Metadata and Mapping Report

Vegetation of the California Department of Fish and Game Carrizo Plain Ecological Reserve, including the Chimineas, American, Panorama, and Elkhorn Units, San Luis Obispo County, California

December 6, 2010

Prepared by the

Vegetation Classification and Mapping Program
California Department of Fish and Game

Abstract

The Vegetation Map of the Carrizo Plain Ecological Reserve, San Luis Obispo County, California was created by the California Department of Fish and Game (DFG) Vegetation Classification and Mapping Program (VegCAMP). Data from 379 vegetation Rapid Assessment surveys that were conducted from 2005-2008 was analyzed using cluster analysis to produce a vegetation and mapping classification for the 39,597-acre study area. The area was delineated and attributed by vegetation type; total cover; conifer tree, hardwood tree and total tree, shrub or herb cover; impacts present; and a subjective assessment of site quality using 2007 1-foot resolution base imagery. The classification and map follow the National Vegetation Classification Standard (NVCS) and Federal Geographic Data Committee (FGDC) standard and State of California Vegetation and Mapping Standards. The minimum mapping unit is one acre, with 0.5 acre for wetland or special types. After a draft map was completed, about half of the polygons were verified in the field, and polygons not visited were corrected if necessary. This metadata and mapping report serves to document the entire project.

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Purpose

The map was created to aid in preparation of a management plan for the Ecological Reserve under a contract to DFG; to focus selection of animal monitoring points; to allow monitoring of vegetation change over time; and to allow modeling of habitat for sensitive or otherwise important species. All vegetation field samples were marked with GPS units and can serve as long-term monitoring points. Photos taken at these GPS points can also aid monitoring.

Supplemental Information

Field sampling

The map classification is based on a floristic classification that was derived from 379 samples collected in the field. Field work was conducted over a four year period. In 2005, 55 surveys were completed between March 3 and October 20. In 2006, 39 surveys were completed between April 21 and December 22, and in 2007, 20 surveys were completed between April 26 and May 23. These surveys used the California Native Plant Society's (CNPS) Rapid Assessment Protocol (Revised February 2003). In 2008, 161 surveys were completed on DFG land and 104 surveys were conducted in the greater Carrizo Plain area between March and May. These were collected using the CNPS Combined Rapid Assessment and Relevé Protocol (Revised April 2008). Both protocols and field survey forms are included as Appendices A1 and A2.

The field data include the date of sampling, GPS location, environmental characteristics of the sampled stands (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 cover, site history, and the field-assessed alliance and association. Additionally, four digital photos were taken in the cardinal directions from each sample location.

Data Analysis

The vegetation data, entered into an Access database, and the set of field photos can serve as a baseline for monitoring. Both are available from VegCAMP by contacting Rosie Yacoub (ryacoub@dfg.ca.gov).

VegCAMP analyzed the species cover data using the PC-Ord cluster analysis software. The final analysis used the Sorensen distance and flexible beta linkage method at -0.25 (McCune and Grace 2002). This cluster analysis technique was based on abundance (cover) values converted to seven different classes using

the following modified Braun-Blanquette (1932) cover categories: 1=<1%, 2=1-5%, 3=>5-15%, 4=>15-25%, 5=>25-50%, 6=>50-75%, 7=>75%.

The resulting floristic classification of the samples follows the hierarchical National Vegetation Classification System (NVCS, FGDC-STD-005-2008 [Version 2], Jennings et al. 2009) and Manual of California (Sawyer et al. 2009). The set of data collected at the Carrizo Plain ER was used as the principal means for defining the association composition and membership rules; however, pre-existing classifications and floras were consulted to locate analogous/similar classifications or descriptions of vegetation.

An Association is defined by a group of samples that have similar dominant and characteristic species in the overstory and other important or indicator species, whereby these species are distinctive for a particular environmental setting. A set of similar Associations is grouped hierarchically to the next higher level in the classification, the Alliance level (the finest level represented in this mapping effort). These are grouped sequentially into the Group, MacroGroup, Division, and upwards through the Formation, Sub-class and Class levels.

Appendix B shows how each vegetation type nests within the NVCS hierarchy.

A key to identifying vegetation types in the field is included as Appendix C.

Mapping

The vegetation classification was translated into a mapping classification (or legend), included as Appendix D.

The key in Appendix C also serves to establish the rules for determining the vegetation type attribute on the map. Polygons were attributed to the Alliance level, or to the lowest level of the classification hierarchy the photo interpreter could confidently identify from the image. Thus, individual polygons are mapped to the MacroGroup, Group, or Alliance level. There was one exception: the mapping unit (MU) used for *Atriplex polycarpa* and *Atriplex canescens* does not fit into the hierarchy. These two species were difficult to distinguish on the imagery and sometimes co-occurred.

Vegetation polygons were digitized using true-color 1-foot imagery from August 01, 2007 as the base. We delineated vegetation polygons using ESRI's ArcMap (versions 9.2 and 9.3) at a scale of 1:2000. Ancillary data included the color infrared imagery acquired at the same time as the 2005 NAIP data and recently processed for the State of California, which was particularly useful in distinguishing trees in shrub canopy. Digital Globe's Image Connect service was also used, particularly in areas where the 2007 was blurry, washed out, or in shadow.

Appendix D shows the upper levels of the hierarchy, along with crosswalks from the map classification to the California Wildlife Habitat Relationships (CWHR 2009) and CalVeg (CalVeg 2005) classifications. These are also included in the map layer, allowing mapping based on higher levels of the hierarchy (e.g., Group or Macrogroup), or on those other classifications.

Vegetation types that were classified or mapped (or both) have been ranked by state and global rarity (Appendix D) as defined by the state Nature Conservancy Heritage Programs. Communities without much information on a statewide or national scale were given a "?" after the rank to denote that this rank may change with more information, but that the best knowledge to date (sometimes personal) was used in these situations. Otherwise, references were used to place rank. These ranks are the "Global" and "State" ranks as seen below:

G1 and S1: Fewer than 6 viable occurrences worldwide and/or 2000 acres
G2 and S2: 6-20 viable occurrences worldwide and/or 2000-10,000 acres
G3 and S3: 21-100 viable occurrences worldwide and/or 10,000-50,000 acres
G4 and S4: Greater than 100 viable occurrences worldwide and/or greater than 50,000 acres
G5 and S5: Community demonstrably secure due to secure worldwide and statewide abundance

Polygons that were distinctive on the imagery but that were not distinguishable based on the classification and mapping resolution (rules) occur within the northern portion of the Chimineas Unit and in the southern portion of the American Unit (Figure 1). They are small hills that seem to have thinner A-horizons due to previous cultivation or to their position on rocky outcrops. At least in 2008 and 2009, these did not have a significantly higher cover of native species or shrubs, and total cover was within the same cover class as the surrounding grasslands. We delineated these in our first draft of the map but merged them with the surrounding grassland on the final map. A layer with these polygons is included in the geodatabase as the feature class "AmericanChimineasGrasslandSubdivisions" in case some future analysis requires them.

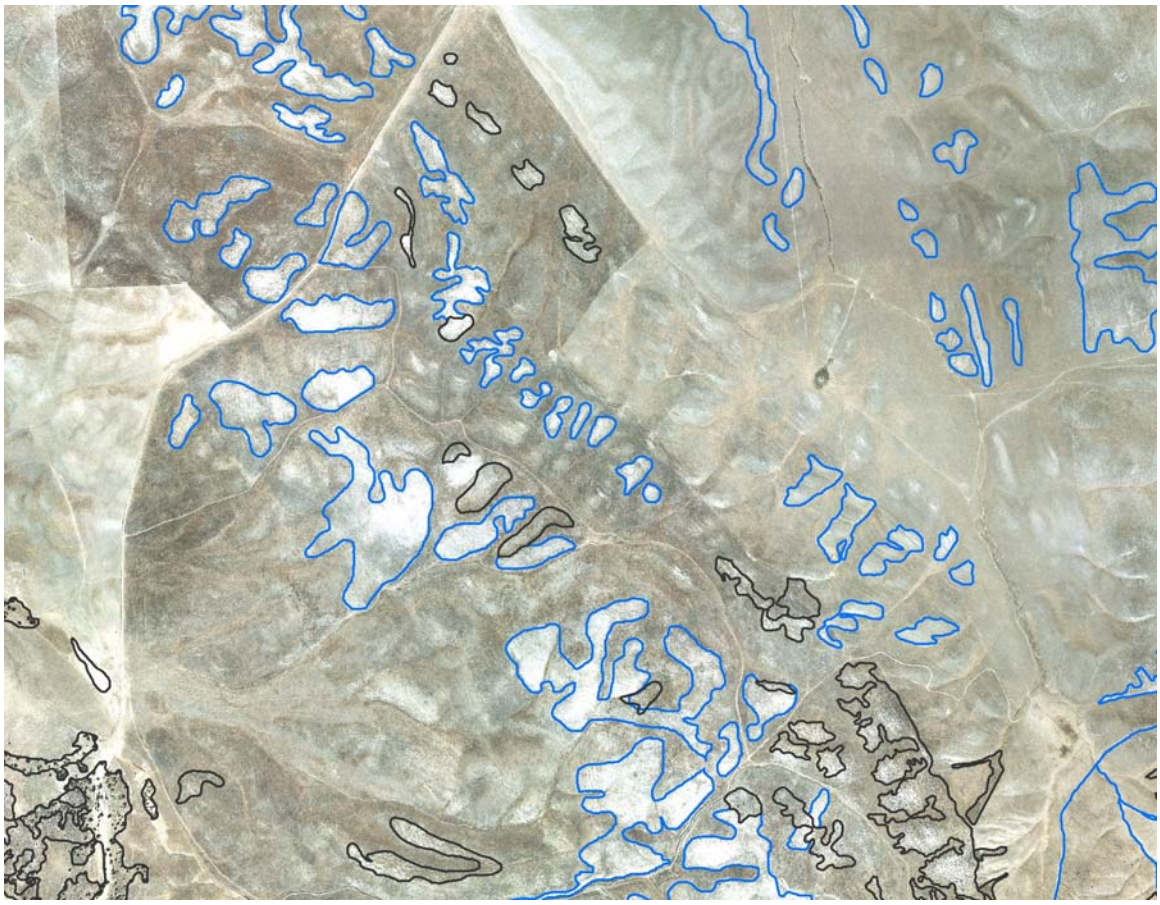

Figure 1. Grassland subdivisions. Blue polygons, not included in the final map, are areas that may be distinguishable at a finer classification resolution (e.g., at the level of Association) than used for this map. Black polygons, which were distinct in the field, are in the final map.

Accuracy Assessment

This map deviates from FGDC and NVCS standards in that there was no formal accuracy analysis. However, 1886 of vegetated polygons were field checked during the weeks of March 9, March 23, and April 6 in 2009. An additional 89 polygons were assessed between September and November 2010 because the map was extended to match updated reserve boundaries. In total, 59% of the polygons were field checked with the results show in Table 1. Additionally, 82 polygons had been documented with field data points so that overall 62% of polygons were verified in the field. This exceeds the requirement for the national standards (Chris Lee, pers. comm.). The average visitation rate per type was 77%; only 6 of the 52 vegetation mapping units had less than 50%, and these generally were types with low numbers of polygons.

Additionally, we updated many polygons that were not visited based on the knowledge gained during field reconnaissance.

Table 1. The number of polygons mapped for each vegetation type and the number and percent that were field checked per type.

VegCode	VegName	Total Polygons	Polygons visited	percent visited
1111	Quercus agrifolia	1	1	100
1121	Juniperus californica	418	254	61
1131	Quercus douglasii	347	202	58
1211	Populus fremontii	5	2	40
2111	Quercus john-tuckeri	46	33	72
2112	Adenostoma sparsifolium	1	1	100
2212	Cercocarpus montanus	2	2	100
2223	Adenostoma fasciculatum	163	108	66
2226	Adenostoma fasciculatum - Salvia mellifera	14	6	43
2227	Ceanothus cuneatus	1	1	100
2228	Eriodictyon crassifolium	1	1	100
2231	Arctostaphylos glauca	30	27	90
2312	Artemisia californica	40	23	58
2314	Artemisia californica - Eriogonum fasciculatum	123	80	65
2316	Ericameria linearifolia	330	181	55
2317	Eriogonum fasciculatum	502	339	68
2321	Gutierrezia californica Provisional	8	8	100
2324	Lupinus albifrons	21	16	76
2325	Salvia leucophylla	240	162	68
2328	Salvia mellifera	19	11	58
2329	Eastwoodia elegans Provisional	22	21	95
2332	Isomeris arborea Provisional	51	41	80
2333	Eriogonum elongatum Provisional	16	16	100
2334	Eriogonum nudum Provisional	8	8	100
2411	Atriplex polycarpa	114	91	80
2412	Atriplex polycarpa-Atriplex canescens MU	47	16	34
2413	Atriplex canescens	22	15	68
2511	Ericameria nauseosa	4	4	100
2521	Krascheninnikovia lanata	1	1	100
2611	Ribes quercetorum Provisional	4	4	100
2711	Artemisia tridentata	1	1	100
4110	Southwestern North American riparian/wash scrub	6	4	67
4111	Baccharis salicifolia	14	11	79
4112	Salix exigua	9	9	100
4113	Salix laevigata	1	1	100
4114	Salix lasiolepis	2	1	50
4211	Ephedra californica	7	6	86
4213	Lepidospartum squamatum	3	3	100
4221	Pluchea sericea	27	25	93
4311	Allenrolfea occidentalis	2	2	100

4312	Atriplex spinifera	7	5	71
5100	California Annual and Perennial Grassland	571	285	50
5111	Amsinckia (menziesii, tessellata)	9	7	78
5114	Lasthenia californica - Plantago erecta - Vulpia microstachys	1	0	
5121	Nassella cernua Provisional	4	1	25
5200	Mediterranean California naturalized annual and perennial grassland	17	10	59
6210	CA warm temperate marsh/seep	5	3	60
6310	Californian mixed annual/perennial freshwater vernal pool / swale bottomland	7	1	14
6400	Arid West freshwater emergent marsh	4	4	100
6411	Distichlis spicata	1	1	100
9140	Exotic trees & shrubs	1	0	
9141	Tamarix	6	6	100
	total polygons	**3306**	**2061**	
	percent total visited			**62**
	average percent visited per type			**77**

Note: Herbaceous types with low visitation percentages above (i.e., *Amsinckia (menziesii, tessellata), Lasthenia californica - Plantago erecta - Vulpia microstachys,* and *Nassella cernua*) were sampled more often than they were mapped. Some of the stands representing these types were below MMU and included in larger polygons that were mapped to another vegetation type.

Data Assumptions and Limitations

The minimum mapping unit (mmu) for vegetation type was 1 acre, with 1/2 acre for wetland types, and a 10-foot width for linear polygons. A 5 acre mmu was used for a break in the understory density, and a 3 acre mmu was used for a break in the overstory density. We did not break polygons for changes in impacts or quality.

Polygons with less than 2% total vegetation cover were considered non-vegetated and mapped with codes in the 9000s.

Because herbaceous cover is not easily discernible on the aerial photography (and varies greatly from year to year) we used only the 2-9% and 10-39% cover categories for herbaceous cover, i.e., anything above 39% herb cover is also in the 10-39% class.

Juniperus californica is considered a tree type in this map classification.

Mixed stands of *Juniperus californica – Quercus john-tuckeri* were put into the *Quercus john-tuckeri* Alliance.

We observed hybrids of *Quercus john-tuckeri* and *Quercus douglasii* in the study area. These can't be determined by photo-interpretation, and so tall blue oak-like trees were mapped as *Quercus douglasii*. For example, oak stands on north-facing slopes along the main canyon road on the Chimineas Unit are likely hybrids; they are tall but many are evergreen. These were mapped as blue oak stands.

Stands with any significant herbaceous layer were assumed to have exotic species present. Only sparsely-vegetated stands, such as on gypsophilous soils, were not coded with exotic species as an impact.

Reservoirs and ponds were mapped as such only if they were inundated on the date of the base imagery. Otherwise, they were mapped based on the vegetation present.

Known Caveats of the Data

We did not have the ability or time to visit two areas of the Chimineas Ranch, and so our confidence in mapping these areas is lower for some vegetation types in these areas than in the rest of the map. The first is the disjunct parcel in the NW portion of the Gifford Field Unit (to the NW of the Gifford Ranch parcel). The second is the eastern half of Section 36 roughly 1.5 miles east of Taylor Spring.

What Each Record Represents in the Vegetation Layer

Each record represents the attributes of the individual polygon in the map layer, as described below. Additional layers or tables in the geodatabase are described in Appendix E.

OBJECTID *ESRI proprietary field*

SHAPE *ESRI proprietary field*

SHAPE_Length *ESRI default field*

SHAPE_Area *ESRI default field*

Mapunits: ***VegCode/VegName***
Following is the map classification (legend) that we developed based on vegetation types distinguishable on the imagery. The map classification follows the NVCS hierarchy with the exception of the non-vegetation and exotic tree units (e.g., Agriculture, Tamarix), and the Mapping Unit 2412, *Atriplex polycarpa-Atriplex canescens.*

MapUnit

VegCode	VegName
1111	Quercus agrifolia
1121	Juniperus californica
1131	Quercus douglasii
1211	Populus fremontii
2111	Quercus john-tuckeri
2112	Adenostoma sparsifolium
2212	Cercocarpus montanus
2223	Adenostoma fasciculatum
2226	Adenostoma fasciculatum - Salvia mellifera
2227	Ceanothus cuneatus
2228	Eriodictyon crassifolium
2231	Arctostaphylos glauca
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4311	Allenrolfea occidentalis
4312	Atriplex spinifera
5100	California Annual and Perennial Grassland
5111	Amsinckia (menziesii, tessellata)

MapUnit	
VegCode	**VegName**
5114	Lasthenia californica - Plantago erecta - Vulpia microstachys
5121	Nassella cernua Provisional
5200	Mediterranean California naturalized annual and perennial grassland
6210	CA warm temperate marsh/seep
6310	Californian mixed annual/perennial freshwater vernal pool / swale bottomland
6400	Western North American Freshwater Marsh
6411	Distichlis spicata
9111	Developed
9112	Road
9113	Cliffs & Rock Outcrops
9114	River & Lacustrine Flats & Streambeds
9115	Playa
9131	Perennial Stream Channel
9132	Reservoirs & Ponds
9140	Exotic trees & shrubs
9141	Tamarix
9999	Unknown

Heterogen

Heterogeneity of the vegetation (i.e., of the composite species distribution and density) within the polygon, in the following cover classes.

For purely herbaceous types, this field does not represent heterogeneity of species, which largely can't be determined by photointerpretation, but of density or moisture. In some cases, it represents the presence of moist swales that are below mmu.

Heterogeneity	
HetCode	**HeterogeneityClass**
1	Low, less than 5% heterogeneous
2	Moderate, 5-40% heterogeneous
3	High, >40% heterogeneous

TotalCov
Total cover (bird's-eye view) of all vegetation taking into consideration the porosity, or hole, in the vegetation within the polygon using the following cover classes (all cover fields use these categories):

Cover	
CoverCode	**CoverClass**
0	0%
1	<2%
2	2-9%
3	10-39%
4	40-59%
5	60-100%

ConiferCov
Cover of coniferous trees in the polygon (considering porosity).

HdwdCov
Cover of hardwood trees in the polygon (considering porosity).

TreeCov
Cover of trees in the polygon (considering porosity).

ShrubCov
Cover of shrubs in the polygon (considering porosity).

HerbCov
Cover of herbs in the polygon. Note that we used only cover classes 0, 1, 2 and 3 for herbaceous cover.

Impact1, Impact2, Impact3, Impact4
Four fields list impacts that were apparent to the photointerpreters. Impacts are not listed in any particular order.

Impacts	
Code	**Desc**
1	Development
2	OHV Activity
3	Exotic species
4	Roads/trails
5	Erosion/runoff
6	Disking/grading
8	Riparian modification
7	Ungulate trails
0	none

Subjective SiteQuality
The photointerpreter's subjective assessment of the site quality of the polygon, based on the number and intensity of disturbance (impact) factors and the size of the polygon.

SiteQuality	
SiteQualCode	**SiteQuality**
1	High
2	Moderate
3	Low
4	Unknown

MethodID
The method that was used to interpret the polygon. Rapid assessments and relevés had full site descriptions, adjacent alliances, and photos that were used in interpreting the vegetation. If field reconnaissance was done, the polygon was visited after the initial delineation was complete; and both the type of vegetation and the coverage of strata were verified. Pre-map reconnaissance means basic vegetation information collected in 2008 was used to help interpret the polygon.

Method	
MethodCode	**MethodDesc**
1	Rapid assessment field data
2	Relevé field data
3	Field reconnaissance
4	Photo-interpretation
5	other information
6	Pre-map reconnaissance

DB_ID
The Database ID number(s) of the Relevé(s) or Rapid Assessment(s) within the polygon. Some polygons include vegetation surveys of stands below the MMU. When the majority of the polygon is dominated by another vegetation type, the mapped type will not match the vegetation type of the included the survey point. The "Comments" column may also include Database ID numbers for below MMU or additional surveys found within a given polygon.

Comments
Comments that may be useful to the map user. The abbreviation "FN" refers to field notes. This field may include additional information about the survey points (see *DB_ID* above) used within the polygon.

K_Rat
"Yes" if Giant Kangaroo rat precincts were evident in the polygon based on air photo interpretation or any field reconnaissance.

Confidence
The confidence of the photointerpreter in the vegetation type call for the polygon. The map user should be aware of polygons with lower confidence attributes; field verification may be warranted for high-risk decisions based on the map.

UID
Unique identifier code for the polygon.

NVCS_Name
The standardized name of the vegetation description used in the National Vegetation Classification System.

NVCS_Level
The level of the National Vegetation Classification System Hierarchy to which the vegetation type corresponds.

NVCS_MG
The standardized name for the Macrogroup within the National Vegetation Classification System.

CWHR
A crosswalk to the California Wildlife Habitat Relationships system. See http://www.dfg.ca.gov/biogeodata/cwhr/

CalVeg
Crosswalk to the CalVeg vegetation system. See http://www.fs.fed.us/r5/rsl/projects/frdb/layers/ev_mid.html

G_rank
The global rarity rank of the plant community mapped (only for alliances and associations).

S_rank
The global rarity rank of the plant community mapped (only for alliances and associations).

Acres
GIS-calculated acres for the polygon.

Field Staff

DFG field staff included Rachelle Boul, George Butterworth, Melanie Gogol-Prokurat, Diana Hickson, Deb Hillyard, Todd Keeler-Wolf, Anne Klein, Teresa LeBlanc, Kari Lewis, Cynthia Roye, Bob Stafford, Jerrad Swaney, and Rosie Yacoub. CNPS field staff included Jennifer Buck, Brianna Collins, Melinda Elster, Julie Evens, Andra Forney, Andrew Georgeades, Betsy Harbert, Suzanne Harmon, Kate Huxster, Theresa Johnson, Eric Peterson, Kendra Sikes, and Lisa Stelzner.

Rachelle Boul, Melanie Gogol-Prokurat, Diana Hickson, Todd Keeler-Wolf, Anne Klein, Cynthia Roye, and Rosie Yacoub were responsible for the classification, mapping and attribution, report, and geodatabase.

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Appendix A1. Field Protocol and Field Data Form used for vegetation sampling in 2005, 2006, and 2007.

CALIFORNIA NATIVE PLANT SOCIETY - VEGETATION RAPID ASSESSMENT FIELD FORM

(Revised Sept. 21, 2004)

For Office Use:	Final database #:	Final vegetation type name:	Alliance_____ Association_____

I. LOCATIONAL/ENVIRONMENTAL DESCRIPTION

Polygon/Stand #:	Air photo #:	Date:	Name(s) of surveyors:
_____	_____	_____	_____

GPS waypoint #: _____ **GPS name:** _____ **GPS datum: (NAD 27)** _____ **Is GPS within stand?** Yes / No

If No, cite from GPS point to stand, the distance _____**(in meters) and bearing** _____**(in degrees) GPS Error: ±**_____ **ft / m**

UTM field reading: UTME ___ ___ ___ ___ ___ ___ **UTMN** ___ ___ ___ ___ ___ ___ ___ **UTM zone:** _____

Elevation: _____ **ft / m Photograph #'s**: _____

Topography: convex____ **flat**____ **concave**____ **undulating**____ | **top**____ **upper**____ **mid**____ **lower**____ **bottom**____

Geology: _____ **Soil Texture:** _____ **Rock: %Large**____ **%Small** ____ **%Bare/Fine:** ____ **%Litter:** ____ **%BA Stems:** ____

Slope exposure (circle one and/or enter actual °): **NE**_____ **NW**_____ **SE**_____ **SW**_____ **Flat**__ **Variable**__

Slope steepness (circle one and enter actual °): **0°**__ **1-5°** _____ **5-25°**_____ **> 25°**_____ **Upland** or **Wetland/Riparian** (circle one)

Site history, stand age, and comments: _____

_____

_____

Type/ Level of disturbance (*use codes*): _____/____ _____/____ _____/____ _____/____ _____/____ _____/____ _____/____ _____/____ _____/____

II. VEGETATION DESCRIPTION

Field-assessed vegetation alliance name: _____

Field-assessed association name (optional): _____

Size of stand: <1 acre___ **1-5 acres**___ **>5 acres**___ **Adjacent alliances:** _____ _____

_____ _____ _____ _____

Tree: 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)

If Tree, list 1-3 dominant overstory spp.: _____

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

Herbaceous: H1 (<12" plant ht.), H2 (>12" ht.) **Desert Palm/Joshua Tree:** 1 (<1.5" base diameter), 2 (1.5-6" diam.), 3 (>6" diam.)

Desert Riparian Tree/Shrub: 1 (<2ft. stem ht.), 2 (2-10ft. ht.), 3 (10-20ft. ht.), 4 (>20ft. ht.) **Total % Veg cover:**_____

% Cover-Overstory Tree Conifer/Hardwood: _____/_____ **Low Tree-Tall Shrub:** _____ **Lo-Mid Shrub:** _____ **Herbaceous:** _____

Height Class - Overstory Conifer/Hardwood: _____/_____ **Low Tree-Tall Shrub:** _____ **Lo-Mid Shrub:** _____ **Herbaceous:** _____

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 (List up to 12 major species), Stratum, and Approximate % cover: (Jepson Manual nomenclature please)

Stratum categories: T=tall, M=medium, L=low; *% cover intervals for reference*: <1%, 1-5%, >5-15%, >15-25%, >25-50%, >50-75%, >75%

Strata	Species	% cover		Strata	Species	% cover

Major non-native species - With % cover: _____

Unusual species: _____

III. PROBLEMS WITH INTERPRETATION

Confidence in identification: (L, M, H) _____ **Explain** _____

Other identification problems (describe): _____

Polygon is more than one type: (Yes, No) _____ (Note: type with greatest coverage in polygon should be entered in above section)

Other types: _____ _____ _____

Has the vegetation changed since air photo taken? Yes / No If Yes, What has changed? _____

CALIFORNIA NATIVE PLANT SOCIETY –
VEGETATION RAPID ASSESSMENT PROTOCOL
CNPS VEGETATION COMMITTEE
(November 5, 2001, Revised February 5, 2003)

Introduction

The rapid assessment protocol is a reconnaissance-level method of vegetation and habitat sampling. It may be used to quickly assess and map the extent of all vegetation types in relatively large, ecologically defined regions. The California Native Plant Society (CNPS) has adopted this method to verify locations of known vegetation types, to gain information about new types, and to acquire general information about their composition, habitat, and site quality. Other agencies, such as California State Parks, the Department of Fish and Game, and the U.S. Forest Service, are also adopting this method for documenting vegetation patterns.

By using this method, biologists and resource managers can gain a broad ecological perspective, as the full range in ecological variation across broad landscapes can be reflected in the vegetation assessments. For example, changes in environmental elements (such as geology, aspect, topographic position) or physical processes (fire, flooding, erosion, and other natural or human-made disturbances) can influence the distribution of plants or patterning of vegetation, which are documented in the rapid assessments. In turn, these vegetation patterns can influence the distribution of animals across the landscape.

The quantitative vegetation data recorded in the rapid assessments can be described with standard classification techniques and descriptions, and they can be depicted in maps across any landscape. Additional information recorded in the assessments, such as disturbance history and anthropogenic impacts, can serve to define habitat quality and integrity for plant and animal distributions. Because this method provides an important means for representing the full array of biological diversity as well as habitat integrity in an area, it can also be an effective and efficient tool for conducting natural resource planning.

Purpose

The Vegetation Program has adopted the rapid assessment method to update the location, distribution, species composition, and disturbance information of vegetation types as identified in the first edition of *A Manual of California Vegetation* (MCV), a CNPS publication. The release of the MCV heralded a new statewide perspective on vegetation classification. The premise of the book – all vegetation can be quantified based on cover, constancy, and composition of plant species, yielding uniform defensible definitions of vegetation units – has proven to be very useful throughout California and the rest of the nation. The MCV has become the standard reference on California vegetation and has been adopted by many agencies such as California Department of Fish and Game, the National Park Service, California State Parks, and the U.S. Forest Service as the standard approach to classify vegetation statewide.

One of the most important purposes of rapid assessments is to verify the locations of each vegetation type because much about the geography of vegetation remains uncertain in this state. To obtain a more accurate understanding of the location and distribution of the vegetation types, nothing short of systematic inventory will suffice. Using the rapid assessment method, CNPS Chapters and other organizations can work together in selected ecological regions to gather

vegetation data over a short time period in a broad area. This geographic inventory of vegetation types can greatly advance the current distribution understanding of vegetation.

In addition, California is working with a new vegetation classification, and its parameters are largely untested. The rapid assessment method will be used to gather additional information on species composition, distribution, disturbance effects, and environmental influences of vegetation. Thus, this method will provide modifications to the existing vegetation classifications and information on new types.

This protocol can also be used in tandem with other resource assessment protocols such as wildlife assessments or aquatic/stream assessments. For example, the California Wildlife Habitat Relationships (CWHR) protocols have been used in conjunction with the vegetation assessment protocol to obtain detailed records on habitat quality and suitability for vertebrate animals in terrestrial habitats. The CWHR protocols can also help test the relationships between the vegetation type and habitat of various animals and thereby refine the understanding and predictability of the distribution of animals. A portion of the CWHR protocols is incorporated into the rapid assessment method to obtain suitability information for vertebrate species.

While people can quickly obtain information on the variety of vegetation types using this method, some of the vegetation types recorded in the rapid assessment process may be poorly defined in the current classification system. These poorly understood or unknown types will be identified and located and then will be prioritized for more detailed assessment using the CNPS relevé protocol. Thus, the rapid assessment method will be used in conjunction with the relevé method to provide large quantities of valuable data on the distribution and the definition of vegetation. These data will be entered into existing databases for summarizing and archiving, and they will be used to modify and improve statewide vegetation classification and conservation information.

Why do we need to know about the composition and distribution of vegetation?

- to have a more accurate understanding of the commonness and rarity of different forms of vegetation throughout the state
- to link the distribution of various rare and threatened plant species with the vegetation units
- to provide a clearer picture of relationships between vegetation types
- to help prioritize community-based land conservation goals based on the local representation of unique types, high diversity areas, etc.
- to do the same for regional vegetation throughout the state and the nation.
- to broaden the vegetation knowledge base for California
- to motivate people to do more to help identify, protect, and conserve vegetation in their area
- to link vegetation types with habitat for animals

Selecting stands to sample:

To start the rapid assessment method, stands 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, a sparse woodland occupying a slope with very shallow rocky soils would be considered a different stand from an adjacent slope with deeper, moister soil and a denser woodland or forest of the same species.

The 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.

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).

Definitions of fields in the protocol

LOCATIONAL/ENVIRONMENTAL DESCRIPTION

Polygon/Stand #: Number assigned either in the field or in the office prior to sampling. It is usually denoted with an abbreviation of the sampling location and then a sequential number of that locale (*e.g.* CRRA-001 for Coyote Ridge rapid assessment number 1).

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 rapid assessment. In successive assessments, 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 stand location. These waypoints can be downloaded from the GPS into a computer Geographic Information System to depict sample points accurately on a map.

GPS name: The name personally assigned to each GPS unit (especially useful if more than one GPS unit is used to mark waypoints for the project).

GPS datum: (NAD 27) The map datum that is chosen for GPS unit to document location coordinates. The default datum for CNPS projects is NAD 27. However, other agencies and organizations may prefer another datum. Please circle NAD27 or write in the appropriate datum.

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, or circle "No" to denoted the waypoint was taken at a distance from the stand (such as with a binocular view of the stand).

If No cite distance (note ft/m), bearing and view from point to stand: An estimate of the number of feet or meters (please circle appropriate), the compass bearing from the waypoint of GPS to the stand, and the method of view used to verify the plot (*e.g*. binoculars, aerial photo).

Error: ± The accuracy of the GPS location, when taking the UTM field reading. Please denote feet (ft) or meters (m). It is typical for all commercial GPS units to be accurate to within 5 m (or 16 ft.) of the actual location, because the military's intentional imprecision (known as "selective availability") has been "turned off" as of July 2000. Please become familiar with your GPS unit's method of determining error. Some of the lower cost models do not have this ability. If using one of those, insert N/A in this field.

UTM field reading: Easting (UTME) and northing (UTMN) location coordinates using the Universal Transverse Mercator (UTM) grid. Record using a GPS unit or USGS topographic map.

UTM zone: Universal Transverse Mercator zone. Zone 10S for California west of the 120th longitude; zone 11S for California east of 120th longitude.

Elevation: Recorded from the GPS unit or USGS topographic map. Please denote feet (ft) or meters (m), and note if reading is from GPS unit or map. (Please note: Readings taken from a GPS unit can be hundreds of feet off.)

Photograph #'s: Note the roll number, frame number, direction, and the name of the person whose camera is being used. Take at least two photographs from different directions, and describe the location and view direction from compass bearings for each frame. Additional photographs of the stand may also be helpful. (Also, if using a digital camera or scanning the image into a computer, positions relative to the polygon/stand number can be recorded digitally.)

Topography: Check two of the provided features, characterizing both the local relief and the broad topographic position of the area. First assess the minor topographic features or the lay of the area (*e.g.* surface is flat, concave, etc.). Then assess the broad topographic feature or general position of the area (*e.g.* stand is at the bottom, lower (1/3 of slope), middle (1/3 of slope), upper (1/3 of slope), or top).

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

% Large Rock (optional): Estimate the percent surface cover of large rocks (e.g. stones, boulders, bedrock) that are beyond 25 cm in size.

% Small Rock (optional): Estimate the percent surface cover of small rocks (e.g. gravel, cobbles) that are greater than 2 mm and less than 25 cm in size.

% Bare/Fines (optional): Estimate the percent surface cover of bare ground and fine sediment (e.g. dirt) that is 2 mm or less in size.

General slope exposure (circle one and enter actual º): Read degree aspect from a compass or clinometer (or estimate). Make sure to average the reading across entire stand. "Variable" may be selected if the same, homogenous stand of vegetation occurs across a varied range of slope exposures.

General slope steepness (circle one and enter actual º): Read degree slope from compass (or estimate), using degrees from true north (adjusting for declination). Average the reading over entire stand.

Upland or Wetland/Riparian (circle one) Indicate if the stand is in an upland or a wetland; note that a site need not be officially delineated as a wetland to qualify as such in this context (*e.g.* seasonally wet meadow).

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.

Type / level of disturbance (use codes): 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). *See code list for impacts.*

VEGETATION DESCRIPTION

Basic alliance and stand description

Field-assessed vegetation alliance name: Name of alliance (series) or habitat following the CNPS classification system (Sawyer and Keeler-Wolf 1995). Please use binomial 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 (and a diagnostic is consistently found in some vegetation types but not others).

Please note: The field-assessed alliance name may not exist in present classification, in which you can provide a new alliance name in this field. If this is the case, also make sure to denote and explain this in the "Cannot identify alliance based on MCV classification" of the "**Problems with Interpretation**" section below.

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 agrifolia/Toxicodendron diversilobum*). Species in the same stratum are separated with a dash (*e.g. Quercus agrifolia-Quercus kelloggii).*

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

Size of stand: Estimate the size of the entire stand in which the rapid assessment is taken. As a measure, one acre is about 0.4 hectares or about 4000 square meters.

Adjacent Alliances: Identify other vegetation types that are directly adjacent to the stand being assessed. Specifically, list up to three alliances (or associations or mapping units) by noting the dominant species; 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. Abies concolor-Pinus ponderosa 50m, 360°/N Arctostaphylos patula 100m, 110°).

Habitat classification 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: Circle one of the tree size classes provided 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 dbh (diameter of trunk at breast height). In

choosing a size class, make sure to estimate the mean diameter of all trees over the entire stand. Circle the size class 6 multi-layered tree if there is a size class 5 of trees over a distinct layer of size class either 3 or 4 (*i.e.* distinct height class separation between different tree species) and the total tree canopy exceeds 60%.

If tree, list 1-3 dominant overstory species: If tree canopy cover exceeds 10 percent (except in desert types), please list the dominant species that occur in the overstory canopy.

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

Herbaceous: Circle one of the herb height classes provided when herbaceous cover exceeds 2 percent. This height class is based on the average plant height at maturity.

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

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

Overall cover of vegetation Provide an ocular estimate of cover for the following categories (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.

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.

%Overstory Conifer/Hardwood Tree cover: The total aerial cover (canopy closure) of all live tree species that are specifically in the overstory or are emerging, disregarding overlap of individual trees. Estimate conifer and hardwood covers separately. Please note: These cover values should not include the coverage of suppressed understory trees.

Shrub cover: The total aerial cover (canopy closure) of all live shrub species, disregarding overlap of individual shrubs.

Ground cover: The total aerial cover (canopy closure) of all herbaceous species, disregarding overlap of individual herbs.

Total Veg cover: The total aerial cover of all vegetation. This is an estimate of the absolute vegetation cover, disregarding overlap of the various tree, shrub, and/or herbaceous layers.

Modal height for conifer/hardwood tree, shrub, and herbaceous categories (optional)
If height values are important in your vegetation survey project, provide an ocular estimate of height for each category listed. Record an average height value, estimating the modal height for each group. Use the following height intervals and record a height class: 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 list and coverage
Species (List up to 12 major species), Stratum, and Approximate % cover: (Jepson Manual nomenclature please)
List the species that are dominant or that are characteristically consistent throughout the stand.

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. Provide a stratum code for each species listed, based on height, where T (=Tall) is >5 m in height, M (=Medium) is between 0.5 and 5 m in height, and L (=Low) is <0.5 m in height.

Also, provide a numerical ocular estimate of aerial coverage for each species. When estimating, it is often helpful to think of coverage in terms of the cover intervals from the CNPS relevé form at first (*e.g.* <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 (*e.g* the cover of species "x" is somewhere between 25 and 50 percent, but I think it is actually around 30%). Please note: All estimates are to be reported as absolute cover (not relative cover), and all the species percent covers may total over 100% when added up because of overlap.

Major non-native species in stand (with % cover): All exotic species occurring in the stand should be listed in this space provided (or they can be recorded in the above Species list). Make sure to give each exotic species an absolute coverage estimate.

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

PROBLEMS WITH INTERPRETATION

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. 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.

Explain: Please elaborate if your "Confidence in Identification" is low or moderate. Similarly, if the field-assessed alliance name is not defined by CNPS's present Manual of California Vegetation (MCV) classification, note this in the space and describe why. In some instances for specific projects, there may be the benefit of more detailed classifications than what is presented in the first edition of the MCV. If this is the case, be sure to substitute the most appropriate and detailed classification.

Other identification problems (describe): Discuss any further problems with the identification of the assessment (*e.g.* stand is observed with an oblique view using binoculars, so the species list may be incomplete, or the cover percentages may be imperfect).

Polygon is more than one type (Yes, No) (Note: type with greatest coverage in polygon should be entered in above section) This is relevant to areas that have been delineated as polygons on aerial photographs for a vegetation-mapping project. In most cases the polygon delineated is intended to represent a single stand, however mapping conventions and the constraints and

interpretability of remote images will alter the ability to map actual stands on the ground. “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.

Other types: If “Yes” above, then list the other subordinate vegetation alliances that are included within the polygon. List them in order of their amount of the polygon covered.

Has the vegetation changed since air photo taken? (Yes, No) If an aerial photograph is being used for reference, evaluate if the stand of the field-assessed alliance has changed as a result of disturbance or other historic change since the photograph was taken.

If Yes, how? What has changed (write N/A if so)**?** If the photographic signature of the vegetation has changed (*e.g.* in structure, density, or extent), please detail here.

Simplified Key to Soil Texture (Brewer and McCann, 1982)

Place about three teaspoons of soil in the palm of your hand. Take out any particles <2mm in size, and use the following key to figure out the soil texture (e.g. loamy sand). Then figure out the texture subclass by using the Code List attached (e.g. coarse loamy sand).

A1 Soil does not remain in a ball when squeezed.....…..…..... sand

A2 Soil remains in a ball when squeezed.....…..…..... B

B1 Add a small amount of water. Squeeze the ball between your thumb and forefinger, attempting to make a ribbon that you push up over your finger. Soil makes no ribbon.....…..…….….loamy sand

B2 Soil makes a ribbon; may be very short.....….....C

C1 Ribbon extends less than 1 inch before breaking.....….....D

C2 Ribbon extends 1 inch or more before breaking.....….....E

D1 Add excess water to small amount of soil; soil feels very gritty or at least slightly gritty .....….....loam or sandy loam

D2 Soil feels smooth.....….....silt loam

E1 Soil makes a ribbon that breaks when 1–2 inches long; cracks if bent into a ring.....F

E2 Soil makes a ribbon 2+ inches long; does not crack when bent into a ring.....G

F1 Add excess water to small amount of soil; soil feels very gritty or at least slightly gritty.....….sandy clay loam or clay loam

F2 Soil feels smooth.....…...silty clay loam or silt

G1 Add excess water to a small amount of soil; soil feels very gritty or at least slightly gritty.....…….....sandy clay or clay

G2 Soil feels smooth.....…..….....silty clay

CALIFORNIA NATIVE PLANT SOCIETY RELEVÉ FIELD FORM CODE LIST

(revised 7/8/02)**PACTS**

01 Development
02 ORV activity
03 Agriculture
04 Grazing
05 Competition from exotics
06 Logging
07 Insufficient population/stand size
08 Altered flood/tidal regime
09 Mining
10 Hybridization
11 Groundwater pumping
12 Dam/inundation
13 Other
14 Surface water diversion
15 Road/trail construction/maint.
16 Biocides
17 Pollution
18 Unknown
19 Vandalism/dumping/litter
20 Foot traffic/trampling
21 Improper burning regime
22 Over collecting/poaching
23 Erosion/runoff
24 Altered thermal regime
25 Landfill
26 Degrading water quality
27 Wood cutting
28 Military operations
29 Recreational use (non ORV)
30 Nest parasitism
31 Non-native predators
32 Rip-rap, bank protection
33 Channelization (human caused)
34 Feral pigs
35 Burros
36 Rills
37 Phytogenic mounding

MACRO TOPOGRAPHY

00 Bench
01 Ridge top (interfluve)
02 Upper 1/3 of slope
03 Middle 1/3 of slope
04 Lower 1/3 of slope (lowslope)
05 Toeslope (alluvial fan/bajada)
06 Bottom/plain
07 Basin/wetland
08 Draw
09 Other
10 Terrace (former shoreline or floodplain)
11 Entire slope
12 Wash (channel bed)
13 Badland (complex of draws & interfluves)
14 Mesa/plateau
15 Dune/sandfield
16 Pediment
17 Backslope (cliff)

MICRO TOPOGRAPHY

01 Convex or rounded
02 Linear or even
03 Concave or depression
04 Undulating pattern
05 Hummock or Swale pattern
06 Mounded
07 Other

PARENT MATERIAL

ANDE	Andesite
ASHT	Ash (of any origin)
GRAN	Granitic (generic)
GREE	Greenstone
DIOR	Diorite
BASA	Basalt
OBSI	Obsidian
PUMI	Pumice
IGTU	Igneous (type unknown)
MONZ	Monzonite
PYFL	Pyroclastic flow
QUDI	Quartz diorite
RHYO	Rhyolite
VOLC	General volcanic extrusives
VOFL	Volcanic flow
VOMU	Volcanic mud
BLUE	Blue schist
CHER	Chert
DOLO	Dolomite
FRME	Franciscan melange
INTR	General igneous intrusives
GNBG	Gneiss/biotite gneiss
HORN	Hornfels
MARB	Marble
METU	Metamorphic (type unknown)
PHYL	Phyllite
SCHI	Schist
SESC	Semi-schist
SLAT	Slate
BREC	Breccia (non-volcanic)
CACO	Calcareous conglomerate
CASA	Calcareous sandstone
CASH	Calcareous shale
CASI	Calcareous siltstone
CONG	Conglomerate
FANG	Fanglomerate
GLTI	Glacial till, mixed origin, moraine
LALA	Large landslide (unconsolidated)
LIME	Limestone
SAND	Sandstone
SETU	Sedimentary (type unknown)
SHAL	Shale
SILT	Siltstone
DIAB	Diabase
GABB	Gabbro
PERI	Peridotite
SERP	Serpentine
ULTU	Ultramafic (type unknown)
CALU	Calcareous (origin unknown)
DUNE	Sand dunes
LOSS	Loess
MIIG	Mixed igneous
MIME	Mixed metamorphic
MIRT	Mix of two or more rock types
MISE	Mixed sedimentary
CLAL	Clayey alluvium
GRAL	Gravelly alluvium
MIAL	Mixed alluvium
SAAL	Sandy alluvium (most alluvial fans and washes)
SIAL	Silty alluvium
OTHE	Other than on list

SOIL TEXTURE

COSA	Coarse sand
MESN	Medium sand
FISN	Fine sand
COLS	Coarse, loamy sand
MELS	Medium to very fine, loamy sand
MCSL	Moderately coarse, sandy loam
MESAL	Medium to very fine, sandy loam
MELO	Medium loam
MESIL	Medium silt loam
MESI	Medium silt
MFCL	Moderately fine clay loam
MFSA	Moderately fine sandy clay loam
MFSL	Moderately fine silty clay loam
FISA	Fine sandy clay
FISC	Fine silty clay
FICL	Fine clay
SAND	Sand (class unknown)
LOAM	Loam (class unknown)
CLAY	Clay (class unknown)
UNKN	Unknown
PEAT	Peat
MUCK	Muck

DOMINANT VEGETATION GROUP

Trees:

TBSE	Temperate broad-leaved seasonal evergreen forest
TNLE	Temperate or subpolar needle-leafed evergreen forest
CDF	Cold-deciduous forest
MNDF	Mixed needle-leafed evergreen-cold deciduous. forest
TBEW	Temperate broad-leaved evergreen woodland
TNEW	Temperate or subpolar needle-leaved evergreen woodland
EXEW	Extremely xeromorphic evergreen woodland
CDW	Cold-deciduous woodland
EXDW	Extremely xeromorphic deciduous woodland
MBED	Mixed broad-leaved evergreen-cold deciduous woodland
MNDW	Mixed needle-leafed evergreen-cold deciduous woodland

Shrubs:

TBES	Temperate broad-leaved evergreen shrubland
NLES	Needle-leafed evergreen shrubland
MIES	Microphyllus evergreen shrubland
EXDS	Extremely xeromorphic deciduous shrubland
CDS	Cold-deciduous shrubland
MEDS	Mixed evergreen-deciduous shrubland
XMED	Extremely xeromorphic mixed evergreen-deciduous shrubland

Dwarf Shrubland:

NMED	Needle-leafed or microphyllous evergreen dwarf shrubland
XEDS	Extremely xeromorphic evergreen dwarf shrubland
DDDS	Drought-deciduous dwarf shrubland
MEDD	Mixed evergreen cold-deciduous dwarf shrubland

Herbaceous:

TSPG	Temperate or subpolar grassland
TGST	Temperate or subpolar grassland with sparse tree
TGSS	Temperate or subpolar grassland with sparse shrublayer
TGSD	Temperate or subpolar grassland with sparse dwarf shrub layer
TFV	Temperate or subpolar forb vegetation
THRV	Temperate or subpolar hydromorphic rooted vegetation
TAGF	Temperate or subpolar annual grassland or forb vegetation

***Sparse Vegetation*:**

SVSD	Sparsely vegetated sand dunes
SVCS	Sparsely vegetated consolidated substrates

Appendix A2. Field Protocol and Field Data Form used for vegetation sampling in 2008.

CNPS VEGETATION FIELD FORM FOR SJV and SSNF

Relevé or Rapid Assessment (Circle One) (Revised Apr. 14, 2008)

For Office Use:	Final database #:	Final vegetation type name:	Alliance_____ Association

I. LOCATIONAL/ENVIRONMENTAL DESCRIPTION

Polygon/Stand #:	Air photo:	Date:	Name(s) of surveyors (circle recorder):

GPS wypt #: _____ GPS name: _____ Datum: _____ or NAD83. Bearing, left axis at SW pt_____ (degrees) of Long / Short side

UTME ___ ___ ___ ___ ___ ___ UTMN ___ ___ ___ ___ ___ ___ ___ Zone: 10 / 11 (circle one) GPS Error: ±____ ft / m

GPS within stand? Yes / No If No, cite from waypoint to stand, distance _____(meters) & bearing _____(degrees)

Elevation: ft / m Camera/Photograph #'s:

Stand Size (acres): <1, 1-5, >5 | Plot Size (m^2): 10 / 100 / 400 / 1000 | Plot Shape ___ x___ ft / m or Circle Radius____ft / m

Exposure, Actual °: _____ NE NW SE SW Flat Variable /All | Steepness, Actual °: _____ 0° 1-5° 5-25° > 25°

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

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

% Surface cover

H20:____ BA Stems:____ Litter: ____ Bedrock:____ Boulder:____ Stone:____ Cobble: _____ Gravel:____ Fines:_____ =100%
. (Incl. outcrops) (>60cm diam) (25-60cm) (7.5-25cm) (2mm-7.5cm) (Incl sand, mud)

% Current year bioturbation _____ Past bioturbation present? Y / N | % Hoof punch _____

Site history, stand age, comments:

Type/ Level of disturbance codes: _____/____ _____/____ _____/____ _____/____ _____/____ "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), S3 mature (1-25% dead), S4 decadent (>25% dead)

Herbaceous: H1 (<12" plant ht.), H2 (>12" ht.) % Non-Vasc cover: _____ Total % Vasc Veg cover:_____

% Cover -Overstory Tree Conifer/Hardwood: _____/_____ Low-Medium Tree: _____ Shrub: _____ Herbaceous: _____

Height Class - Overstory Conifer/Hardwood: _____/_____ Low-Medium Tree: _____ Shrub: _____ Herbaceous: _____

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= Overstory tree, U= Low-Medium Tree, S = Shrub, H= Herb, N= Non-vascular.
% cover intervals for reference: <1%, 1-5%, >5-15%, >15-25%, >25-50%, >50-75%, 75%.

Strata	Species	% cover		Strata	Species	% cover

Unusual species: _____

III. INTERPRETATION OF STAND

Field-assessed vegetation alliance name: _____

Field-assessed association name (optional): _____

Adjacent alliances: _____

Confidence in alliance identification: L M H Explain: _____

Phenology (E,P,L): Herb____ Shrub____ Tree____ Other identification or mapping information:

CALIFORNIA NATIVE PLANT SOCIETY –
PROTOCOL FOR COMBINED
VEGETATION RELEVÉ AND RAPID ASSESSMENT SAMPLING FORM FOR THE SAN JOAQUIN VALLEY – SOUTHERN SIERRA NEVADA FOOTHILLS – CARRIZO PROJECT
CNPS VEGETATION COMMITTEE
(November 5, 2001, Revised April 14, 2008)

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 18, 2008. 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.

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 with the least amount of effort. 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
Shrublands: 400 sq. m plot
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, you need to sample 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 One).

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).

Air photo #: Leave blank for this project

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 default GPS datum for this project is NAD 83. If you are using another datum for some reason, denote it here.

Bearing, left axis at SW pt (note in degrees) of Long or Short side: For square or rectangular plots: from the SW corner (=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, W/E should run along the short side while N/S should run along the long side of the rectangle.

UTM coordinates: Easting (UTME) and northing (UTMN) location coordinates using the Universal Transverse Mercator (UTM) grid. Record using a GPS unit.

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

Error: ± The accuracy of the GPS location, when taking the UTM field reading. Please denote feet (ft) or meters (m). 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" to

denoted 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 feet or meters (please circle appropriate), the compass bearing from the waypoint of GPS to the stand.

Elevation: Recorded from the GPS unit or USGS topographic map. Please denote 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, or 208 feet by 208 feet.

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

Plot Shape: Denote the length and width of the plot and include measurement units (i.e., ft or m). If it is a circular plot, enter radius (or just check).

Exposure: (Enter actual º and circle general category): Read degree slope from compass (or estimate), using degrees from north, adjusted for declination. Average the reading over entire stand, even if you are sampling a relevé plot, since your plot is representative of the stand. "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 º and circle general category): Read degree aspect from a compass or clinometer (or estimate). Make sure to average the reading across 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. 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 "Y"(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.

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.

Type / level of disturbance (use codes): 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, 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). You can record tree size class by circling the main size class(es), 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.*

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.

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 and bryophytes (mosses, liverworts, hornworts) on substrate surfaces including downed logs, rocks and soil, but not on standing or inclined trees.

% Total Vasc Veg cover: The total aerial cover of all vascular vegetation. This is an estimate of the absolute vegetation cover, disregarding overlap of the various tree, shrub, and/or herbaceous layers and species.

%Overstory Conifer/Hardwood Tree: The total aerial cover (canopy closure) of all live tree species that are specifically in the overstory or are emerging, disregarding overlap of individual trees. Estimate conifer and hardwood covers separately. Please note: These cover values should not include the coverage of suppressed understory trees.

%Low-Medium Tree: The total aerial cover (canopy closure) of all live understory low to medium height tree species, disregarding overlap of individual trees and shrubs. This category contains recruits of overstory tree species (with seedlings and saplings in the understory) and understory tree species that typically do not make up the overstory canopy (*e.g.*, trees that typically do not attain a height >10m).

%Shrub: The total aerial cover (canopy closure) of all live shrub species disregarding overlap of individual shrubs.

%Herbaceous: The total aerial cover (canopy closure) of all herbaceous species, disregarding overlap of individual herbs.

Modal height for conifer/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=1-2m, 04=2-5m, 05=5-10m, 06=10-15m, 07=15-20m, 08=20-35m, 09=35-50m, 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= Overstory tree, U= Understory tree, S = Shrub, H= Herb, N= Non-vascular. Note that Understory tree includes seedlings and saplings of trees that may be in the overstory.

Use Jepson Manual nomenclature.

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.

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 species list will be useful to the Program for obtaining data on regionally or locally significant populations of plants.

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.

INTERPRETATION OF STAND

Field-assessed vegetation alliance name: Name of alliance or habitat following the CNPS classification system (Sawyer and Keeler-Wolf 1995). 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 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 present classification, in which you can provide a new association name in this field.

Adjacent Alliances: 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, and if so, 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."

CALIFORNIA NATIVE PLANT SOCIETY RELEVÉ FIELD FORM CODE LIST (revised 3/0107)

MACRO TOPOGRAPHY

00 Bench
01 Ridge top (interfluve)
02 Upper 1/3 of slope
03 Middle 1/3 of slope
04 Lower 1/3 of slope (lowslope)
05 Toeslope (alluvial fan/bajada)
06 Bottom/plain
07 Basin/wetland
08 Draw
09 Other
10 Terrace (former shoreline or floodplain)
11 Entire slope
12 Wash (channel bed)
13 Badland (complex of draws & interfluves)
14 Mesa/plateau
15 Dune/sandfield
16 Pediment
17 Backslope (cliff)

MICRO TOPOGRAPHY

01 Convex or rounded
02 Linear or even
03 Concave or depression
04 Undulating pattern
05 Hummock or Swale pattern
06 Mounded
07 Other

SITE IMPACTS

01 Development
02 ORV activity
03 Agriculture
04 Grazing
05 Competition from exotics
06 Logging
07 Insufficient population/stand size
08 Altered flood/tidal regime
09 Mining
10 Hybridization
11 Groundwater pumping
12 Dam/inundation
13 Other
14 Surface water diversion
15 Road/trail construction/maint.
16 Biocides
17 Pollution
18 Unknown
19 Vandalism/dumping/litter
20 Foot traffic/trampling
21 Improper burning regime
22 Over collecting/poaching
23 Erosion/runoff
24 Altered thermal regime
25 Landfill
26 Degrading water quality
27 Wood cutting
28 Military operations
29 Recreational use (non ORV)
30 Nest parasitism
31 Non-native predators
32 Rip-rap, bank protection
33 Channelization (human caused)
34 Feral pigs
35 Burros
36 Rills
37 Phytogenic mounding
38 Sudden oak death syndrome (SODS)

PARENT MATERIAL

IGTU	Igneous (type unknown)
VOLC	General volcanic extrusives
RHYO	Rhyolite
ANDE	Andesite
BASA	Basalt
ASHT	Ash (of any origin)
OBSI	Obsidian
PUMI	Pumice
PYFL	Pyroclastic flow
VOFL	Volcanic flow
VOMU	Volcanic mud
INTR	General igneous intrusives
GRAN	Granitic (generic)
MONZ	Monzonite
QUDI	Quartz diorite
DIOR	Diorite
GABB	Gabbro
DIAB	Diabase
PERI	Peridotite
METU	Metamorphic (type unknown)
GNBG	Gneiss/biotite gneiss
SERP	Serpentine
SCHI	Schist
SESC	Semi-schist
PHYL	Phyllite
SLAT	Slate
HORN	Hornfels
BLUE	Blue schist
MARB	Marble
SETU	Sedimentary (type unknown)
BREC	Breccia (non-volcanic)
CONG	Conglomerate
FANG	Fanglomerate
SAND	Sandstone
SHAL	Shale
SILT	Siltstone
CACO	Calcareous conglomerate
CASA	Calcareous sandstone
CASH	Calcareous shale
CASI	Calcareous siltstone
DOLO	Dolomite
LIME	Limestone
CALU	Calcareous (origin unknown)
CHER	Chert
FRME	Franciscan melange
GREE	Greenstone
ULTU	Ultramafic (type unknown)
MIIG	Mixed igneous
MIME	Mixed metamorphic
MISE	Mixed sedimentary
MIRT	Mix of two or more rock types
GLTI	Glacial till, mixed origin, moraine
LALA	Large landslide (unconsolidated)
DUNE	Sand dunes
LOSS	Loess
CLAL	Clayey alluvium
GRAL	Gravelly alluvium
MIAL	Mixed alluvium
SAAL	Sandy alluvium (most alluvial fans and washes)
SIAL	Silty alluvium
OTHE	Other than on list

SOIL TEXTURE

COSA	Coarse sand
MESN	Medium sand
FISN	Fine sand
COLS	Coarse, loamy sand
MELS	Medium to very fine, loamy sand
MCSL	Moderately coarse, sandy loam
MESA	Medium to very fine, sandy loam
MELO	Medium loam
MESL	Medium silt loam
MESI	Medium silt
MFCL	Moderately fine clay loam
MFSA	Moderately fine sandy clay loam
MFSL	Moderately fine silty clay loam
FISA	Fine sandy clay
FISC	Fine silty clay
FICL	Fine clay
SAND	Sand (class unknown)
LOAM	Loam (class unknown)
CLAY	Clay (class unknown)
UNKN	Unknown
PEAT	Peat
MUCK	Muck

DOMINANT VEGETATION GROUP

Trees:

TBSE	Temperate broad-leaved seasonal evergreen forest
TNLE	Temperate or subpolar needle-leafed evergreen forest
CDF	Cold-deciduous forest
MNDF	Mixed needle-leafed evergreen-cold deciduous. forest
TBEW	Temperate broad-leaved evergreen woodland
TNEW	Temperate or subpolar needle-leaved evergreen woodland
EXEW	Extremely xeromorphic evergreen woodland
CDW	Cold-deciduous woodland
EXDW	Extremely xeromorphic deciduous woodland
MBED	Mixed broad-leaved evergreen-cold deciduous woodland
MNDW	Mixed needle-leafed evergreen-cold deciduous woodland

Shrubs:

TBES	Temperate broad-leaved evergreen shrubland
NLES	Needle-leafed evergreen shrubland
MIES	Microphyllus evergreen shrubland
EXDS	Extremely xeromorphic deciduous shrubland
CDS	Cold-deciduous shrubland
MEDS	Mixed evergreen-deciduous shrubland
XMED	Extremely xeromorphic mixed evergreen-deciduous shrubland

Dwarf Shrubland:

NMED	Needle-leafed or microphyllous evergreen dwarf shrubland
XEDS	Extremely xeromorphic evergreen dwarf shrubland
DDDS	Drought-deciduous dwarf shrubland
MEDD	Mixed evergreen cold-deciduous dwarf shrubland

Herbaceous:

TSPG	Temperate or subpolar grassland
TGST	Temperate or subpolar grassland with sparse tree
TGSS	Temperate or subpolar grassland with sparse shrublayer
TGSD	Temperate or subpolar grassland with sparse dwarf shrub layer
TFV	Temperate or subpolar forb vegetation
THRV	Temperate or subpolar hydromorphic rooted vegetation
TAGF	Temperate or subpolar annual grassland or forb vegetation

***Sparse Vegetation*:**

SVSD	Sparsely vegetated sand dunes
SVCS	Sparsely vegetated consolidated substrates

Simplified Key to Soil Texture (Adapted from Brewer and McCann 1982)

Place about three teaspoons of soil in the palm of your hand. Take out any particles ≥ 3 mm in size.

A. Does soil remain in ball when squeezed in your hand palm?

Yes, soil does remain in a ball when squeezed..... **B**

No, soil does not remain in a ball when squeezed..... **sand**

SAND Sand (class unknown)
Very coarse texture……COSA Coarse sand
Moderately coarse texture…… MESN Medium sand
Moderately fine texture…….. FISN Fine sand

B. Add a small amount of water until the soil feels like putty. Squeeze the ball between your thumb and forefinger, attempting to make a ribbon that you push up over your finger. Does soil make a ribbon?

Yes, soil makes a ribbon; though it may be very short.....**C**

No, soil does not make a ribbon.....**loamy sand**

Very gritty with coarse particles….....COLS Coarse, loamy sand
Moderately to slightly gritty with medium to fine particles.....MELS Medium to very fine, loamy sand

C. Does ribbon extends more than one inch?

Yes, soil extends > 1 inch.....**D**

No, soil does not extend > 1 inch.....Add excess water

Soil feels gritty……..…….…….....**loam or sandy loam**

LOAM Loam (class unknown)
Very gritty with coarse particles….....MCSL Moderately coarse, sandy loam
Moderately gritty with medium to fine particles.....MESA Medium to very fine, sandy loam
Slightly gritty .....MELO Medium loam

Soil feels smooth.....**silt loam**

MESIL medium silt loam

D. Does soil extend more than 2 inches?

Yes, ribbon extends more than 2 inches, and does not crack if bent into a ring.....**E**

No, soil breaks when 1–2 inches long; cracks if bent into a ring……...Add excess water

Soil feels gritty….....**sandy clay loam or clay loam**

Very gritty……..……..... MFSA Moderately fine sandy clay loam
Slightly gritty……MFCL Moderately fine clay loam

Soil feels smooth.....…….**silty clay loam or silt**

Moderately fine texture……..MFSL Moderately fine silty clay loam
Very fine texture…….. MESI Medium silt

E. Soil makes a ribbon 2+ inches long; does not crack when bent into a ring.....Add excess water

Soil feels gritty.....**sandy clay or clay**

CLAY Clay (class unknown)
Very gritty…… FISA Fine sandy clay
Slightly gritty…….. FICL Fine clay

Soil feels smooth.....…….….....**silty clay**

FISC Fine silty clay

UNKN = Unknown PEAT = Peat MUCK = Muck

Appendix B. The National Vegetation Classification Hierarchy as Applied to Vegetation of the California Department of Fish and Game Carrizo Plain Ecological Reserve, including the Chimineas, American, Panorama, and Elkhorn Units, San Luis Obispo County, California

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Hierarchy Format:
Level 1 - Formation Class
Level 2 - Formation Sub Class
Level 3 - Formation
Level 4 - Division
Level 5 - Macrogroup
Level 6 - Group
Level 7 - Alliance
Level 8 - Association

Formation Class- Mesomorphic Tree Vegetation (Forest and Woodland)
Formation Sub Class - Temperate Forest
Formation - Warm Temperate Forest
Division - Madrean Forest and Woodland
Macrogroup - California Forest and Woodland
Group - Californian broadleaf forest and woodland
Alliance - Quercus agrifolia
Alliance - Quercus douglasii
Association - Quercus douglasii - Juniperus californica / Ericameria linearifolia
Association - Quercus douglasii / Ericameria linearifolia
Association - Quercus douglasii / Herbaceous
Group - Californian evergreen coniferous forest and woodland
Alliance - Juniperus californica
Association - Juniperus californica / Ericameria linearifolia / Herbaceous
Association - Juniperus californica / Herbaceous
Association - Juniperus californica / Salvia leucophylla
Association - Juniperus californica / Ericameria linearifolia -

(Eriogonum fasciculatum) / Herbaceous Provisional

Formation - Temperate Flooded and Swamp Forest*

Division - Western North America Warm Temperate Flooded and Swamp Forest

Macrogroup - Southwestern North American Riparian, Flooded and Swamp Forest/Scrubland

Group - Southwestern North American riparian evergreen and deciduous woodland

Alliance - Populus fremontii

Group - Southwestern North American riparian/wash scrub

Alliance - Baccharis salicifolia

Association - Baccharis salicifolia - Pluchea sericea

Formation Class - Mesomorphic Shrub and Herb Vegetation (Shrubland and Grassland)

Formation Sub Class - Mediterranean Scrub and Grassland

Formation - Mediterranean Scrub

Division - California Scrub

Macrogroup - California Chaparral

Group - Californian xeric chaparral

Alliance - Adenostoma fasciculatum

Association - Adenostoma fasciculatum - Eriogonum fasciculatum

Association - Adenostoma fasciculatum

Alliance - Adenostoma fasciculatum - Salvia mellifera

Association - Adenostoma fasciculatum - Salvia mellifera

Alliance - Arctostaphylos glauca

Association - Adenostoma fasciculatum - Arctostaphylos glauca

Alliance -Ceanothus cuneatus

Association - Adenostoma fasciculatum - Ceanothus cuneatus

Group - Californian mesic chaparral

Alliance - Quercus berberidifolia

Association - Quercus berberidifolia - Cercocarpus montanus

Association - Quercus berberidifolia - Ceanothus cuneatus

Macrogroup - California Coastal Scrub

Group - Central and South Coastal Californian coastal sage scrub

Alliance - Artemisia californica

Association - Artemisia californica
Alliance - Artemisia californica - Eriogonum fasciculatum
Association - Artemisia californica - Eriogonum fasciculatum
Alliance - Eriogonum fasciculatum
Association - Eriogonum fasciculatum - Hesperoyucca whipplei
Association - Eriogonum fasciculatum
Alliance - Salvia leucophylla
Association - Salvia leucophylla
Association - Salvia leucophylla - Artemisia californica
Alliance - Salvia mellifera
Association - Salvia mellifera - Eriogonum fasciculatum / Bromus rubens
Group - Central and south coastal California seral scrub
Alliance - Ericameria linearifolia Provisional
Alliance - Gutierrezia californica Provisional
Alliance - Lupinus albifrons
Formation - Mediterranean Grassland and Forb Meadow
Division - California Grassland and Meadow
Macrogroup - California Annual and Perennial Grassland
Group - California annual forb/grass vegetation
Alliance - Amsinckia (menziesii, tessellata)
Association - Amsinckia menziesii - Erodium spp.
Alliance - Eschscholzia (californica)
Alliance - Lasthenia californica - Plantago erecta - Vulpia microstachys
Group - California perennial grassland
Alliance - Nassella cernua Provisional
Group - Mediterranean California naturalized annual and perennial grassland
Formation Sub Class - Temperate and Boreal Shrubland and Grassland
Formation - Temperate Grassland, Meadow, and Shrubland
Division - Vancouverian and Rocky Mountain Grassland and Shrubland
Macrogroup - Western Cordilleran Montane Shrubland and Grassland
Group - Western Cordilleran montane deciduous scrub
Alliance - Ribes quercetorum Provisional

Division - Western North America Interior Sclerophyllous Shrubland
Macrogroup - Warm Interior Chaparral
Group - Western Mojave and Western Sonoran Desert borderland chaparral
Alliance - Quercus john-tuckeri
Association - Quercus john-tuckeri - Ericameria linearifolia / Juniperus californica
Formation - Temperate and Boreal Freshwater Marsh
Division - Western North American Freshwater Marsh
Macrogroup - Western North America Vernal Pool
Group - Californian mixed annual/perennial freshwater vernal pool/swale/plain bottomland
Alliance - Eleocharis acicularis
Alliance - Eleocharis macrostachya
Macrogroup - Western North America Wet Meadow and Low Shrub Carr
Group - Californian warm temperate marsh/seep
Alliance - Juncus arcticus (var. balticus, mexicanus)
Association - Juncus arcticus var. balticus
Alliance - Leymus triticoides
Formation - Temperate and Boreal Salt Marsh
Division - Temperate and Boreal Pacific Coastal Salt Marsh
Macrogroup - North American Pacific Coastal Salt Marsh
Group - Temperate Pacific tidal salt and brackish meadow
Alliance - Distichlis spicata
Association - Distichlis spicata - Herbaceous
Division - Western North American Interior Alkali–Saline Wetland
Macrogroup - Warm Semi-Desert/Mediterranean Alkali–Saline Wetland
Group - Southwestern North American alkali marsh/seep vegetation
Alliance - Schoenoplectus americanus
Association - Schoenoplectus americanus
Group - Southwestern North American salt basin and high marsh group
Alliance - Allenrolfea occidentalis
Alliance - Atriplex spinifera

Association - Atriplex spinifera / Herbaceous
Alliance - Suaeda moquinii

Formation Class - Xeromorphic Scrub and Herb Vegetation (Semi-Desert)
Formation Sub Class - Warm Semi-Desert Scrub and Grassland
Formation - Warm Semi-Desert Scrub and Grassland
Division - Sonoran and Chihuahuan Semi-Desert Scrub and Grassland
Macrogroup - Mojavean–Sonoran Desert Scrub
Group - Lower Bajada and Fan Mojavean–Sonoran desert scrub
Alliance - Atriplex polycarpa
Alliance - Ambrosia salsola
Macrogroup - Madrean Warm Semi-Desert Wash Woodland/Scrub
Group - Mojavean semi-desert wash scrub
Alliance - Ephedra californica
Association - Ephedra californica / Herbaceous
Alliance - Lepidospartum squamatum
Association - Lepidospartum squamatum - Artemisia californica
Group - Sonoran-Coloradan semi-desert wash woodland/scrub
Alliance - Pluchea sericea
Formation Sub Class - Cool Semi-Desert Scrub and Grassland
Formation - Cool Semi-Desert Scrub and Grassland
Division - Western North American Cool Semi-Desert Scrub and Grassland
Macrogroup – Western North American Cool Semi-Desert Shrubland, Shrub-Steppe
Group - Shadscale-saltbush cool semi-desert scrub
Alliance - Atriplex canescens
Macrogroup - Cool Semi-desert wash and disturbance scrub
Group - Intermontane seral shrubland
Alliance - Ericameria nauseosa
Macrogroup - Inter-Mountain Dry Shrubland and Grassland
Group - Intermontane deep or well-drained soil scrub
Alliance - Krascheninnikovia lanata
Alliance - Lycium andersonii

Appendix C. Field and mapping key for distinguishing vegetation types in the California Department of Fish and Game Carrizo Plain Ecological Reserve.

The following key was created to distinguish the mapped and classified vegetation types in the Department of Fish and Game Carrizo Plain Ecological Reserve. This key was used to attribute each photo-interpreted polygon within the map. It was written specifically for the Carrizo Plain Ecological Reserve based on data collected or observed here, so may not apply to other areas. For example, cover of California juniper, considered a tree in the National Hierarchy, may be as low as 3% and the stand will still be considered a tree type. Horticultural, non-vegetated (less than 2% total vegetation cover), and Tamarix-dominated types are not included in this key but are included in the map.

Due to the diversity of vegetation in the fine-scale 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. Broader level types (i.e., Macro Group, Group, and mapping units) that were used to attribute difficult polygons are 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. Some alliances thought to occur in the Carrizo Plain Ecological Reserve, but not sampled, are included in the key. *Please note: since there may be more than two alternatives in a group, be sure to work through all of the options in a list before you decide on the best choice.*

Terms and Concepts Used Throughout the Key

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.

Class A. Vegetation characterized by an even distribution of overstory of trees. Shrub or herbaceous species may total higher cover than trees. However, the canopy may have as low as 3% 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. However, the shrub canopy may have less than 10% total cover, especially in shrublands characterized by species that grow on 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 grass, graminoid, and broad-leaved herbaceous species. Shrubs, if present, usually comprise <10% of the vegetation. Trees, if present, generally have <5% cover **= Herbaceous Vegetation**

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…*

IA.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. A species of *Salix* is often present and may be co-dominant…

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

IA.2. *Salix laevigata* dominates with >50% relative cover in the tree canopy, or >30% relative cover with *S. lasiolepis* in the sub-canopy…

***Salix laevigata* Woodland Alliance (4113)**
***From existing classification, no survey data from this project**

IA.3. *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 existing classification, no survey data from this project**

IA.4. *Salix lasiolepis* is dominant in the shrub or tree canopy, typically with >50% relative cover…

***Salix lasiolepis* Shrubland Alliance (4114)**
***From existing classification, no survey data from this project**

IA.5. Stands not as above and characterized by any combination of the above species. *Baccharis salicifolia* may intermix. No clear dominance or co-dominance by any of these species…

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

I.B. The tree overstory is characterized by a species of *Quercus* that is evenly distributed with >2% cover. The oak may be the sole dominant tree or share dominance with *Juniperus californica*…

IB.1. *Quercus agrifolia,* which is not common in the Chimineas, dominates the tree canopy and tends to grow on soils with high organic matter. A variety of shrubs such as *Adenostoma fasciculatum, Arctostaphylos glauca, Ericameria linearifolia, Eriogonum fasciculatum* and *Rhamus ilicifolia* may be present in the understory…

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

IB.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)**

IB2.a. *Juniperus californica* is a sub- to co-dominant tree with *Quercus douglasii*, while *Ericameria linearifolia* is present in the shrub understory…

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

IB2.b. *Ericameria linearifolia* is present in the shrub understory and may mix with other shrubs such as *Eriogonum fasciculatum, Salvia leucophylla, Artemisia californica, Adenostoma fasciculatum, Rhamnus ilicifolia, and Arctostaphylos glauca*. *Juniperus californica* is absent in the tree layer…

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

IB2.c. Annual grasses and forbs dominate the understory and shrubs have low 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)**

IC. The tree canopy is characterized by an even distribution of *Juniperus californica* with >2% cover. *Quercus douglasii* is typically absent in the overstory and soils tend to be shallow and sandy or silty…

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

IC.1. *Quercus john-tuckeri* intermixes as a shrub and is similar or higher in cover to *Juniperus californica*. *Ericameria linearifolia* is present in the shrub layer and often occurs with a variety of other sub-dominant shrubs such as *Eriogonum fasciculatum* and *Salvia leucophylla…*

***Quercus john-tuckeri-Ericameria linearifolialJuniperus californica* Shrubland Association of the *Quercus john-tuckeri* Shrubland Alliance (2111)**

IC.2. *Salvia leucophylla* is present in the shrub understory. *Eriogonum fasciculatum* and/or *Ericameria linearifolia* may be sub- to co-dominant with *S. leucophylla,* or both species may be absent…

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

IC.3. Both *Ericameria linearifolia* and *Eriogonum fasciculatum* are present in the shrub understory. If *Salvia leucophylla* is present, it is sub-dominant to both *E. fasciculatum* and *E. linearifolia*…

***Juniperus californica/Ericameria linearifolia*-(*Eriogonum fasciculatum*)/Herbaceous Provisional Woodland Association (1121)**

IC.4. *Ericameria linearifolia* is present and *Eriogonum fasciculatum* is absent in the shrub understory. If *Salvia leucophylla* is present, it is sub-dominant to *E. linearifolia*…

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

IC.5. Annual grasses and forbs dominate the understory and shrubs have low cover. A variety of native and non-native forbs and grasses occur in the herbaceous layer…

***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. *Quercus berberidifolia* is dominant to co-dominant in the shrub canopy. Stands are found primarily on north-facing slopes with well- to extensively-drained soils…

***Quercus berberidifolia* Shrubland Alliance (2211)**

IA.1. *Ceanothus cuneatus* intermixes as a sub- to co-dominant shrub. *Adenostoma fasciculatum* may also be present…

***Quercus berberidifolia-Ceanothus cuneatus* Shrubland Association (2211)**

IA.2. *Cercocarpus betuloides* (=*C. montanus*) intermixes as a sub- to co-dominant shrub. Other shrubs such as *Ceanothus cuneatus* and *Rhamnus ilicifolia* may also be present…

***Quercus berberidifolia-Cercocarpus montanus* Shrubland Association (2211)**

I.B. *Quercus john-tuckeri* is dominant to co-dominant in the shrub canopy. Stands are found primarily on north-facing slopes with well- to extensively drained soils…

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

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

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

I.C. *Ceanothus cuneatus* is dominant or shares dominance with *Adenostoma fasciculatum* or deciduous shrubs (e.g. *Artemisia californica*) in the canopy. Soils are often sandy and well-drained…

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

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

***Adenostoma fasciculatum-Ceanothus cuneatus* Shrubland Association of the *Ceanothus cuneatus* Shrubland Alliance (2227)**

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

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

ID.1. *Adenostoma fasciculatum* co-dominates in the shrub canopy, sometimes having twice as much cover as *Arctostaphylos glauca…*

***Adenostoma fasciculatum-Arctostaphylos glauca* Shrubland Association of the *Arctostaphylos glauca* Shrubland Alliance (2231)**

I.E. *Cercocarpus betuloides* (=*C. montanus*) intermixes as a co-dominant to dominant shrub with other chaparral species. Occasional in mesic scrub settings on north-facing, protected slopes. Stands are poorly developed in the mapping area…

***Cercocarpus montanus* Shrubland Alliance (2212)**
***From existing classification, no survey data from this project**

I.F. *Salvia mellifera* shares dominance with *Adenostoma fasciculatum* in the shrub canopy, with *A. fasciculatum* sometimes have 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**
of the *Adenostoma fasciculatum-Salvia mellifera* Shrubland Alliance (2226)

I.G. *Adenostoma fasciculatum* dominates the shrub canopy with >50% relative cover or shares dominance with *Eriogonum fasciculatum* …

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

IG.1. *Eriogonum fasciculatum* is sub- to co-dominant with *Adenostoma fasciculatum* in the shrub canopy. A variety of other shrub species may be present as sub-dominants…

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

IG.2. *Adenostoma fasciculatum* is the sole dominant shrub and typically has greater than 40% absolute cover. A variety of shrubs occur as sub-dominants with sparse cover, including *Ceanothus cuneatus, Yucca whipplei, Salvia leucophylla, Arctostaphylos glauca, Eriogonum fasciculatum,* and others…

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

I.H. *Adenostoma sparsifolium* is dominant or co-dominant the shrub layer with other chaparral or coastal scrub species. Not common in the mapping area - scattered stands occur in the Gifford unit or possibly other areas in the southwest portion of the Chimineas Ranch...

***Adenostoma sparsifolia* Shrubland Alliance (2112)**

I.I. *Eriodictyon crassifolium* is dominant in an open shrub canopy. Often occurs in chaparral in stands that are recovering from fire. Generally uncommon in the south-central portion of the mapping area...

***Eriodictyon crassifolium* Shrubland Alliance (2228)**
***From existing classification, no survey data from this project**

I.J. *Lupinus albifrons* has >50% relative cover in the shrub canopy and grows on dry slopes that may be disturbed, steep, and unstable. A variety of coastal sage shrubs may be present, including *Ericameria linearifolia, Eriogonum fasciculatum, Artemisia californica, Isocoma acradenia,* and others…

***Lupinus albifrons* Shrubland Alliance (2324)**

<u>Group II.</u> 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, Krascheninnikovia,* and *Suaeda…*

IIA.1. *Allenrolfea occidentalis* dominates the shrub canopy on intermittently saturated soils with >2% absolute cover. *Atriplex spinifera* and other alkaline-tolerant shrubs may be present but no other species have equal or greater cover …

***Allenrolfea occidentalis* Shrubland Alliance (4311)**

IIA.2. *Suaeda moquinii* dominates the shrub canopy with >2% absolute cover and no other species have equal or greater cover. *Atriplex lentiformis* and other alkaline-tolerant shrub species may be present…

***Suaeda moquinii* Shrubland Alliance (4314)**

IIA.3. *Krascheninnikovia lanata* is dominant to co-dominant in the shrub cover with no other species having equal or greater cover. Other shrub species may include *Eastwoodia elegans, Ephedra californica, Gutierrezia californica,* and *Eriogonum fasciculatum…*

***Krascheninnikovia lanata* Shrubland Alliance (2521)**

IIA.4. A species of *Atriplex* is dominant or co-dominant in the shrub canopy with >50% relative cover…

IIA4.a. *Atriplex spinifera* dominates the shrub canopy, and may have as little as 2% absolute cover. The herbaceous layer has open to intermittent cover…

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

IIA4.b. *Atriplex canescens* dominates the shrub canopy with >2% absolute cover. Other sub-dominant species may include *Ericameria linearifolia* and *Gutierrezia californica…*

***Atriplex canescens* Shrubland Alliance (2413)**

IIA4.c. *Atriplex polycarpa* is dominant or co-dominant in the shrub canopy with >2% absolute cover. Other shrubs such as *Ericameria linearifolia* and *Eastwoodia elegans* may be present…

***Atriplex polycarpa* Shrubland Alliance (2411)**

IIA4.d. *Atriplex canescens* and/or *A. polycarpa* present with no clear dominance by either species. Used for mapping polygons where it is too difficult to distinguish between the two species…

Atriplex polycarpa-Atriplex canescens Mapping Unit (2412)
***For mapping only, not part of the floristic classification**

IIA.5. *Pluchea sericea* is present in the canopy with >2% absolute cover and no other shrub species have equal or greater cover. Occurs around springs, seeps, irrigation ditches, canyon bottoms, streamsides, seasonally flooded washes. May include *Baccharis salicifolia, Atriplex,* and others…

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

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, mesic slopes, marshes, or washes. Includes *Baccharis salicifolia, Lepidospartum, Ribes quercetorum, Pluchea,* and *Salix...*

IIB.1. *Lepidospartum squamatum* characterizes an open shrub canopy along alluvial streams, washes, or fans, and may have as little as 1% absolute cover. A variety of coastal sage shrubs or other shrubs such as *Ericameria nauseosa* may intermix…

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

IIB1.a. *Artemisia californica* is sub-dominant to dominant in the shrub canopy…

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

IIB.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 existing classification, no survey data from this project**

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

***Salix lasiolepis* Shrubland Alliance (4114)**
***From existing classification, no survey data from this project**

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

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

IIB.5. *Baccharis salicifolia* is dominant or co-dominant in the shrub canopy along canyon bottoms, floodplains, irrigation ditches, lake margins, or stream channels. May include a variety of coastal sage or other shrubs…

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

IIB5.a. *Pluchea sericea* is sub- to co-dominant in the shrub canopy and has lower cover than *Baccharis salicifolia*…

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

IIB.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 Macro Group (4110)

IIB.7. *Hymenoclea salsola* (=*Ambrosia salsola*) characterizes an open to intermittent shrub canopy on sandy alluvial soils. *A. salsola* may have as low as 2% absolute cover, with no other shrubs having greater canopy cover…

***Ambrosia salsola* Shrubland Alliance**
***Not mapped on DFG land, but occurs in the greater Carrizo area**

IIB.8. *Ericameria nauseosa* has >50% relative cover in the shrub canopy and grows on well-drained soils. The shrub layer may include *Atriplex canescens, Ephedra californica, Ericameria linearifolia, Gutierrezia californica, Hymenoclea salsola* and others…

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

IIB.9. *Ribes quercetorum* is the sole dominant shrub in the canopy and often grows clonally in stands that resprout after fire…

***Ribes quercetorum* Provisional Shrubland Alliance (2611)**

II.C. Shrublands not as above and characterized by desert or desert-transition shrubs. Includes *Ephedra, Gutierrezia, Hymenoclea,* and *Lycium…*

IIC.1. *Hymenoclea salsola* (=*Ambrosia salsola*) characterizes an open to intermittent shrub canopy on sandy alluvial soils. *A. salsola* may have as low as 2% absolute cover, with no other shrubs having greater canopy cover…

***Ambrosia salsola* Shrubland Alliance**
***Not mapped on DFG land, but occurs in the greater Carrizo area**

IIC.2. *Ephedra californica* has >1% absolute cover in an open shrub canopy on low elevation uplands and washes, with sandy soils…

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

IIC2.a. A variety of shrubs, such as *Eriogonum fasciculatum, Hymenoclea salsola, Eastwoodia elegans, Ericameria linearifolia, Gutierrezia californica,* and others intermix in the canopy. The herb layer is open and may include natives *Poa secunda, Uropappus lindleyi, Amsinckia tessellata, Salvia carduacea,* and others…

***Ephedra californica*/Herbaceous Shrubland Association (4211)**

IIC.3. *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*, and *Krascheninnikovia lanata,* and others…

***Lycium andersonii* Shrubland Alliance (2522)**

IIC.4. *Atriplex polycarpa* is dominant or co-dominant in the shrub canopy with >2% absolute cover. Other species such as *Ericameria linearifolia* and *Eastwoodia elegans* may be present…

***Atriplex polycarpa* Shrubland Alliance (2411)**

IIC.5. *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 existing classification, no survey data from this project**

IIC.6. *Krascheninnikovia lanata* is dominant to co-dominant in the shrub cover with no other species having equal or greater cover. Other shrub species may include *Eastwoodia elegans, Ephedra californica, Gutierrezia californica,* and *Eriogonum fasciculatum…*

***Krascheninnikovia lanata* Shrubland Alliance (2521)**

IIC.7. *Eastwoodia elegans* is dominant or shares dominance with *Ericameria linearifolia* in the shrub canopy*…*

***Eastwoodia elegans* Provisional Shrubland Alliance (2329)**

IIC.8. *Ericameria linearifolia* is dominant or shares dominance with *Isomeris arborea* in the shrub canopy. The shrub layer may include *Gutierrezia californica, Eriophyllum confertiflorum, Eastwoodia elegans, Eriogonum fasciculatum* and others…

***Ericameria linearifolia* Provisional Shrubland Alliance (2316)**

II.D. Shrublands characterized by coastal sage shrub species. Includes *Artemisia, Eriogonum, Salvia, Ericameria linearifolia, Lupinus albifrons,* and *Eastwoodia…*

IID.1. *Gutierrezia californica* dominates an open shrub canopy that may include *Ericameria linearifolia, Atriplex polycarpa, Eriophyllum confertiflorum,* and others…

***Gutierrezia californica* Provisional Shrubland Alliance (2321)**

IID.2. *Lupinus albifrons* has >50% relative cover in the shrub canopy and grows on dry slopes that may be disturbed, steep, and unstable. A variety of coastal sage shrubs may be present, including *Ericameria linearifolia, Eriogonum fasciculatum, Artemisia californica, Isocoma acradenia,* and others…

***Lupinus albifrons* Shrubland Alliance (2324)**

IID.3. *Salvia leucophylla* is dominant or shares dominance with *Artemisia californica* or *Eriogonum fasciculatum…*

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

IID3.a. *Salvia leucophylla* is the sole dominant in the shrub canopy…
***Salvia leucophylla* Shrubland Association (2325)**

IID3.b. *Artemisia californica* is sub- to co-dominant with *Salvia leucophylla*, and *Eriogonum fasciculatum* and *Hesperoyucca whipplei* are often present…
***Salvia leucophylla-Artemisia californica* Shrubland Association (2325)**

IID3.c. *Eriogonum fasciculatum* is sub- to co-dominant with *Salvia leucophylla* and the two species characterize the shrub canopy…
***Salvia leucophylla* Shrubland Alliance (2325)**
***Association with *S. leucophylla* & *E. fasciculatum* not defined**

IID.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)**

IID4.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)**

IID.5. *Eastwoodia elegans* is dominant or shares dominance with *Ericameria linearifolia* in the shrub canopy*…*
***Eastwoodia elegans* Provisional Shrubland Alliance (2329)**

IID.6. *Ericameria linearifolia* is dominant or shares dominance with *Isomeris arborea* in the shrub canopy. The shrub layer may include *Gutierrezia californica, Eriophyllum confertiflorum, Eastwoodia elegans, Eriogonum fasciculatum* and others…
***Ericameria linearifolia* Provisional Shrubland Alliance (2316)**

IID.7. *Isomeris arborea* is strongly dominant in an open shrub canopy. Occurs in similar stands as *Ericameria linearifolia*, but with little or no cover of *E. linearifolia…*
***Isomeris arborea* Provisional Community (2332)**
***From existing classification, no survey data from this project**

IID.8. *Artemisia californica* and *Eriogonum fasciculatum* co-dominate 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 *Yucca whipplei, Salvia leucophylla,* and *Malacothamnus jonesii…*
***Artemisia californica-Eriogonum fasciculatum* Shrubland Association of the *Artemisia californica-Eriogonum fasciculatum* Shrubland Alliance (2314)**

IID.9. *Artemisia californica* dominates with >60% relative cover in the shrub canopy while other shrubs have sparse cover. Often found on relatively steep slopes…
***Artemisia californica* Shrubland Association of the *Artemisia californica* Shrubland Alliance (2312)**

IID.10. *Eriogonum fasciculatum* is dominant or shares dominance with *Hesperoyucca whipplei* or *Ericameria linearifolia* in the shrub canopy. Soils are usually sandy and well-drained…
***Eriogonum fasciculatum* Shrubland Alliance (2317)**

IID10.a. *Eriogonum fasciculatum* dominates an open canopy, with other shrub species having sparse cover…
***Eriogonum fasciculatum* Shrubland Association (2317)**

IID10.b. *Hesperoyucca whipplei* co-dominates with *Eriogonum fasciculatum* in the shrub canopy. Often found on southern exposures with native herbs such as *Dichelostemma capitatum, Salvia columbariae, Amsinckia tessellata, Uropappus lindleyi, Plantago erecta,* and others…

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

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 or vernal pool species, including *Juncus*, *Eleocharis*, and *Schoenoplectus*…

IA.1. *Eleocharis parishii* is dominant or co-dominant. *Rorippa nasturtium-aquatilis, Polypogon monspeliensis, Juncus*, *Mimulus guttatus,* and a variety of wetland graminoids or forbs may be present...

***Eleocharis acicularis* Herbaceous Alliance (6311)**
Alliance/Association not defined for *E. parishii

IA.2. *Eleocharis macrostachya* is dominant or co-dominant along lakeshores, streambeds, swales, pastures, ditches, and ponds. *Juncus arcticus, Polypogon monspeliensis, Rumex crispus, Distichlis spicata,* and a variety of other wetland herbs may be present…

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

IA.3. *Juncus arcticus* var. *balticus* is dominant or co-dominant along streambanks, rivers, lakes, and ponds. *Rorippa nasturtium-aquaticum* and *Polypogon monspeliensis* may have higher cover than *Juncus arcticus.* A variety of wetland graminoids or forbs intermix in the herbaceous layer…

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

IA.4. *Schoenoplectus pungens* and/or *Schoenoplectus americanus* dominates along streams, around ponds and lakes, fresh and brackish marshes, and roadside ditches. Soils are poorly aerated. *Typha, Distichlis spicata, Eleocharis parishii, Polypogon monspeliensis, Schoenoplectus maritimus,* and a variety of other wetland herbs may be present…

***Schoenoplectus americanus* Herbaceous Alliance (6111)**
Alliance/Association not defined for *S. pungens

IA.5. Vegetation not as above and characterized by tall perennial graminoids such as *Schoenoplectus, Scirpus, Typha,* and *Juncus effusus…*

Western North American Freshwater Marsh Macro Group (6400)

IA.6. Vegetation not as above and characterized by vernal pool species such as *Eleocharis macrostachya, E. acicularis, Eryngium, Lasthenia fremontii, Layia, Downingia,* and others. Restricted to winter-flooded or at least winter-saturated substrates; not of convex or upland slopes - watered only by ambient precipitation…

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

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

IB.1. A perennial *Eriogonum* species characterizes the herbaceous layer on shallow soils derived from sedimentary substrate. Stands typically have grazing or other disturbance history…

IB1.a. *Eriogonum nudum* is dominant to co-dominant on south-facing slopes in the Cuyama river drainage…

***Eriogonum nudum* Provisional Herbaceous Alliance (2334)**
***From existing classification, no survey data from this project**

IB1.b. *Eriogonum elongatum* is dominant to co-dominant on low hills and mounds in the American unit of the Carrizo Plain drainage…

***Eriogonum elongatum* Provisional Herbaceous Alliance (2333)**
****From existing classification, no survey data from this project***

IB.2. Native perennial grasses are characteristic and evenly distributed across the herbaceous layer, though non-native herbs may be dominant. Diagnostic species include *Distichlis spicata, Leymus triticoides,* and *Nassella cernua…*

IB2.a. *Distichlis spicata* is dominant or co-dominant with >30% relative cover in the low herb layer. Grows on playas, swales, and terraces along washes that are typically intermittently flooded. 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*-Annual Grasses Herbaceous Alliance (6411)**

IB2.b. *Leymus triticoides* is dominant or co-dominant with >50% relative cover on poorly drained floodplains, drainage and valley bottoms, and marsh margins. *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 Alliance (6213)**

IB2.c. *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 Alliance (5121)**

IB.3. Native forbs are characteristic and evenly distributed across the herbaceous layer, though non-native forbs and grasses may be dominant. Diagnostic species include *Lasthenia californica, Plantago erecta, Vulpia microstachys, Amsinckia* spp., and *Eschscholzia californica…*

IB3.a. Native annual species *Vulpia microstachys*, *Plantago erecta* and/or *Lasthenia californica* characteristically present in stands. Other native species such as *Lepidium nitidum* and *Crassula connata* are often well-represented with a variety of other herbs. *Lasthenia californica* usually expresses dominance in the early spring, while *Vulpia microstachys* develops later. *Plantago erecta* typically has intermediate phenology…

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

IB3.b. *Eschscholzia californica* is seasonally dominant on upland slopes or flats with sandy to loamy soils that are well drained. *Erodium cicutarium, Bromus*, *Amsinckia*, *Avena, Lupinus bicolor, Castilleja exserta, Lupinus microcarpus, Uropappus lindleyi* and a variety of other native and non-native forbs and grasses may be present…

***Eschscholzia (californica)* Herbaceous Alliance (5113)**
Includes dominance by other species of *Eschscholzia
(e.g., *E. caespitosa, E. lemmonii*)

IB3.c. *Amsinckia menziesii*, *A. tessellata, A. douglasiana,* and/or *A. vernicosa* 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)...

***Amsinckia* (*menziesii, tessellata*) Herbaceous Alliance (5111)**

IB3c.1. *Erodium cicutarium* is present and sub-dominant to dominant. *Bromus rubens, Lotus wrangelianus, Astragalus didymocarpus, Bromus rubens,* and *Guillenia lasiophylla* may be present with a variety of other native and non-native herbs…

***Amsinckia menziesii-Erodium* spp. Herbaceous Association (5111)**
Includes dominance by other species of *Amsinckia
(e.g., *A. douglasiana, A. lycopsoides, A. tessellata*)

IB3.d. *Coreopsis calliopsidea* is seasonally dominant on alkali berms in the Soda Lake basin…

***Coreopsis calliopsidea* Unclassified Stands**
***Not mapped in project area, but occurs in greater Carrizo Plain**

IB3.e. *Monolopia lanceolata* is seasonally dominant on fine-textured, moderate to steep slopes. Later in the season stands may transition to grassland or other herb-dominated vegetation…

***Monolopia lanceolata* Unclassified Stands**
***Not mapped in project area, but occurs in greater Carrizo Plain**

IB.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 Macro Group (5100)

IB.5. Vegetation not as above and strongly dominated by non-native annual herbaceous and/or grass species including such species as *Aegilops triuncialis, Avena, Brachypodium distachyon, Brassica nigra and other mustards, Bromus, Schismus, Centaurea, Cortaderia, Conium maculatum, Foeniculum vulgare, Cynosurus echinatus, Lolium perenne, Pennisetum setaceum…*

Mediterranean California Naturalized Annual and Perennial Grassland Group (5200)

Appendix D. Map Classification Crosswalk and Ranking

This Appendix is a Microsoft Excel spreadsheet. See the file,
\CarrizoReport\App D. Map Classification Crosswalk and Ranking.xls

Appendix E. Layers and Tables in the Geodatabase

CarrizoVegSurveys is a point layer of the locations of relevés and rapid assessments collected between 2005 and 2008.

CarrizoVegReconnaissance is a point layer of the field reconnaissance locations from 2008, which were used to help mapping. (Note: Not all field reconnaissance was recorded using GPS. A majority was done using field notes tied to polygon numbers on hardcopy maps. Notes and maps are not included in this report).

CarrizoVegetation is a polygon layer of vegetation stands delineated using 1 ft. true color imagery from 2007 as a primary source.

AmericanChimineasGrasslandSubdivisions is a polygon layer of grassland subdivisions that couldn't be differentiated using cover class breaks or the map classes. See report for more information.

RAPlants is a copy of the plant cover table from the survey database, which can be used as a related table in a GIS. This table has each species and its cover class, by Stand ID number.

RAPlots is a copy of the survey table that can be used as a join table in a GIS. This table has the environmental and structure data of each stand, by Stand ID number.

NVCSHierarchy is a table that includes the upper floristic levels of the hierarchy used in the National Vegetation Classification System subset for the macrogroups that are represented in the classification for this project. For a better understanding of the NVCS hierarchy, please see http://www.natureserve.org/explorer/classeco.htm#heirarchy or http://www.fgdc.gov/standards/projects/FGDC-standards-projects/vegetation/NVCS_V2_FINAL_2008-02.pdf