonii</i>
<i>Epilobium canum</i>	<i>Gutierrezia californica</i>
<i>Eremalche parryi</i>	<i>Helianthus annuus</i>
<i>Eriastrum densifolium</i>	<i>Heliotropium curassavicum</i>
<i>Eriastrum hooveri</i>	<i>Herniaria hirsuta</i> var. <i>cinerea</i> *
<i>Eriastrum pluriflorum</i>	<i>Hesperocnide tenella</i>
<i>Eriastrum wilcoxii</i>	<i>Heterodraba unilateralis</i>
<i>Ericameria ericoides</i>	<i>Hirschfeldia incana</i> *
<i>Ericameria linearifolia</i>	<i>Hollisteria lanata</i>
<i>Ericameria nauseosa</i>	<i>Hordeum brachyantherum</i>
<i>Eriogonum angulosum</i>	<i>Hordeum depressum</i>
<i>Eriogonum baileyi</i>	<i>Hordeum marinum</i> *
<i>Eriogonum cithariforme</i>	<i>Hordeum murinum</i> *
<i>Eriogonum covilleianum</i>	<i>Hutchinsia procumbens</i>
<i>Eriogonum elongatum</i>	<i>Isocoma acradenia</i>

Isomeris arborea
Iva axillaris ssp. *robustior*
Juncus balticus
Juncus bufonius
Juniperus californica
Krascheninnikovia lanata
*Lactuca serriola**
Lagophylla ramosissima
Lastarriaea coriacea
Lasthenia californica
Lasthenia debilis
Lasthenia ferrisiae
Lasthenia gracilis
Lasthenia microglossa
Lasthenia minor
Layia glandulosa
Layia heterotricha
Layia munzii
Layia pentachaeta ssp. *pentachaeta*
Layia platyglossa
Lepidium dictyotum
Lepidium jaredii
Lepidium nitidum
Lepidospartum squamatum
Leptosyne bigelovii
Leymus triticoides
Lichen
Linanthus bicolor
Linanthus bigelovii
Linanthus dichotomus
Linanthus liniflorus
Linanthus parviflorus
Linanthus pygmaeus
Lithophragma cymbalaria
Logfia californica
*Logfia gallica**
Lomatium caruifolium
Lomatium utriculatum
Lonicera sp.
Lonicera subspicata
Lotus humistratus
Lotus salsuginosus
Lotus scoparius
Lotus strigosus
Lotus wrangelianus
Lupinus albifrons
Lupinus bicolor
Lupinus microcarpus
Lupinus nanus
Lupinus succulentus
Lycium andersonii
Madia radiata
Malacothrix sp.
Malacothrix californica
Malacothrix coulteri
Malacothrix floccifera
Malacothrix glabrata
Malva parviflora
Marah fabaceus
*Marrubium vulgare**
Matricaria matricarioides
Matricaria occidentalis
Melica sp.
Melica californica
Melica imperfecta
*Melilotus indicus**
Mentzelia affinis
Mentzelia albicaulis
Mentzelia dispersa
Mentzelia gracilentata
Mentzelia pectinata
Micropus californicus
Microseris campestris
Microseris douglasii
Microseris elegans
Mimulus guttatus
Minuartia californica
Minuartia douglasii
Mirabilis laevis
Monolepis nuttalliana
Monolopia congdonii
Monolopia lanceolata
Monolopia stricta
Moss
Mucronea californica
Mucronea perfoliata
Muhlenbergia rigens
Muilla maritima
Myosurus minimus
Nassella cernua
Navarretia sp.
Navarretia jaredii
Nemophila menziesii
Nemophila pedunculata
Nicotiana quadrivalvis
Onagraceae (species unknown)
Pectocarya linearis ssp. *ferocula*
Pectocarya penicillata
Pectocarya peninsularis
Pectocarya platycarpa
Pectocarya recurvata
Pectocarya setosa
Pellaea andromedifolia
Penstemon centranthifolius
Pentachaeta fragilis
Perideridia pringlei
Phacelia cicutaria var. *hispida*
Phacelia ciliata
Phacelia cryptantha
Phacelia distans
Phacelia douglasii
Phacelia egena

Phacelia fremontii
Phacelia imbricata
Phacelia ramosissima
Phacelia saxicola
Phacelia tanacetifolia
Phlox gracilis
Pholistoma membranaceum
Pholistoma racemosum
Phoradendron densum
Phoradendron juniperinum
Phoradendron villosum
Plagiobothrys acanthocarpus
Plagiobothrys canescens
Plagiobothrys humistratus
Plagiobothrys infectivus
Plagiobothrys leptocladus
Plagiobothrys nothofulvus
Plantago elongata
Plantago erecta
Plantago ovata
Platystemon californicus
Plectritis brachystemon
*Poa bulbosa**
Poa secunda
*Polypogon monspeliensis**
Populus fremontii
Prunus fasciculata
Psilocarphus brevissimus var. *brevissimus*
Psilocarphus oregonus
Psilocarphus tenellus
*Pseudognaphalium luteoalbum**
Pterostegia drymarioides
Quercus xalvordiana
Quercus douglasii
Quercus john-tuckeri
Rafinesquia californica
Rhamnus crocea
Rhamnus ilicifolia
Ribes quercetorum
*Rumex crispus**
Rumex hymenosepalus
Salix exigua
Salix laevigata
*Salsola tragus**
Salvia carduacea
Salvia columbariae
Salvia leucophylla
Salvia mellifera
Sambucus mexicana
Sanicula bipinnatifida
Schismus sp.*
Senecio aphanactis
Senecio breweri
Senecio flaccidus
*Senecio vulgaris**
*Sisymbrium altissimum**
*Sisymbrium irio**
*Sisymbrium orientale**
Solanum umbelliferum
*Sonchus asper**
*Sonchus oleraceus**
Spergularia marina
Stachys albens
Stanleya pinnata
Stellaria sp.
Stellaria nitens
Stephanomeria exigua
Stephanomeria lactucina
Stephanomeria pauciflora
Stylocline gnaphalioides
Stylomecon heterophylla
Suaeda moquinii
Symphoricarpos albus
Thysanocarpus curvipes
Thysanocarpus laciniatus
*Torilis arvensis**
Tragopogon sp.*
Trichostema lanceolatum
Trifolium albopurpureum
Trifolium bifidum
Trifolium depauperatum
Trifolium gracilentum
Trifolium willdenovii
Tropidocarpum gracile
Typha sp.
Uropappus lindleyi
*Vulpia bromoides**
Vulpia microstachys
*Vulpia myuros**
Yabea microcarpa
Yucca whipplei

Appendix D. Non-native species identified in the study area. Moderate and high ranked species are highlighted in grey.

Non-Native Species	Cal-IPC Ranking
<i>Anthriscus caucalis</i>	Not listed
<i>Atriplex rosea</i>	Not listed
<i>Avena barbata</i>	Moderate
<i>Avena fatua</i>	Moderate
<i>Brassica nigra</i>	Moderate
<i>Bromus arenarius</i>	Not listed
<i>Bromus diandrus</i>	Moderate
<i>Bromus hordeaceus</i>	Limited
<i>Bromus rubens</i>	High
<i>Bromus tectorum</i>	High
<i>Bromus trinii</i>	Not listed
<i>Capsella bursa-pastoris</i>	Not listed
<i>Centaurea melitensis</i>	Moderate
<i>Descurainia sophia</i>	Limited
<i>Erodium botrys</i>	Evaluated but not listed
<i>Erodium brachycarpum</i>	Evaluated but not listed
<i>Erodium cicutarium</i>	Limited
<i>Erodium moschatum</i>	Evaluated but not listed
<i>Herniaria hirsuta</i> var. <i>cinerea</i>	Not listed
<i>Hirschfeldia incana</i>	Moderate
<i>Hordeum marinum</i>	Moderate
<i>Hordeum murinum</i>	Moderate
<i>Lactuca serriola</i>	Evaluated but not listed
<i>Logfia gallica</i>	Not listed
<i>Marrubium vulgare</i>	Limited
<i>Melilotus indicus</i>	Evaluated but not listed
<i>Poa bulbosa</i>	Evaluated but not listed
<i>Polypogon monspeliensis</i>	Limited
<i>Pseudognaphalium luteoalbum</i>	Not listed
<i>Rumex crispus</i>	Limited
<i>Salsola tragus</i>	Limited
<i>Schismus arabicus</i> , <i>S. barbatus</i>	Limited
<i>Senecio vulgaris</i>	Not listed
<i>Sisymbrium altissimum</i>	Not listed
<i>Sisymbrium irio</i>	Moderate
<i>Sisymbrium orientale</i>	Not listed
<i>Sonchus asper</i>	Evaluated but not listed
<i>Sonchus oleraceus</i>	Not listed
<i>Torilis arvensis</i>	Moderate
<i>Trapogon</i> sp.	Evaluated but not listed
<i>Vulpia bromoides</i>	Evaluated but not listed
<i>Vulpia myuros</i>	Moderate



Ericameria linearifolia - *Isomeris arborea*
Shrubland Alliance



Monolopia (lanceolata)-*Coreopsis (calliopsidea)*
Herbaceous Alliance



Isocoma acradenia Shrubland Alliance



Salvia carduacea Herbaceous Alliance



Corethrogyne filaginifolia Herbaceous Alliance



Atriplex vallicola–*Lasthenia ferrisiae*–*Lepidium jaredii*
Herbaceous Association



Eriogonum (elongatum, nudum) Herbaceous Alliance

Appendix F. Draft key to floristic vegetation types in the Carrizo Plain

The following key was created to distinguish the mapped and classified vegetation types in the Carrizo Plain National Monument. This key was used to attribute each photo-interpreted polygon within the map. It was written specifically for the Carrizo Plain National Monument based on data collected or observed here; it may not apply to other areas without revision from local area data. For example, cover of California juniper, considered a tree in the National Vegetation Classification Hierarchy, may be as low as 5% and the stand will still be considered a tree type.

Due to the diversity of vegetation in the mapping area, and to avoid an excessively long document, a series of paired statements (or couplets) was not developed for each option. Instead, sets of characteristics with choices beneath them are provided. Also, to make this key shorter and more easily applied in the field, it is somewhat artificial in not following the exact hierarchy (i.e., one does not have to key down through all levels of the hierarchy to get to the Association). The key will first lead the user to general options, and the individual selections for the finest-level vegetation types 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. Some broader level types (i.e., Macro Group, Group) that were used to attribute difficult polygons are also included.

All 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. This coding system in the 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 preliminary key will direct you to the major groupings, such as forest/woodland, shrubland, and herbaceous, with the more specific choices beneath them. The more specific lists within these are generally based on presence/absence or dominance/sub-dominance of 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.*

Also, alliances that occur in the Chimineas Ranch or other adjacent DFG lands but were not sampled in the Carrizo Plain National Monument are included in the key and are marked with an asterisk(*).

Terms and Concepts Used Throughout the Key

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 Douglas-fir"), 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.

Key to vegetation types in the Carrizo Plain National Monument

Class A. Vegetation characterized by an even distribution of overstory trees. Shrub or herbaceous species may total higher cover than trees. The tree canopy may have as low as 5% cover (i.e. in the *Juniperus californica* and *Quercus douglasii* Alliances) when shrubs are not significant = **Tree-Overstory (Woodland / Forest Vegetation)**

Class B. Vegetation characterized by an even distribution of woody shrubs in the canopy. Herbaceous species may total higher cover than shrubs. The shrub canopy may have less than 10% total cover, especially in areas of saline or alkaline soils, along washes, or in desert-transition areas (e.g., *Allenrolfea occidentalis*, *Atriplex* spp., *Eastwoodia elegans*, *Ephedra californica*, *Ericameria nauseosa*, *Gutierrezia californica*, *Lepidospartum squamatum*, *Lycium andersonii*, *Suaeda moquinii*) = **Shrubland Vegetation**

Class C. Vegetation characterized by non-woody, herbaceous species in the canopy including grasses, graminoids, and broad-leaved herbaceous species. Shrubs, if present, usually comprise <6% of the vegetation. Trees, if present, generally have <6% cover = **Herbaceous Vegetation**

Class D. Non-vegetated or urbanized types with <2% total vegetation cover = **Unvegetated or Urbanized**

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

Woodlands and forests characterized by needle or scale-leaved conifer trees and/or broad-leaved evergreen and deciduous tree species. The trees may only occur intermittently in the overstory and may be associated with shrubs.

I.A. Stands are dominated or characterized by riparian winter deciduous trees or tall shrubs, including *Populus fremontii* and/or a species of *Salix*...

I.A.1. *Populus fremontii* is dominant or co-dominant with >5% absolute cover in the tree canopy. Stands occur along streams, springs, and valleys with a subsurface water supply ...

***Populus fremontii* Forest Alliance (1211)**

I.A.1.a. *P. fremontii* is dominant in the overstory with *Salix exigua* in the shrub layer and a variable mix of grasses and forbs ...

***Populus fremontii/Salix exigua* Association (1211)**

I.A.1.b. *P. fremontii* is dominant in the overstory, and the understory has a variable mix of grasses and forbs ...

***Populus fremontii* Association (1211)**

I.A.2. *Salix laevigata* dominates with >50% relative cover in the tree canopy, or >30% relative cover when *S. lasiolepis* is present in the sub-canopy...

***Salix laevigata* Woodland Alliance (4113)
(no association defined)**

I.B. The tree overstory is characterized by a species of *Quercus* that is evenly distributed with >5% cover. The oak may be the sole dominant tree or share dominance with *Juniperus californica*...

I.B.1. *Quercus agrifolia* dominates the tree canopy and is an uncommon type that tends to grow on soils with high organic matter. A variety of shrubs such as *Adenostoma fasciculatum*, *Arctostaphylos glauca*, *Ericameria linearifolia*, *Eriogonum fasciculatum* and *Rhamnus ilicifolia* may be present in the understory...

***Quercus agrifolia* Woodland Alliance* (1111)**

I.B.2. *Quercus douglasii* is the dominant oak species in an open to intermittent tree canopy. *Juniperus californica* may be present as a sub- to co-dominant tree...

***Quercus douglasii* Woodland Alliance (1131)**

I.B.2.a. *Juniperus californica* is a sub- to co-dominant tree with *Quercus douglasii*, while *Cercocarpus montanus* is present and dominant or co-dominant in the shrub understory...

***Quercus douglasii*–*Juniperus californica*/*Ceanothus montanus* Woodland Association* (1131)**

I.B.2.b. *Juniperus californica* is a sub- to co-dominant tree with *Quercus douglasii*, while *Ericameria linearifolia* is generally present and dominant or co-dominant in the shrub understory...

***Quercus douglasii*–*Juniperus californica*/*Ericameria linearifolia* Woodland Association (1131)**

I.B.2.c. *Ericameria linearifolia* is present in the shrub understory and may mix with other shrubs such as *Arctostaphylos glauca*, *Adenostoma fasciculatum*, *Artemisia californica*, *Eriogonum fasciculatum*, *Rhamnus ilicifolia*, and *Salvia leucophylla*. *Poa secunda* is generally present in this association within the study area, and *Juniperus californica* is absent or low in cover (<1% absolute cover) ...

***Quercus douglasii*/*Ericameria linearifolia* Woodland Association* (1131)**

I.B.2.d. Annual grasses and forbs dominate the understory and shrubs have no or low (<2%) absolute cover. The most common herb species are non-natives *Bromus diandrus*, *B. hordeaceus*, *B. rubens*, and *Erodium cicutarium*. Native grasses *Nassella cernua* and *Poa secunda* are often present...

***Quercus douglasii*/Herbaceous Woodland Association* (1131)**

I.C. *Quercus john-tuckeri* is the dominant oak or it intermixes as a low tree with similar or higher cover than *Juniperus californica*. A variety of shrubs such as *Ceanothus cuneatus*, *Ericameria linearifolia*, *Eriogonum fasciculatum* and *Salvia leucophylla* may be present in the shrub understory ...

***Quercus john-tuckeri* Shrubland Alliance (2111)**

I.C.1. *Juniperus californica* occurs in the tree canopy and is similar or lower in cover to *Quercus john-tuckeri*. *Ericameria linearifolia* often intermixes in the shrub layer, and a variety of other sub-dominant shrubs such as *Eriogonum fasciculatum* and *Salvia leucophylla* can also occur...

***Quercus john-tuckeri*–*Ericameria linearifolia*/*Juniperus californica* Shrubland Association (2111)**

I.C.2. *Quercus john-tuckeri* is the sole dominant in the low tree or tall shrub canopy. Other plants may be present at relatively low cover including *Adenostoma fasciculatum*, *Ceanothus cuneatus* and *Salvia leucophylla*...

***Quercus john-tuckeri* Shrubland Association (2111)**

I.D. The tree canopy is characterized by an even distribution of *Juniperus californica* with >4% absolute cover. *Quercus douglasii* is typically absent in the overstory and soils tend to be shallow and sandy or silty...

***Juniperus californica* Woodland Alliance (1121)**

I.D.1. *Salvia leucophylla* is present in the shrub understory and other shrubs such as *Eriogonum fasciculatum* may be sub- to co-dominant. If *Ericameria linearifolia* present, it is much lower cover in cover than the *S. leucophylla*...

***Juniperus californica/Salvia leucophylla* Woodland Association (1121)**

I.D.2. *Ericameria linearifolia* is present in the shrub understory and other shrubs such as *Eriogonum fasciculatum* or *Ephedra viridis* may be present and co-dominant with *E. linearifolia*. If *Salvia leucophylla* is present, it is much lower in cover than *E. linearifolia*. Various herbs are present in the understory...

***Juniperus californica/Ericameria linearifolia*/Herbaceous Woodland Association (1121)**

I.D.3. Annual grasses and forbs dominate the understory and shrubs have low cover (<2% absolute cover)...

***Juniperus californica*/Herbaceous Woodland Association (1121)**

Class B. Shrubland Vegetation

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

I.A. *Prunus fasciculata* is the dominant shrub in the canopy, often occurring in riparian areas and steep moist slopes. *Ribes quercetorum* and *Juniperus californicus* may be present and low in cover ...

***Prunus fasciculata* Shrubland Association
Prunus fasciculata Shrubland Alliance (4215)**

I.B. *Ribes quercetorum* is the dominant shrub in the canopy, often growing clonally in stands on steep north-facing slopes, which have resprouted recently after fire...

***Ribes quercetorum* Shrubland Association
In the *Ribes quercetorum* Shrubland Alliance (2611)**

I.C. *Quercus berberidifolia* is dominant to co-dominant in the shrub canopy. Stands are small, rare and likely found on north-facing slopes with well- to extensively-drained soils...

***Quercus berberidifolia*–*Ceanothus cuneatus*
in the *Quercus berberidifolia* Shrubland Alliance* (2211)**

I.D. *Quercus john-tuckeri* is dominant or it intermixes with similar or higher cover than *Juniperus californica*. A variety of other shrubs such as *Ceanothus cuneatus*, *Ericameria linearifolia*, *Eriogonum fasciculatum* and *Salvia leucophylla* may be present. Stands are found primarily on north-facing slopes with well- to extensively-drained soils...

***Quercus john-tuckeri* Shrubland Alliance (2111)**

I.D.1. *Juniperus californica* occurs in the tree canopy and is similar or lower in cover to *Quercus john-tuckeri*. *Ericameria linearifolia* often intermixes in the shrub layer, and a variety of other sub-dominant shrubs such as *Eriogonum fasciculatum* and *Salvia leucophylla* can also occur...

***Quercus john-tuckeri*–*Ericameria linearifolia*/*Juniperus californica* Shrubland
Association (2111)**

I.D.2. *Quercus john-tuckeri* is the sole dominant shrub in the shrub canopy. Other shrubs may be present at relatively low cover including *Adenostoma fasciculatum*, *Ceanothus cuneatus* and *Salvia leucophylla*...

***Quercus john-tuckeri* Shrubland Association (2111)**

I.E. *Ceanothus cuneatus* is dominant or shares dominance with *Adenostoma fasciculatum* or other shrubs (e.g. *Artemisia californica*, *Malacothamnus* sp.) in the canopy. Soils are often sandy and well-drained...

***Ceanothus cuneatus* Shrubland Alliance* (2227)**

I.E.1. *Adenostoma fasciculatum* co-dominates in the shrub canopy, sometimes having twice as much cover as *Ceanothus cuneatus*...

***Adenostoma fasciculatum–Ceanothus cuneatus* Shrubland Association* (2227)**

I.F. *Arctostaphylos glauca* is dominant or shares dominance with *Adenostoma fasciculatum* in the shrub canopy...

***Arctostaphylos glauca* Shrubland Alliance (2231)**

I.F.1. *A. glauca* is the sole dominant in the shrub canopy, and other shrubs if present are low in cover...

***Arctostaphylos glauca* Shrubland Association (2231)**

I.F.2. *Quercus john-tuckeri* is sub- to co-dominant in the shrub canopy...

***Arctostaphylos glauca–Quercus john-tuckeri* Provisional Shrubland Association (2231)**

I.F.3. *Adenostoma fasciculatum* co-dominates in the shrub canopy, sometimes having twice as much cover as *Arctostaphylos glauca*...

***Adenostoma fasciculatum–Arctostaphylos glauca* Shrubland Association* (2231)**

I.G. *Cercocarpus betuloides* (= *C. montanus*) intermixes as a co-dominant to dominant shrub with other chaparral species. Stands occur in mesic scrub settings on north-facing, protected slopes and are rare in the region...

***Cercocarpus montanus* Shrubland Alliance* (2212)**

I.H. *Salvia mellifera* shares dominance with *Adenostoma fasciculatum* in the shrub canopy, with *A. fasciculatum* sometimes having twice as much cover as *S. mellifera*. Found on slopes of all aspects, but especially those with south-facing exposure...

***Adenostoma fasciculatum–Salvia mellifera* Shrubland Association* in the
Adenostoma fasciculatum–Salvia mellifera Shrubland Alliance* (2226)**

I.I. *Adenostoma fasciculatum* dominates the shrub canopy with >50% relative cover...

***Adenostoma fasciculatum* Shrubland Alliance* (2223)**

I.I.1. *Adenostoma fasciculatum* is the sole dominant shrub, and generally has greater than 20% absolute cover in the region. A variety of shrubs can occur as sub-dominants with sparse or low cover, including *Arctostaphylos glauca*, *Ceanothus cuneatus*, *Eriogonum fasciculatum*, *Salvia leucophylla*, *Hesperoyucca whipplei*, and others...

***Adenostoma fasciculatum* Shrubland Association* (2223)**

I.J. *Adenostoma sparsifolium* is dominant or co-dominant in the shrub layer with other chaparral or coastal scrub species. Scattered, uncommon stands occur in the DFG Gifford unit and possibly other areas in the southwest portion of the Chimineas Ranch...

***Adenostoma sparsifolium* Shrubland Alliance[†] (2112)**

[†]From observations in surrounding area, no survey data from the project

I.K. *Eriodictyon crassifolium* is dominant in an open shrub canopy. This uncommon type often occurs in chaparral stands that have had recent fire or similar disturbance.

***Eriodictyon crassifolium* Provisional Shrubland Alliance[†] (2228)**

[†]From observations in surrounding area, no survey data from the project

Group II. Shrublands dominated by scale-like, microphyllous, or broad-leaved species, including drought-deciduous and cold-deciduous species. These are generally considered to be part of desert transition, riparian, coastal sage scrub or other more soft-leaved shrub habitats. Includes *Allenrolfea*, *Artemisia californica*, *Atriplex*, *Baccharis*, *Ephedra*, *Ericameria*, *Pluchea*, *Salix*, *Salvia*, and others.

II.A. Shrublands characterized by species that can tolerate saline or alkaline soils, but are not necessarily restricted to these conditions. Includes *Allenrolfea*, *Atriplex*, *Frankenia*, and *Suaeda*...

II.A.1. *Allenrolfea occidentalis* dominates with >2% absolute cover on seasonally saturated soils, and other alkaline-tolerant shrubs such as *Atriplex spinifera* may be present at low cover. *Lasthenia (gracilis)* is sub-dominant to dominant with *Bromus rubens*, *Delphinium recurvatum*, *L. ferrisiae*, and others in the herb layer ...

***Allenrolfea occidentalis*/Lasthenia (*gracilis*) Shrubland Association
In the *Allenrolfea occidentalis* Shrubland Alliance (4311)**

II.A.2. *Suaeda moquinii* dominates the shrub canopy with >2% absolute cover. *Lepidium dictyotum*, *Atriplex* spp., *Frankenia salina*, *Hordeum murinum*, *Descurainia sophia*, and other alkaline-tolerant species may be present...

***Suaeda moquinii*/Lepidium dictyotum Provisional Shrubland Association
in the *Suaeda moquinii* Shrubland Alliance (4314)**

II.A.3. *Frankenia salina* dominates as a sub-shrub or herb with >4% absolute cover, though non-native herbs may be high in cover during some years...

**(no association defined)
Frankenia salina Herbaceous Alliance (4317)**

II.A.4. A species of *Atriplex* is dominant or co-dominant in the shrub canopy with >50% relative cover and >2% absolute cover. Other shrubs such as *Eastwoodiae elegans*, *Ericameria linearifolia*, or *Eriogonum fasciculatum* may be present at lower cover...

II.A.4.a. *Atriplex spinifera* dominates the shrub canopy. The herb layer has open to intermittent cover including *Bromus rubens*, *Erodium cicutarium* and *Lasthenia (gracilis)*...

***Atriplex spinifera*/Herbaceous Shrubland Association
in the *Atriplex spinifera* Shrubland Alliance (4312)**

II.A.4.b. *Atriplex canescens* dominates the shrub canopy. Herbs such as *Erodium cicutarium*, *Malacothrix coulteri*, *Monolopia lanceolata*, *Phacelia* and *Schismus* are present and may be higher in cover than the shrub layer...

***Atriplex canescens*/Herbaceous Provisional Shrubland Association
In the *Atriplex canescens* Shrubland Alliance (2413)**

II.A.4.c. *Atriplex polycarpa* dominates the shrub canopy. Herbs such as *Amsinckia tessellata*, *Bromus rubens*, *Eremalche parryi*, *Erodium cicutarium*, *Lotus wrangelianus*, and *Monolopia lanceolata* are present and can be higher in cover than the shrub layer...

***Atriplex polycarpa*/Annual Herbaceous Shrubland Association
in the *Atriplex polycarpa* Shrubland Alliance (2411)**

II.A.5. Shrublands in alkaline basins and high marshes with dominant plants or mixture of plants not like above...

Southwestern North American Salt Basin and High Marsh Group (4300)

II.B. Shrublands characterized by species that grow in seasonally or intermittently flooded habitats on alluvial soils. Stands often occur along riparian and stream corridors, lake margins, permanent springs, marshes, or washes. Includes *Baccharis salicifolia*, *Lepidospartum*, *Pluchea*, *Salix* and others...

II.B.1. *Lepidospartum squamatum* characterizes an open shrub canopy along alluvial streams, washes, or fans, and may have as little as 2% absolute cover. Other shrubs such as *Artemisia californica* or *Ericameria nauseosa* may intermix as co-dominants ...

***Lepidospartum squamatum* Shrubland Alliance (4213)**

II.B.1.a. *Artemisia californica* is sub-dominant to co-dominant in the shrub canopy...

***Lepidospartum squamatum*–*Artemisia californica* Shrubland Association* (4213)**

II.B.1.b. Other shrubs if present occur at low cover, and a variety of herbs are present in the understory ...

***Lepidospartum squamatum*/Mixed ephemeral annuals Shrubland Association (4213)**

II.B.2. *Salix exigua* is dominant or co-dominant in the shrub canopy with >50% relative cover or >30% relative cover when *S. lasiolepis* is present...

***Salix exigua* Shrubland Alliance[†] (4112)**

[†]From observations in surrounding area, no survey data from the project

II.B.3. *Salix lasiolepis* is dominant in the shrub or tree canopy, typically with >50% relative cover...

***Salix lasiolepis* Shrubland Alliance[†] (4114)**

[†]From observations in surrounding area, no survey data from this project

II.B.4. *Pluchea sericea* is present in the canopy with >2% absolute cover and no other shrub species have equal or greater cover. Stands occur around springs, seeps, irrigation ditches, canyon bottoms, streamsides, and seasonally flooded washes. May include *Baccharis salicifolia*, *Atriplex*, *Ericameria nauseosa*, and others...

***Pluchea sericea* Shrubland Alliance* (4221)**

II.B.5. *Baccharis salicifolia* is dominant or co-dominant in the shrub canopy usually with >3% cover. Stands occur along canyon bottoms, floodplains, irrigation ditches, lake margins, or stream channels and they may include a variety of other shrub species...

***Baccharis salicifolia* Shrubland Alliance* (4111)**

II.B.5.a. Other shrubs if present are low cover, and annual herbs including *Bromus rubens*, *Melilotus indicus*, and *Erodium* spp. are usually present and may be abundant in the understory...

***Baccharis salicifolia* Shrubland Association* (4111)**

II.B.5.b. *Pluchea sericea* is sub- to co-dominant in the shrub canopy (usually with lower cover than *Baccharis salicifolia*)...

***Baccharis salicifolia*–*Pluchea sericea* Shrubland Association* (4111)**

II.B.6. Stands not as above and characterized by any combination of *Salix exigua*, *Salix lasiolepis*, and *Baccharis salicifolia*. *Populus fremontii* and other *Salix* species may intermix No clear dominance or co-dominance by any of these species. ...

Southwestern North American Riparian, Flooded and Swamp Forest Macrogroup (4110)

II.B.7. *Ambrosia salsola* (= *Hymenoclea salsola*) characterizes an open to intermittent shrub canopy on sandy alluvial soils with >4% absolute cover. Other shrubs, such as *Eriogonum fasciculatum* and *Ericameria linearifolia*, may be present at lower cover in the canopy...

***Ambrosia salsola* Shrubland Association
Ambrosia salsola Shrubland Alliance (2416)**

II.B.8. *Ericameria nauseosa* has >50% relative cover in the shrub canopy and grows on well-drained soils in washes, stream terraces or slopes. The shrub layer may include *Atriplex canescens*, *Ephedra californica*, *Ericameria linearifolia*, *Gutierrezia californica*, *Hymenoclea salsola* and others, which are typically low in cover...

***Ericameria nauseosa* Shrubland Association
Ericameria nauseosa Shrubland Alliance (2511)**

II.B.9. *Forestiera pubescens* has >50% relative cover in the shrub canopy and grows in steep ravines and washes...

***Forestiera pubescens* Provisional Shrubland Association
Forestiera pubescens Shrubland Alliance (4114)**

II.C. Shrublands not as above and characterized by desert or desert-transition shrubs. Includes *Ambrosia*, *Eastwoodia*, *Ephedra*, *Ericameria*, *Isomeris*, *Krascheninnikovia* and *Lycium*...

II.C.1. *Ephedra californica* has >2% absolute cover in an open shrub canopy on low elevation uplands and washes, with sandy soils. Other shrubs may be sub- to co-dominant, such as *Ambrosia salsola* and *Gutierrezia californica*...

***Ephedra californica* Shrubland Alliance (4211)**

II.C.1.a. Stands occur in uplands where other shrubs are not present or low in cover. The herb layer is open to dense and may include *Amsinckia tessellata*, *Bromus rubens*, *Poa secunda*, *Uropappus lindleyi*, and others ...

***Ephedra californica*/Annual-perennial herb Shrubland Association (4211)**

II.C.1.b. Stands occur in washes where *Ambrosia salsola* is typically present as a sub- to co-dominant. The herb layer is variable...

***Ephedra californica*–*Ambrosia salsola* Shrubland Association (4211)**

II.C.2. *Ephedra californica* occurs at >2% cover and usually co-dominates with *Eriogonum fasciculatum* in the shrub canopy. Often found on southern exposures with herbs such as *Amsinckia tessellata*, *Erodium cicutarium*, *Schismus* and others...

***Eriogonum fasciculatum*–*Ephedra californica* Provisional Shrubland Association of the
Eriogonum fasciculatum Shrubland Alliance (2317)**

II.C.3. *Ambrosia salsola* (= *Hymenoclea salsola*) characterizes an open to intermittent shrub canopy on sandy alluvial soils with >4% absolute cover. Other shrubs, such as *Eriogonum fasciculatum* and *Ericameria linearifolia*, may be present at lower cover in the canopy...

***Ambrosia salsola* Shrubland Association
Ambrosia salsola Shrubland Alliance (2416)**

II.C.4. *Lycium andersonii* has >50% relative cover in the shrub canopy and grows on low elevation uplands or near washes. The shrub layer may include *Ephedra californica*, *Eriogonum fasciculatum*, *Gutierrezia californica*, *Krascheninnikovia lanata*, and others...

***Lycium andersonii* Shrubland Association of the
Lycium andersonii Shrubland Alliance (2522)**

II.C.6. *Artemisia tridentata* is dominant or co-dominant on sandy alluvial soils in the lower Cuyama River drainage. Stands tend to be small and scattered in the mapping area...

***Artemisia tridentata* Shrubland Alliance[†] (2711)**

[†]From observations in surrounding area, no survey data from this project

II.C.7. *Ericameria linearifolia*, *Isomeris arborea*, and/or *Eastwoodiae elegans* is dominant to co-dominant in the shrub canopy. The shrub layer may also include *Gutierrezia californica*, *Ephedra californica*, *Eriophyllum confertiflorum*, *Eriogonum fasciculatum* and others. The herb layer can be well-developed, and *Poa secunda* is characteristically present...

***Ericameria linearifolia*–*Isomeris arborea* Shrubland Alliance (2335)**

II.C.7.a. *Ericameria linearifolia* is primarily dominant in the shrub overstory...

***Ericameria linearifolia* Shrubland Association (2335)**

II.C.7.b. *Isomeris arborea* is primarily dominant or shares dominance with *Ericameria linearifolia* in the shrub canopy...

***Isomeris arborea* Shrubland Association (2335)**

II.C.7.c. *Eastwoodia elegans* is dominant or shares dominance with *Ericameria linearifolia*...

***Eastwoodia elegans* Association (2335)**

II.C.7.d. *Krascheninnikovia lanata* and/or *Eriogonum fasciculatum* are sub- to co-dominant in the shrub canopy with *Eastwoodia elegans*...

***Eastwoodia elegans*–*Krascheninnikovia lanata* Shrubland Association (2335)**

II.C.8. *Krascheninnikovia lanata* is dominant in the shrub canopy. Other shrub species may include *Eastwoodia elegans*, *Ephedra californica*, *Gutierrezia californica*, and *Eriogonum fasciculatum*...

***Krascheninnikovia lanata* Shrubland Association of the
Krascheninnikovia lanata Shrubland Alliance (2521)**

II.C.9. *Ericameria nauseosa* has >50% relative cover in the shrub canopy and grows on well-drained soils in washes, stream terraces or slopes. The shrub layer may include *Atriplex canescens*, *Ephedra californica*, *Ericameria linearifolia*, *Gutierrezia californica*, *Hymenoclea salsola* and others, which are typically low in cover...

***Ericameria nauseosa* Shrubland Association
Ericameria nauseosa Shrubland Alliance (2511)**

II.C.10. *Ephedra viridis* is dominant or sometimes can be co-dominant with *Ericameria linearifolia* or *Eriogonum fasciculatum*. The shrub layer may also include *Isomeris arborea* and others, and the herb understory is well-developed with *Poa secunda* characteristically present...

***Ephedra viridis*–*Ericameria linearifolia*/*Monolopia lanceolata* Provisional Shrubland
Association of the *Ephedra viridis* Shrubland Alliance (2525)**

II.D. Shrublands characterized by coastal sage shrub species. Includes *Artemisia californica*, *Eriogonum fasciculatum*, *Salvia* spp., and *Lupinus albifrons*...

II.D.1. *Gutierrezia californica* dominates an open shrub canopy, and other shrubs may occur at low cover. The herb layer is usually well-developed, including natives such as *Poa secunda* and non-natives such as *Bromus* and *Erodium* species...

***Gutierrezia californica*/*Poa secunda* Association of the
Gutierrezia californica Shrubland Alliance (2321)**

II.D.2. *Lupinus albifrons* dominates in the shrub canopy and grows on slopes that may be disturbed, steep, and unstable. A variety of coastal sage shrubs may be present, including *Ericameria linearifolia*, *Eriogonum fasciculatum*, and others...

***Lupinus albifrons* Shrubland Association of the
Lupinus albifrons Shrubland Alliance (2324)**

II.D.3. *Salvia leucophylla* is dominant or shares dominance with *Artemisia californica*, *Eriogonum fasciculatum*, and/or *Ericameria linearifolia*...

***Salvia leucophylla* Shrubland Alliance (2325)**

II.D.3.a. *Salvia leucophylla* is the sole dominant (>60% relative cover) in the shrub canopy...

***Salvia leucophylla* Shrubland Association (2325)**

II.D.3.b. *Artemisia californica* is co-dominant with *Salvia leucophylla*, and *Eriogonum fasciculatum* and *Hesperoyucca whipplei* are often present...

***Salvia leucophylla*–*Artemisia californica* Shrubland Association (2325)**

II.D.3.c. *Eriogonum fasciculatum* is sub- to co-dominant with *Salvia leucophylla* and the two species characterize the shrub canopy. Sometimes other shrubs such as short-lived *Malacothamnus* can be present and co-dominant...

***Salvia leucophylla–Eriogonum fasciculatum* Shrubland Association (2325)**

II.D.4. *Salvia mellifera* is dominant or shares dominance with *Eriogonum fasciculatum* in the shrub overstory. Typically occurs on steep slopes...

***Salvia mellifera* Shrubland Alliance (2328)**

II.D.4.a. *Eriogonum fasciculatum* is sub- to co-dominant with *Salvia mellifera* and *Bromus rubens* is typically present in the understory...

***Salvia mellifera–Eriogonum fasciculatum/Bromus rubens*
Shrubland Association (2328)**

II.D.5. *Artemisia californica* and *Eriogonum fasciculatum* are co-dominant in the shrub canopy, with both having >30% relative cover. Stands tend to occur on relatively hot and steep slopes. The shrub layer may include *Hesperoyucca whipplei*, *Salvia leucophylla*, *Malacothamnus* spp or other shrubs....

***Artemisia californica–Eriogonum fasciculatum* Shrubland Association
in the *Artemisia californica–Eriogonum fasciculatum* Shrubland Alliance (2314)**

II.D.6. *Artemisia californica* dominates (with >60% relative cover) in the shrub canopy while other shrubs have sparse or low cover. Often found on relatively steep slopes...

***Artemisia californica* Shrubland Association
in the *Artemisia californica* Shrubland Alliance (2312)**

II.D.7. *Eriogonum fasciculatum* is dominant or shares dominance with *Hesperoyucca whipplei* in the shrub canopy. Soils are usually sandy and well-drained...

***Eriogonum fasciculatum* Shrubland Alliance (2317)**

II.D.7.a. *Eriogonum fasciculatum* is the dominant in the shrub layer, and other shrub species have sparse or low cover...

***Eriogonum fasciculatum* Shrubland Association (2317)**

II.D.7.b. *Hesperoyucca whipplei* occurs at >2% cover and usually co-dominates with *Eriogonum fasciculatum* in the shrub canopy. Sometimes *E. fasciculatum* is low in cover and *H. whipplei* has a much higher relative cover. Often found on southern exposures with native herbs such as *Amsinckia tessellata*, *Dichelostemma capitatum*, *Salvia columbariae*, *Uropappus lindleyi*, *Plantago erecta*, and others...

***Eriogonum fasciculatum–Hesperoyucca whipplei* Shrubland Association (2317)**

II.D.7.c. *Ephedra californica* occurs at >2% cover and usually co-dominates with *Eriogonum fasciculatum* in the shrub canopy. Often found on southern exposures with herbs such as *Amsinckia tessellata*, *Erodium cicutarium*, *Schismus* and others...

***Eriogonum fasciculatum–Ephedra californica* Shrubland Association (2317)**

II.D.8. *Ericameria linearifolia*, *Isomeris arborea*, and/or *Eastwoodiae elegans* is dominant to co-dominant in the shrub canopy. The shrub layer may also include *Gutierrezia californica*, *Ephedra californica*, *Eriophyllum confertiflorum*, *Eriogonum fasciculatum* and others. The herb layer can be well-developed, and *Poa secunda* is characteristically present...

***Ericameria linearifolia–Isomeris arborea* Shrubland Alliance (2335)
(See above for key step II.C.7. for associations in this alliance)**

Class C. Herbaceous Vegetation

Vegetation characterized by non-woody, herbaceous species in the canopy including grass, graminoid, and broad-leaved herbaceous species. Woody species may be emergent, typically with <5% cover.

I.A. Vegetation is characterized mainly by wetland graminoid, playa or vernal pool species, including graminoids such as *Distichlis*, *Juncus*, *Eleocharis*, *Schoenoplectus*, and forbs such as *Atriplex*, *Lasthenia*, and *Lepidium*.

I.A.1. *Eleocharis macrostachya* is dominant or co-dominant along lakeshores, streambeds, swales, pastures, ditches, and ponds. *Juncus arcticus* (var. *mexicanus* or *balticus*), *Polypogon monspeliensis*, *Rumex crispus*, *Distichlis spicata*, and a variety of other wetland herbs may be present...

***Eleocharis macrostachya* Herbaceous Alliance* (6312)**

I.A.1.a. *E. macrostachya* is strongly dominant (>66% average cover) in freshwater ponds, reservoir margins, and streamsides...

***Eleocharis macrostachya* Association* (6312)**

I.A.2. *Juncus arcticus* var. *balticus* is dominant or co-dominant along edges of streams, lakes, and ponds. A variety of wetland graminoids or forbs intermix in the herbaceous layer, and *Rorippa nasturtium-aquaticum* and *Polypogon monspeliensis* may have similar or higher cover than *Juncus arcticus*. ...

***Juncus arcticus* (var. *balticus*, *mexicanus*) Herbaceous Alliance (6211)**

I.A.2.a. *Juncus arcticus* var. *balticus* is typically dominant in the herb layer...

***Juncus arcticus* var. *balticus* Association (6211)**

I.A.3. *Schoenoplectus pungens* dominates with *Schoenoplectus americanus* along streams, around ponds and lakes, marshes, and roadside ditches. Soils are poorly drained. *Typha*, *Distichlis spicata*, *Eleocharis parishii*, *Polypogon monspeliensis*, *Schoenoplectus maritimus*, and a variety of other wetland herbs may be present...

***Scirpus pungens*–*Schoenoplectus americanus* Provisional Association*
in the *Schoenoplectus americanus* Herbaceous Alliance* (6111)**

I.A.4. Vegetation not as above and characterized by tall perennial graminoids such as *Schoenoplectus*, *Scirpus*, *Typha*, and *Juncus effusus*...

Western North American Freshwater Marsh Macrogroup (6400)

I.A.5. Vegetation not as above and characterized by vernal pool, playa, and swale species such as *Eleocharis* spp., *Eryngium* spp., *Lasthenia fremontii*, *Layia* spp., *Downingia* spp., *Psilocarphus* spp., and others. Restricted to winter-flooded or at least winter-saturated substrates; not of convex or upland slopes - watered only by ambient precipitation. This vegetation occurs in alkaline vernal pools and playas in the study area ...

**Californian Mixed Annual/Perennial Freshwater Vernal Pool/
Swale Bottomland Group (6310)**

I.A.5.a. 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. ...

***Atriplex vallicola*–*Lasthenia ferrisiae*–*Lepidium jaredii* Herbaceous Association
in the *Lasthenia fremontii*–*Distichlis spicata* Alliance (6313)**

I.A.5.b. Native annual and perennial species such as *Frankenia salina*, *Myosurus minimus*, *Psilocarphus brevissimus*, and *Plagiobothrys leptocladus* dominate, co-dominate, or are characteristically present in stands...

***Frankenia salina*–*Psilocarphus brevissimus* Provisional Herbaceous Association
in the *Frankenia salina* Alliance (4317)**

I.A.6. Native perennial grasses and forbs are characteristic and evenly distributed across the herbaceous layer, though non-native herbs sometimes are dominant. Diagnostic species include *Distichlis spicata*, *Leymus triticoides*, and *Frankenia salina* in alkaline wetlands, playas, intermittently flooded terraces, and other similar locations...

I.A.6.a. *Distichlis spicata* is dominant or co-dominant with >30% relative cover in the herb layer. Soils are often deep, alkaline or saline, and poorly drained. *Descurainia sophia*, *Erodium cicutarium*, *Bromus*, *Hordeum*, *Amsinckia*, *Lasthenia*, and a variety of other native and non-native forbs and grasses may be present...

***Distichlis spicata* Herbaceous Alliance (6411)**

I.A.6.a.i. *Distichlis spicata* dominant (>50% relative cover) in the herb layer, though various annual forbs may be present...

***Distichlis spicata* Herbaceous Association (6411)**

I.A.6.b. *Leymus triticoides* is dominant or co-dominant (>30% relative cover) and with >15% absolute cover on poorly drained floodplains, pond/lake margins, drainage and valley bottoms. *Hordeum murinum*, *Erodium cicutarium*, *Amsinckia*, *Bromus*, *Distichlis spicata*, and a variety of other native and non-native forbs and grasses may be present...

***Leymus triticoides* Herbaceous Association
in the *Leymus triticoides* Herbaceous Alliance (6213)**

I.A.6.c. *Frankenia salina* is dominant or co-dominant (>30% relative cover) in playas, alkaline depressions and alkali sinks that have poorly drained soils. *Atriplex* spp., *Cressa truxillensis* and other species may be present...

**(no association defined)
Frankenia salina Herbaceous Alliance (4317)**

I.B. Vegetation is characterized mainly by upland and mesic herbaceous species, including native and non-native grasses and forbs...

I.B.1. A perennial *Eriogonum* species, *Corethrogyne filaginifolia*, or *Isocoma acradenia* characterizes the herb layer on shallow soils derived from sedimentary substrate. Stands typically have grazing or other disturbance history...

I.B.1.a. *Eriogonum nudum* or *E. elongatum* is dominant on low hills, mound, and toeslopes that usually have exposed bare ground and rocky soils, which may be disturbed by small mammals or grazing animals ...

***Eriogonum (elongatum, nudum)* Herbaceous Alliance (5132)**

I.B.1.a.1. *Eriogonum elongatum* is dominant or co-dominant with *Bromus rubens* on low hills and mounds...

***Eriogonum elongatum* Provisional Herbaceous Association (5132)**

I.B.1.a.2. *Eriogonum nudum* is dominant or is co-dominant with other herb species...

***Eriogonum nudum* Provisional Herbaceous Association (5132)**

I.B.1.b. *Corethrogyne filaginifolia* is dominant on gentle to moderately slopes with sandy soils with *Castilleja exserta*, *Erodium cicutarium* and other herbs...

***Corethrogyne filaginifolia* Provisional Herbaceous Association**

Corethrogyne filaginifolia Provisional Herbaceous Alliance (5131)

I.B.1.c. *Isocoma acradenia* is dominant on flat to gentle slopes near Soda Lake or base of the Temblor Range with a variety of herbs...

***Isocoma acradenia* Provisional Association of the
Isocoma acradenia Provisional Alliance (2323)**

I.B.2. Annual native herbs are characteristic and evenly distributed across the herbaceous layer, though non-native forbs and grasses may be dominant. Diagnostic species include *Amsinckia* spp., *Coreopsis calliopsidea*, *Eschscholzia* spp., *Lasthenia* spp., *Monolopia* spp., *Phacelia* spp., *Plantago erecta*, and *Vulpia microstachys*...

California Annual Herb/Grass Group (5110)

I.B.2.a. Native annual species *Vulpia microstachys*, *Plantago erecta* and/or *Lasthenia californica* (or *L. gracilis*) characteristically present in stands and usually at least 10% relative in cover to other herbs. Other native species such as *Castilleja exserta*, *Crassula connata*, *Lepidium nitidum*, *Lupinus*, and *Trifolium* species are often well-represented (and sometimes co-dominant to dominant) as well as a variety of herbs. Soils may be clayey, wet to moist in spring and dry by summer ...

***Lasthenia californica*–*Plantago erecta*–*Vulpia microstachys*
Herbaceous Alliance (5114)**

I.B.2.a.1. *Erodium* 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* Association (5114)**

I.B.2.a.2. *Erodium cicutarium* and *Bromus rubens* are present and sub-dominant while *Vulpia microstachys*, *Lepidium nitidum*, and/or *Trifolium gracilentum* are co-dominant to dominant with other herbs...

***Lepidium nitidum*–*Trifolium gracilentum*–*Vulpia microstachys* Association (5114)**

I.B.2.a.3. *Erodium* and *Bromus* appear sub-dominant to dominant in stands with *Lasthenia (gracilis)*, *Plantago erecta*, *Plagiobothrys canescens*, *Crassula connata*, and a variety of other native herbs...

***Lasthenia gracilis*–*Plantago erecta*–*Plagiobothrys canescens* Herbaceous Association
(5114)**

I.B.2.a.4. *Lasthenia (gracilis)* appears dominant or co-dominant with other herbs on vernal alkaline flats...

***Lasthenia gracilis* Herbaceous Association (5114)**

I.B.2.a.5. *Lasthenia minor* appears dominant or co-dominant with other herbs on vernal alkaline flats of the valley floor. Stands are rare in the region ...

***Lasthenia minor* Provisional Herbaceous Association (5114)**

I.B.2.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 in the
Lasthenia californica–*Plantago erecta*–*Vulpia microstachys*
Herbaceous Alliance (5114)**

I.B.2.c. *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 (5113)**

I.B.2.c.1 *Eschscholzia californica* is seasonally dominant on upland slopes or flats...

***Eschscholzia californica* Herbaceous Association (5113)**

I.B.2.c.2 *Lupinus bicolor* is seasonally dominant on grazed flats...

***Lupinus bicolor* Provisional Herbaceous Association (5113)**

I.B.2.d. *Amsinckia menziesii*, *A. tessellata*, *A. vernicosa*, *Phacelia ciliata* and/or *P. tanacetifolia* is/are seasonally characteristic in the herbaceous layer with greater than or equal to 10% relative cover. 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 (5111)**

I.B.2.d.1. *Erodium cicutarium* is present and sub-dominant to dominant with *Amsinckia tessellata*. *Astragalus didymocarpus*, *Bromus rubens*, *Guillenia lasiophylla*, *Lotus wrangelianus*, and *Vulpia microstachys* may be present with a variety of other native and non-native herbs...

***Amsinckia tessellata–Erodium cicutarium* Herbaceous Association (5111)**

I.B.2.d.2. *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* Provisional Herbaceous Association (5111)**

I.B.2.d.3. *Phacelia tanacetifolia* is seasonally dominant or co-dominant on steep, dry slopes on siltstone derived soils. A variety of other herbs such as *Amsinckia tessellata*, *A. vernicosa*, *Astragalus didymocarpus*, *Caulanthus inflatus*, *Eremalche parryi*, *Erodium cicutarium*, *Salvia columbariae*, *Lupinus succulentus*, *Eriogonum elongatum* are present. Stands typically on moderate to steep slopes facing southeast and southwest...

***Phacelia tanacetifolia* Provisional Herbaceous Association (5115)**

I.B.2.e. *Coreopsis calliopsidea*, *Monolopia* spp, and/or *Mentzelia pectinata* 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)–Coreopsis (calliopsidea)* Herbaceous Alliance (5115)**

I.B.2.e.1. *Coreopsis calliopsidea* and/or *Mentzelia pectinata* are seasonally dominant on steep, dry slopes with siltstone and gypsum-derived soils. A variety of other herbs such as *Amsinckia tessellata*, *Caulanthus inflatus*, *Camissonia boothii*, *Chaenactis stevioides*, *Guillenia lasiophylla*, *Erodium cicutarium*, and *Phacelia* species are present...

***Coreopsis calliopsidea–Mentzelia pectinata* Herbaceous Association (5115)**

I.B.2.e.2. *Monolopia lanceolata* is seasonally dominant or co-dominant on fine-textured, moderate to steep slopes in the Temblor and Caliente ranges and sometimes on flats/terraces above Soda Lake with *Amsinckia* spp...

***Monolopia lanceolata* Herbaceous Association (5115)**

I.B.2.e.3. *Monolopia stricta* is seasonally dominant on clay and silty hill slopes directly above Soda Lake with *Coreopsis calliopsidea*, *Erodium cicutarium*, *Layia munzii*, *Lepidium nitidum*, *Phacelia tanacetifolia*, and *Poa secunda*...

***Monolopia stricta* Provisional Herbaceous Association (5115)**

I.B.2.f. *Salvia carduea* 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 also occur in the herb layer, and *Gutierrezia californica* typically occurs at low cover in the shrub layer...

***Salvia carduea* Herbaceous Association in the
Salvia carduea Provisional Herbaceous Alliance (5116)**

I.B.3. Perennial native grasses are characteristic and evenly distributed across the herbaceous layer, though non-native forbs and grasses may be dominant. Diagnostic species include *Poa secunda* and *Nassella cernua*...

California Perennial Grassland Group (5120)

I.B.3.a. *Poa secunda* characterizes the herbaceous layer...

***Poa secunda* Herbaceous Alliance (5122)**

I.B.3.a.1. *Coreopsis calliopsidea*, *Monolopia stricta*, and/or *Poa secunda* are seasonally co-dominant to dominant in the Soda Lake basin associated with *Erodium cicutarium*, *Heterodraba unilateralis*, *Layia munzii*, *Layia platyglossa*, and other herbs...

***Monolopia stricta*–*Poa secunda* Herbaceous Association (5122)**

I.B.3.a.2. *Poa secunda* is dominant or co-dominant with *Bromus rubens* on clayey soils on both 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 (5122)**

I.B.3.b. *Nassella cernua* characterizes the herbaceous layer with >2% absolute cover on well-drained soils. *Erodium cicutarium* is usually present and co-dominant, though it may be dominant to *N. cernua*. *Castilleja exserta*, *Bromus rubens*, *Lasthenia californica*, *Lotus wrangelianus*, *Trifolium albopurpureum*, and *Pectocarya penicillata* are often present...

***Nassella cernua* Provisional Herbaceous Association
Nassella cernua Provisional Herbaceous Alliance (5121)**

I.B.4. Vegetation not as above and dominated by a pure to mixed assemblage of native annual or perennial herbs and grasses. Adapted to winter precipitation and summer drought, typically not of bottomland or concave conditions, but of uplands. May have significant non-native herbaceous cover, but all stands have diagnostic native species of forbs and/or grasses...

California Annual and Perennial Grassland Macrogroup (5100)

I.B.5. Vegetation not as above and strongly dominated by non-native annual herbaceous and/or grass species including *Aegilops triuncialis*, *Avena* spp., *Brachypodium distachyon*, *Brassica nigra*, *Bromus* spp., *Centaurea melitensis*, *Conium maculatum*, *Cynosurus echinatus*, *Foeniculum vulgare*, *Lolium perenne*, *Schismus*, *Sisymbrium irio* and other mustards ...

Mediterranean California Naturalized Annual and Perennial Grassland Group (5200)

Class D. Unvegetated or Urbanized

I.A. Unvegetated (9110)

I.A.1. Developed (9111)

I.A.2. Road (9112)

I.A.3. Cliff & Rock Outcrops (9113)

I.A.4. River & Lacustrine Flats & Streambeds (9114)

I.A.5. Playa (9115)

I.B. Agriculture (9120)

I.C. Water (9130)

I.C.1. Perennial Stream Channel (9131)

I.C.2. Reservoirs & Ponds (9132)

I.D. Exotic trees and shrubs (9140)

I.D.1. Tamarix (9141)

I.E. Unknown (9999)