Public Draft

Land Management Plan for the

Carrizo Plains Ecological Reserve

March 2019

State of California

The Resources Agency

Department of Fish and Wildlife

CARRIZO PLAINS ECOLOGICAL RESERVE

LAND MANAGEMENT PLAN

Prepared for

California Department of Fish and Wildlife, Region 4

1234 E. Shaw Avenue Fresno, CA 93710

Prepared by

Jodi McGraw Consulting

PO Box 221, Freedom, CA 95019

(831) 768-6988 • jodi@jodimcgrawconsulting.com

www.jodimcgrawconsulting.com

Approved by:

Regional Manager Date

Contents

Appendices

Common Monolopia in the South Chimineas Unit
(Photograph by Craig Fiehler)

List of Tables

Pale Yellow Layia and Showy Madia within the South Chimineas Unit in Spring
(Photograph by George Butterworth)

List of Figures

Acronyms

Acronym	Definition
ADA	Americans with Disabilities Act
ARB	Air Resources Board
APCD	Air Pollution Control District
BLM	Bureau of Land Management
BMP	Best Management Practice
BRM	Bedrock mortar
CalFire	California Department of Forestry and Fire Protection
CalIPC	California Invasive Plant Council
Caltrans	California Department of Transportation
CAR	Center for Archaeological Research
CCR	California Code of Regulations
CDFG	California Department of Fish and Game
CDFW	California Department of Fish and Wildlife (formerly California Department of Fish and Game, or CDFG)
CDPH	California Department of Public Health
CDWR	California Department of Water Resources
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CNPS	California Native Plant Society
COOP	Cooperative Observer Program
CPER	Carrizo Plains Ecological Reserve
CPNA	Carrizo Plain Natural Area
CPNM	Carrizo Plain National Monument
CRF	Chimineas Ranch Foundation
CRP	Conservation Reserve Program
CRPR	California Rare Plant Rank
CWRCB	California Water Resources Control Board
DWR	Department of Water Resources
EDRR	early detection/rapid response
EIR	environmental impact report
ESA	Endangered Species Act
ESRP	Endangered Species Recovery Program
eWRIMS	Electronic Water Rights Information Management System
GIS	geographic information system
GPS	global positioning system
IRS	Internal Revenue Service
LMP	land management plan

Acronym	Definition
LPNF	Los Padres National Forest
MOU	Memorandum of Understanding
MSDS	material safety data sheet
MYA	million years ago
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
PFIRS	Prescribed Fire Information Reporting System
PMP	Paleontological Mitigation Plan
POD	Point of Diversion
PRBO	Point Reyes Bird Observatory
RAP	Resource Assessment Program
RDM	residual dry matter
SLO	San Luis Obispo
SWPPP	Storm Water Pollution Prevention Plan
TNC	The Nature Conservancy
USDA	United States Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geologic Survey
WCB	Wildlife Conservation Board
WRCC	Western Regional Climate Center
YBP	years before present

Carrizo Plain and Soda Lake from the North Chimineas Unit
(Photograph by Jodi McGraw)

Acknowledgements

This plan was prepared by ecologists at Jodi McGraw Consulting (JMc):

Jodi McGraw, Ph.D.

Yuri Springer, Ph.D.

Justin Burks

Angelica Amesquita

Jodi McGraw Consulting

Cultural resources expertise was provided by

David Whitley, Ph.D., ASM Affiliates

Rebecca Orfila, M.A., Center for Archaeological Research

The plan incorporates extensive input provided by biologists and other staff at the Department of Fish and Wildlife:

Terry Palmasano, Senior Environmental Scientist Supervisor

Teresa LeBlanc, Senior Environmental Scientist Supervisor

Robert Stafford, Senior Environmental Scientist

Rocky Thompson, Senior Environmental Scientist Supervisor

Deborah Hillyard, Senior Environmental Scientist (retired)

Dennis Mitchniuk, Environmental Scientist (Fisheries)

Todd Tognazzini, Patrol Lieutenant

George Butterworth, Scientific Aid (Botanist)

Craig Fiehler, Environmental Scientist

Charlotte Peters, Research Analyst, GIS

The Environmental Impact Report was prepared by DiLeo and Moran.

This project was funded by the Wildlife Conservation Board through a grant to the California Wildlife Foundation, which was administered by Janet Cobb and Amy Larson. State funding was provided by the California Clean Water, Clean Air, Safe Neighborhood Parks, and Coastal Protection Act of 2002 (2002 Resources Bond Act, or Proposition 40).

The cover photograph of Soda Lake from the Caliente Range is courtesy of Robert W. Floerke.

WCB State of California Wildlife Conservation Board

CALIFORNIA DEPARTMENT OF FISH & WILDLIFE

California Wildlife Foundation
WWW.CALIFORNIAWILDLIFEFOUNDATION.ORG

1 Introduction

The Carrizo Plains Ecological Reserve is an approximately 39,500-acre area managed by the California Department of Fish and Wildlife (Department) to protect rare, threatened and endangered plants and animals and the important ecological communities found within and adjacent to the Carrizo Plain in southeastern San Luis Obispo County (Figure 1). The Carrizo Plains Ecological Reserve (CPER or Reserve) supports a rich mosaic of ecological communities including blue oak woodlands, coastal scrub, chaparral, grasslands, juniper woodland, desert scrub, riparian systems, and ponds. Together, these communities support diverse assemblages of plants and animals that include over 400 native plant species (Appendix D) and more than 250 native vertebrate species (Appendix D).

The biological richness within the CPER reflects its occurrence at a contact zone between three bioregions:

- The South Inner Coast Range Mountains, which feature communities adapted to a climate influenced by the coast, and includes grasslands, blue oak woodlands, riparian communities, coastal scrub, and chaparral;
- The San Joaquin Valley, which supports desert scrub and juniper woodlands that reflect the drier climate in the rain shadow of the Coast Range Mountains, and the influence of the Mojave Desert bioregion further east; and
- The Transverse Range Mountains, which support chaparral at lower elevations and oak forests and dry montane forests dominated by white fir, or Jeffrey, sugar, and lodgepole pines at higher elevations (Hickman 1993).

The biodiversity of the CPER also results from the relatively intact nature of the habitat. Located far from the Los Angeles Metropolitan area to the south, the San Francisco Bay Area to the north, and the rapidly-developing communities in the Central Valley to the east, the CPER region is characterized by limited development and intensive agricultural use. As a result, the Reserve supports intact and unfragmented communities including some of the best remaining examples of the San Joaquin Valley bioregion.

Habitat contained within the Carrizo Plain region is essential to the conservation of numerous species that were once more widespread within the adjacent San Joaquin Valley prior to land use intensification in the Central Valley. These include the giant kangaroo rat (*Dipodomys ingens*), San Joaquin antelope squirrel (*Ammospermophilus nelsoni*), blunt-nosed leopard lizard (*Gambelia sila*), San Joaquin kit fox (*Vulpes macrotis mutica*), and San Joaquin woolly threads (*Monolopia congdonii*). These endangered species are among the more than 90 plant and animal species within the CPER that are rare, endangered, threatened, sensitive, or otherwise of conservation concern (Section 3.3, Appendix E).

The CPER links federal land managed as part of the two-million-acre Los Padres National Forest (LPNF), to the west, with public lands located within the 250,000-acre Carrizo Plain National Monument (CPNM), to the east, which are managed by the Bureau of Land Management (BLM) in cooperation with the California Department of Fish and Wildlife and The Nature Conservancy. Lands within the CPER have been identified as part of an essential landscape linkage connecting the Coast Range Mountains to the San Joaquin Valley (Spencer et al. 2010).

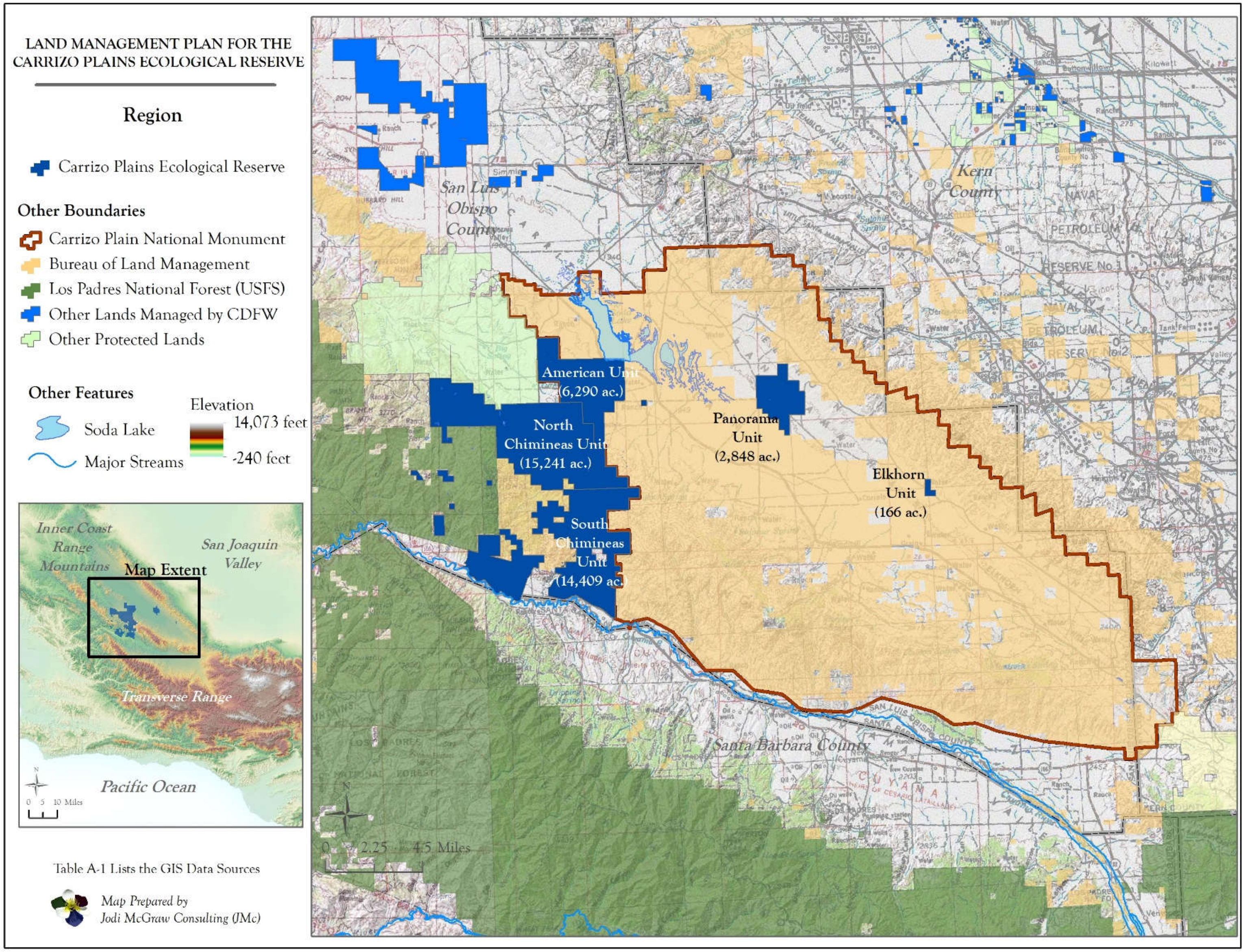


Figure 1: Region

1.1 Purpose of the Acquisitions

Land within the CPER was acquired by the Department and designated as an ecological reserve to "protect threatened or endangered native plants, wildlife, or aquatic organisms or specialized habitat types, both terrestrial and nonmarine aquatic, or large heterogeneous natural gene pools for the future use of mankind" (§1580 of the Fish and Game Code). The CPER acquisitions were designed to protect threatened and endangered species, and upland and grassland habitats. Specific objectives of protecting and managing the lands within the CPER included:

Giant kangaroo rat (Photo by John Roser)

1. Protecting habitat required by the state- and federally-listed species of the San Joaquin Valley upland habitats, including San Joaquin kit fox, giant kangaroo rat, blunt-nosed leopard lizard, San Joaquin antelope squirrel, and San Joaquin woolly-thread and others occurring in the region, including sandhill crane (*Grus canadensis*), and California condor (*Gymnogyps californianus*);
2. Preserving the intact biological communities in the region including grassland, blue oak woodland, coastal scrub, chaparral, desert scrub, wetlands, ponds, and riparian, which provide important habitat for numerous other special-status species including western pond turtle (*Emys marmorata*), California red-legged frog (*Rana draytonii*), grasshopper sparrow (*Ammodramus savannarum*), short-eared owl (*Asio flammeus*), mountain plover (*Charadrius montanus*), and tricolored blackbird (*Agelaius tricolor*);
3. Protecting habitat utilized by tule elk (*Cervus elaphus nannodes*) and pronghorn (*Antilocapra americana*), which the Department reintroduced to the region during the mid-1980s;
4. Maintaining habitat connectivity between the federal land within the Los Padres National Forest and the Carrizo Plain National Monument;
5. Providing limited, quality, wildlife-dependent recreational opportunities that are compatible with the biological resource protection objectives, including hunting and wildlife observation; and
6. Providing interpretive and educational programs for the natural history of the region, which is a replica of the San Joaquin Valley and adjacent foothills prior to its widespread settlement.

1.2 History of the Acquisitions

The approximately 39,500-acre CPER consists of five units[1] that were created as part of seven acquisitions between 1983 and 2004 (Table 1, Figure 2). The acquisitions were the result of a broader collaboration between the Department, the U.S. Fish and Wildlife Service (USFWS), BLM, and The Nature Conservancy (TNC) to protect and manage land within the Carrizo Plain region. These efforts were initiated in 1985, when the partners signed a Memorandum of Understanding (MOU) to create the Carrizo Plain Natural Area (CPNA), which was designated as the Carrizo Plain National Monument (CPNM) in January 2000.

[1] Though the North and South Chimineas units are distinct and feature separate regulations (Section 2.8), these contiguous units are discussed together in portions of this plan.

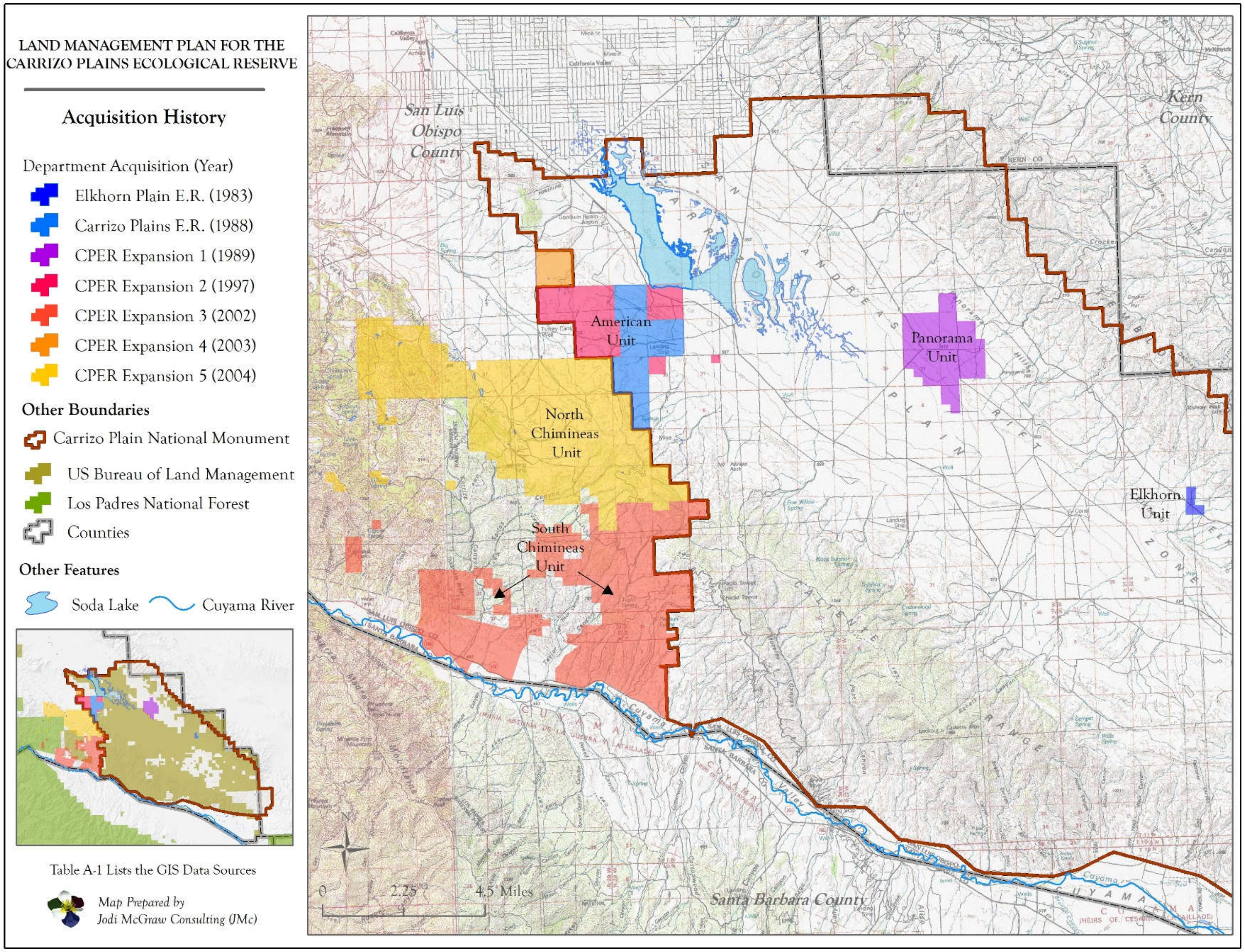


Figure 2: Acquisition history

Table 1: Carrizo Plains Ecological Reserve acquisition history

Acquisition Name	Closing Date	Unit	Acres	Acquired From
Elkhorn Plains Ecological Reserve	Nov. 30, 1983	Elkhorn	160	Sam Etchegaray
Carrizo Plains Ecological Reserve	Oct. 25, 1988	American	2,800	The Nature Conservancy
CPER Expansion 1	Jul. 5, 1989	Panorama	2,834	The Nature Conservancy
CPER Expansion 2	Sept. 17, 1997	American	2,840	The Nature Conservancy
CPER Expansion 3	Jul. 25, 2002	S. Chimineas	14,314	The Nature Conservancy
CPER Expansion 4	Mar. 27, 2003	American	640	Kenneth Eng
CPER Expansion 5	Jan. 9, 2004	N. Chimineas	15,882	Neal and Anna Dow

Over the course of two decades, the Department worked with partner agencies and organizations to identify and acquire lands essential for the effective conservation of the biological resources within the region. The Department acquired lands within the CPER through a variety of mechanisms, including:

1. Direct purchase of land by the State;
2. Donations or bargain sales of land from TNC;
3. Wildlife Conservation Board (WCB) grants to TNC, from the Habitat Conservation Fund and bond funds created through voter-approved initiatives including the Water Security, Clean Drinking Water, Coastal and Beach Protection Fund of 2002 (Proposition 50); and
4. Contributions from other non-governmental organizations including the California Deer Association and the Rocky Mountain Elk Foundation.

While initial acquisitions focused on protecting habitat within the Carrizo Plain and adjacent Elkhorn Plain, later acquisitions were designed to connect protected federal lands (Table 1, Figure 2). In November 1983, the Department acquired a 166-acre parcel on the Elkhorn Plain to protect habitat for the blunt-nosed leopard lizard, San Joaquin antelope squirrel, giant kangaroo rat, and San Joaquin kit fox. Originally named the “Elkhorn Plain Ecological Reserve”, this property was later incorporated as the Elkhorn Unit of the Carrizo Plains Ecological Reserve.

In October 1988, the Department collaborated with TNC to acquire the first 2,800 acres of the 6,341-acre American Unit, which was named for the American Ranch located within the site. Located in the northwest corner of the CPNA, this first acquisition of the “Carrizo Plains Ecological Reserve” was made to protect the expansive grassland habitat on the rolling hills bordering the Carrizo Plain, which supports San Joaquin kit fox.

In July 1989, the Department and TNC collaborated to expand the CPER when the Department acquired the 2,834-acre Panorama Unit, which was in cultivation immediately prior to the acquisition. Located on the eastern edge of the Carrizo Plain in the Panorama Hills, the unit was acquired to protect desert communities that provide habitat for the endangered species of the upland San Joaquin Valley habitats, as well as mountain plovers.

In September 1997, the Department and TNC again collaborated to expand the American Unit by 2,834 acres. This acquisition included the 40-acre Painted Rock Ranch parcel, which contains residential facilities that provided the Department with a headquarters for the field operations in the region. Acquisition of the present-day American Unit was completed in March 2003 when the Department purchased 640 acres (Section 16) from the prior owner of the Carrizo Ranch located immediately west of the unit.

Seeking to connect habitat within the Los Padres National Forest and the Carrizo Plain National Monument, the Department and TNC collaborated to acquire approximately 30,196 acres contained within the North and South Chimineas units of the CPER (Table 1, Figure 2). The Department and its other conservation partners, including the Rocky Mountain Elk Foundation and the California Deer Association, recognized the importance of the Chimineas Ranch as a unique 'contact zone' between the San Joaquin Valley and Inner Coast Range Mountains bioregions. Other conservation values that rendered the ranch important for acquisition include that the site supports one-third of the tule elk population in San Luis Obispo County, as well as good habitat for mule deer (*Odocoileus hemionus*). In collaboration with partners, the Department acquired the Chimineas Ranch from Neal Dow through two acquisitions: in July 2002, the Department acquired the southern 14,314 acres of the property from TNC, and then in January 2004, the present-day CPER was completed when the Department acquired the northern 15,882 acres (Table 1, Figure 2).

Caliente Range within the Chimineas Units
(Photograph by Bob Stafford)

The Department, TNC, and the BLM have a shared, long-term commitment to acquiring, from willing sellers, private inholdings within the CPNM. The managing partners are continuing to acquire these inholdings through purchase, donation, or exchange. Priorities for acquisition have included those parcels that are available, special-status species habitat, cultural resources, and unique natural and geologic features (BLM 2010a). Such future properties may become part of the CPER.

The Department and its partners also recognize that effective management of the conservation lands will be essential to attaining the long-term goals of the CPER. Recognizing that each partner organization is subject to different mandates and policies related to management, the organizations coordinate regularly in order to seamlessly manage lands within the CPNM. In 2010, the BLM completed its Resource Management Plan for lands within the CPNM (BLM 2010b), which was prepared with significant input from the Department and TNC, as well as other conservation partners and stakeholders in the region.

1.3 Purpose of the Land Management Plan

The purpose of this Land Management Plan (LMP or Plan) is to outline the goals, objectives, and actions for management of the Department's lands within the Carrizo Plains Ecological Reserve. The overall goal of management of the Reserve is to protect the natural habitats that contribute to and help sustain the overall ecosystem health of the region. The specific purposes of the LMP are:

1. To guide the adaptive management of habitats, species, and programs described herein to achieve the Department's mission to protect and enhance wildlife values;
2. To serve as a guide for appropriate public uses of the property;
3. To serve as a descriptive inventory of the species and habitats which occur on or use this property;
4. To provide an overview of the property's operation and maintenance, and personnel requirements to implement management goals, and aid budget planning; and
5. To provide a description of potential and actual environmental impacts and subsequent mitigation that may occur during management, and provide the environmental documentation to comply with state and federal statutes and regulations.

The plan was developed based on a detailed analysis of the current land within the CPER. However, its programmatic nature is designed to enable it to also address any new lands that the Department may add to the Reserve through subsequent acquisitions, to expand and buffer the existing protected lands and otherwise further the purpose of the acquisition. However, this LMP is not designed to guide management of other State ecological reserves in the region, such as the yet undesignated North Carrizo Ecological Reserve north of California Valley (Section 2.5.2.4).

1.4 Organization of the Plan

The LMP contains the following components:

- **Property Description (Section 2):** a description of the historic and current land use and the abiotic (non-biological) conditions including geology, hydrology, cultural resources, infrastructure and facilities, and current uses of the Reserve lands;
- **Habitat and Species Descriptions (Section 3):** an assessment of the biological resources, including the plant communities (i.e., vegetation) and species, animals, and rare species;
- **Management Goals and Tasks (Section 4):** a detailed list of management goals for the Reserve, including the steps that will be taken to manage the biological and cultural resources, while providing for compatible public uses and maintaining the facilities.
- **Operations and Maintenance (Section 5):** an assessment of the resources needed to implement the Plan, including personnel and direct costs.

The appendices provide more detailed information used to develop the LMP, which can also facilitate its implementation, including:

- **Geographic Information System (Appendix A):** A list of the spatial data layers used to prepare maps and conduct spatial analyses presented in the Plan;
- **Plant Communities (Appendix B):** Detailed descriptions of the plant communities within the CPER, based on the Department's site-specific classification and mapping study (CDFW 2010c);
- **Plant Species (Appendix C):** A plant species list for the Reserve, which notes their status and relative abundance within each of the Reserve units (Butterworth 2012);
- **Animal Species (Appendix D):** A list of the vertebrate species, which notes their status and relative abundance within each of the Reserve units (Stafford 2016);
- **Special-Status Species Profiles (Appendix E):** Profiles for the rare, threatened, or endangered species known or likely to occur within the Reserve;

- **Cultural Resources Report (Appendix F):** A report prepared to assess the cultural resources within the Reserve (Whitley 2011)[2];
- **Personnel Needs to Implement the Plan (Appendix G):** A table used to estimate the personnel time required to implement the elements (Section 4), which was used to summarize the new positions required (Section 5);
- **Public Input from the Plan Visioning Meeting (Appendix H):** An overview of the public meeting held to obtain input on management of the CPER, and the feedback received;
- **Best Management Practices (Appendix I):** Measures to be taken during implementation of the LMP, to limit impacts to the natural environment and cultural resources; and
- **Environmental Impact Report (Appendix J):** the report prepared as part of the environmental review process for the LMP, under the California Environmental Quality Act (CEQA).

Diverse Assemblage of Native Forbs on a Sand Ridge in the South Chimineas Unit
(Photograph by Jodi McGraw)

[2] The cultural resources report contains sensitive information and is not included in the public version of this document.

2 Property Description

2.1 Geographic Setting

The Carrizo Plains Ecological Reserve is located within and immediately west of the Carrizo Plain—a large inland valley within the Inner Coast Range Mountains in southeastern San Luis Obispo County, in central California. The approximately 50-mile-long, 15-mile-wide Carrizo Plain is bounded by the Temblor Range to the east and the Caliente Range to the west; the Transverse Range separates the Carrizo Plain region from southern California (Figure 3).

The 39,594-acre Reserve consists of five units. The two smaller units, Elkhorn (166 acres) and Panorama (2,897 acres), are situated within the Carrizo Plain. The American Unit (6,341 acres) is in the northern foothills of the Caliente Range. The North and South Chimineas units, which total 30,196 acres, extend from the western edge of the Carrizo Plain, into and over the mountains of the Caliente Range, and down to the Cuyama River, which separates Santa Barbara and San Luis Obispo counties. The La Panza Range Mountains lie to the northwest of the Caliente Range and the American and Chimineas units (Figure 3).

The CPER occurs at the nexus between two of California's biogeographic regions, which have been identified based largely on patterns of floristic diversity and community structure (Hickman 1993). The Elkhorn and Panorama units are located within the Carrizo Plain (Figure 1)—a western extension of the San Joaquin Valley bioregion which supports grasslands and saltbush scrub communities. As a result of the rain shadow created by the Coast Range Mountains to the west, the arid Carrizo Plain and larger San Joaquin Valley Bioregion feature elements of the Mojave Desert Bioregion, which is located just 50 miles to the east. On the western portion of the Reserve, higher rainfall within the southern La Panza Range Mountains supports coastal scrub, chaparral, and blue oak woodland characteristic of the South Inner Coast Range Bioregion, which reflect the Reserve's location within 35 air miles of the Pacific Ocean (Figure 1). Located between these coastal and desert influences, the Caliente Range on the east side of the Chimineas units supports a unique mosaic of assemblages including desert scrub and juniper woodland.

The CPER is in southeastern San Luis Obispo County. State Highway 166 bisects and provides access to the South Chimineas Unit via Chimineas Ranch Road, which is 36 miles east of Santa Maria, a city in Santa Barbara County with approximately 100,000 inhabitants, and 50 miles west of Taft (approximately 9,300 inhabitants) in Kern County, and approximately seven miles south of the center of California Valley (approximately 500 inhabitants), an unincorporated community in eastern San Luis Obispo County (US Census Bureau 2010a). Highway 58 traverses the northern Carrizo Plain and provides access to the Reserve from the north via Highway 101 in San Luis Obispo County and Highway 5 in Kern County (Figure 3).

County roads provide the primary access to the CPER (Figure 3). The main access route bringing visitors to the Carrizo Plain, Soda Lake Road connects Highway 58 near California Valley to Highway 166 just west of Maricopa. Soda Lake Road traverses the western portion of the Carrizo Plain and the northeast portion of the American Unit. It provides access to the Department's Painted Rock Ranch via Painted Rock Ranch Road. From Soda Lake Road, the North Chimineas Unit and the western portion of the American Unit can be accessed via Sprague Hill Road.

On the eastern side of Carrizo Plain, Elkhorn Road, which traverses the foothills the Temblor Range, provides access to the Elkhorn Unit from State Highway 58 to the north and State Highway 166 via Soda Lake Road from the south. Elkhorn Road also provides access to the eastern portion of the Panorama Unit, which can also be reached from Soda Lake Road to the west via Panorama Road.

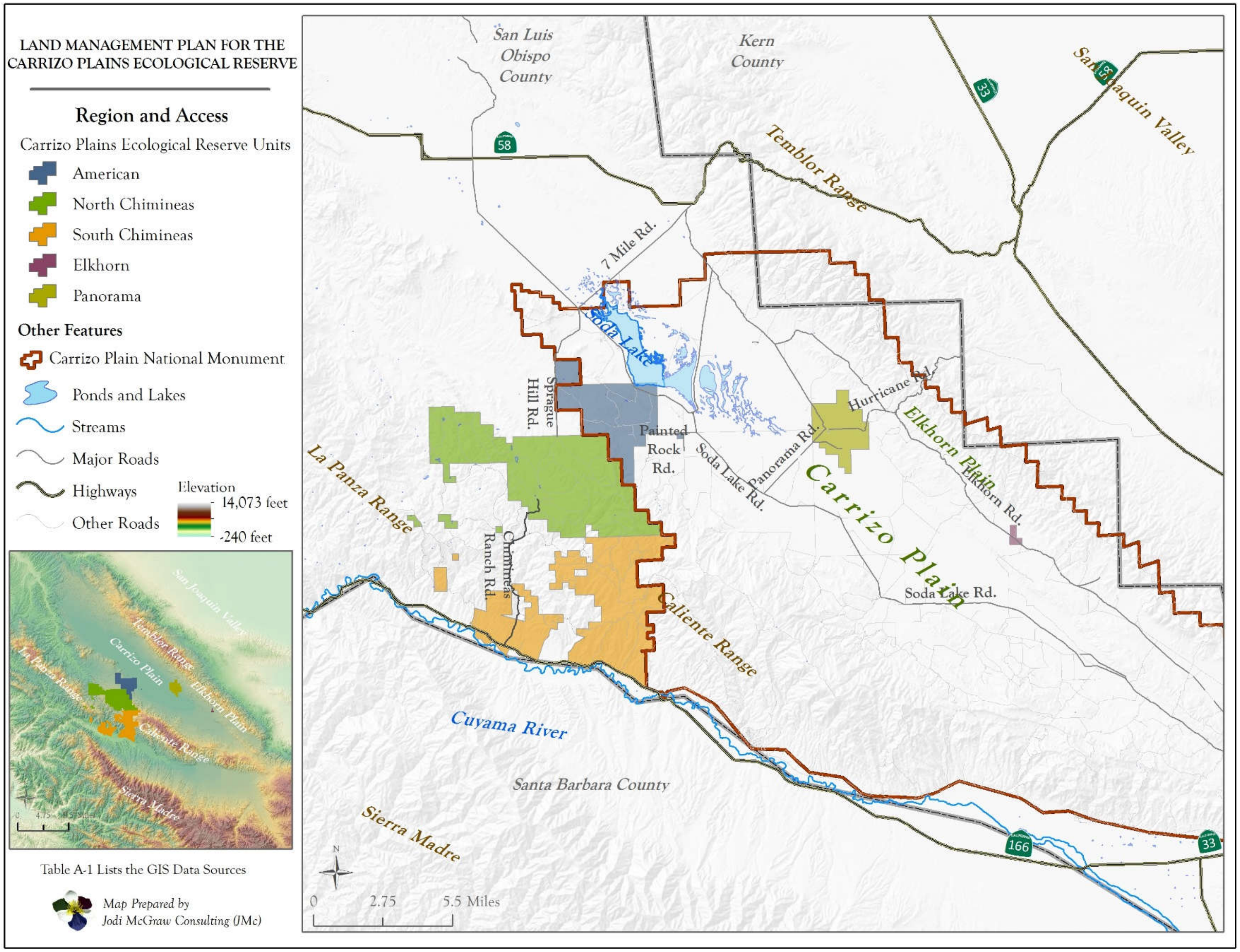


Figure 3: Region and Reserve Access

A series of smaller roads developed for use as part of the historic ranching operations on the Reserve lands provide access for the Department. Public access to the roads is limited by locked gates. Section 2.8 describes public access and uses of the Reserve.

2.2 Property Boundaries

The CPER is located within Ranges 18E-22E of Townships 31S and 32S of the Mount Diablo Base and Meridian, and Ranges 28W-30W of Townships S11N and S12N of the San Bernardino Base and Meridian; these lands are shown within six United States Geological Survey (USGS) 7.5 minute quadrangles (Table 2).

The CPER consists of 95 distinct County of San Luis Obispo Assessor's parcels, which range in size from approximately eight acres to 683 acres (Table 3, Figure 4). These parcels were acquired by the State through a total of seven acquisitions between 1983 and 2004 (Section 1.2).

Table 2: Location of the CPER units within the US Geological Survey 7.5 minute quadrangles

Unit	Quadrangle	Base and Meridian	Township	Range	Section(s)
Elkhorn	Panorama Hills	Mount Diablo	32S	22E	20
Panorama	Panorama Hills	Mount Diablo	31S	21E	20, 28, 29, 32 & 33
	Panorama Hills	Mount Diablo	32S	21E	5
	Painted Rock	Mount Diablo	31S	21E	30 & 31
American	Chimineas Ranch	Mount Diablo	31S	19E	16,21-27,35 & 36
	Chimineas Ranch	Mount Diablo	32S	19E	2
	Painted Rock	Mount Diablo	31S	20E	31
North Chimineas	Branch Mountain	Mount Diablo	31S	18E	22,26,27,34, &35
	Branch Mountain	Mount Diablo	32S	18E	3,14,15,16,22, & 23
	Chimineas Ranch	Mount Diablo	31S	18E	25 & 26
	Chimineas Ranch	Mount Diablo	31S	19E	31-34
	Chimineas Ranch	Mount Diablo	32S	18E	13
	Chimineas Ranch	Mount Diablo	32S	19E	2-11 and 13-18
South Chimineas	Painted Rock	Mount Diablo	32S	20E	19
	Chimineas Ranch	Mount Diablo	32S	19E	20-24
	Miranda Pine Mountain	San Bernardino	12N	30W	25 & 26
	Miranda Pine Mountain	Mount Diablo	32S	18E	27
	Taylor Canyon	San Bernardino	11N	28W	5 & 6
	Taylor Canyon	San Bernardino	11N	29W	1 & 2
	Taylor Canyon	San Bernardino	12N	28W	31 & 32
	Taylor Canyon	San Bernardino	12N	29W	33-36
	Taylor Canyon	Mount Diablo	32S	18E	25 & 36
	Taylor Canyon	Mount Diablo	32S	19E	26-36

Table 3: County of San Luis Obispo Assessor's parcels comprising the Carrizo Plains Ecological Reserve

Unit and APN	Acres[1]	Unit and APN	Acres[1]	APN	Acres[1]
American		North Chimineas		South Chimineas	
094-271-003	637	094-081-007	159	094-201-003	40
094-271-005	656	094-121-002	165	094-241-001	605
094-271-010	82	094-121-003	652	094-241-002	308
094-271-011	566	094-121-004	160	094-331-006	285
094-281-001	635	094-121-005	649	094-331-007	636
094-281-006	635	094-121-006	642	094-331-011	81
094-301-001	628	094-121-007	162	094-331-012	581
094-301-003	644	094-121-008	577	094-341-003	322
094-301-004	637	094-121-009	329	094-351-001	602
094-301-008	162	094-121-010	39	094-351-002	242
094-301-009	472	094-121-011	41	094-351-003	376
094-301-011	155	094-161-001	164	094-361-001	637
094-311-003	315	094-191-002	92	094-361-002	644
095-051-010	37	094-201-001	44	094-361-003	476
American Total	**6,259**	094-201-002	177	094-361-004	557
		094-291-005	617	094-361-005	683
		094-291-006	632	094-361-006	83
Elkhorn		094-291-007	643	094-371-001	330
095-321-004	**162**	094-301-005	648	094-371-002	30
		094-311-004	329	094-371-003	53
Panorama		094-311-005	651	094-371-004	645
095-091-005	160	094-311-006	649	094-371-005	245
095-111-005	513	094-311-007	652	094-391-002	560
095-111-006	157	094-321-001	648	094-391-003	582
095-111-007	623	094-321-002	638	094-391-004	591
095-111-008	646	094-321-003	667	094-391-006	259
095-111-009	524	094-321-004	442	094-391-008	484
095-241-004	202	094-321-005	638	094-401-002	307
Panorama Total	**2,825**	094-321-006	649	094-401-004	398
		094-331-002	517	094-411-001	490
		094-331-004	654	094-411-002	142
		094-331-005	74	094-411-003	446
		094-341-001	328	094-411-004	217
		094-341-002	357	095-191-008	156
		094-341-007	324	096-011-001	504
		N. Chimineas Total	**14,813**	096-011-002	91
				096-031-004	396
				096-031-005	73
				096-031-006	8
				S. Chimineas Total	**14,165**
				Reserve Total	**38,224**

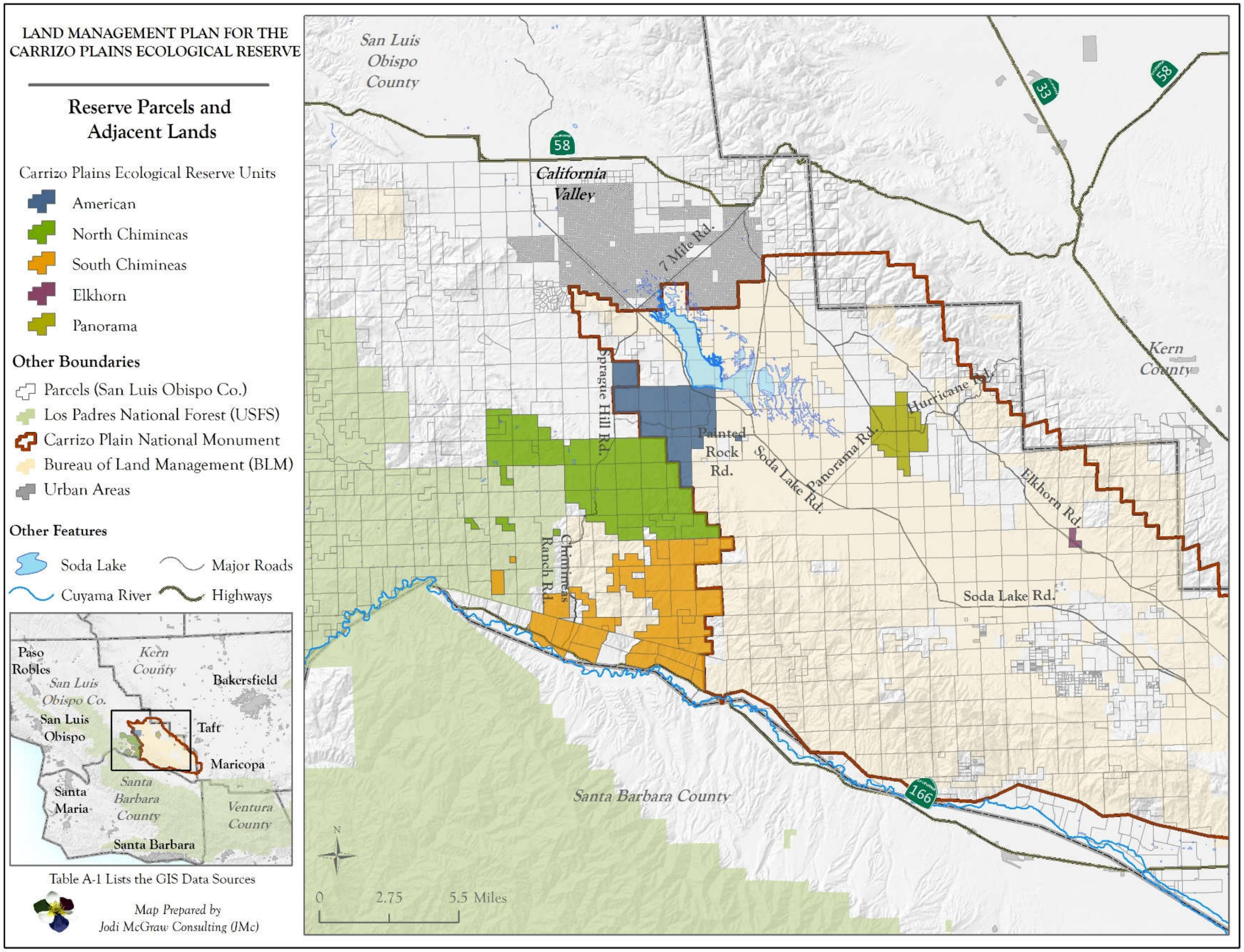


Figure 4: Parcels and adjacent lands

2.3 Adjacent Land Use

The CPER occurs within a rural region characterized primarily by large tracts of public land and medium to large private land holdings utilized primarily for cattle grazing and dry-land farming (Figure 4), with large-scale solar energy production representing a more recent land use. Rural communities in the region include California Valley in the north, which features approximately 300 residents, and New Cuyama in the south, where approximately 500 people reside (US Census Bureau 2010a).

The Elkhorn Unit is surrounded by federal lands managed by BLM as part of the Carrizo Plain National Monument—a 250,000-acre area established by a 2001 presidential proclamation (Figure 4). The BLM manages the federal lands within the monument cooperatively with the Department and TNC. The mission statement for the CPNM is "Manage the Carrizo Plain National Monument so that indigenous species interact within a dynamic and fully functioning system in perpetuity while conserving unique natural and cultural resources and maintaining opportunities for compatible scientific research, cultural, social and recreational activities" (BLM 2010a).

The Panorama Unit is bordered by BLM-managed CPNM lands along its southwestern boundary and northern tip (Figure 4); elsewhere, the unit abuts private land that is used primarily for cattle grazing. The northern and eastern edges of the American Unit are bordered by federal lands managed by the BLM as part of the CPNM while the western edge abuts two private ranches primarily used for cattle grazing, which are 620 and 27,380 acres; the larger ranch is protected from development via a conservation easement held by the California Rangeland Trust. Along its southern boundary, the American Unit adjoins the North Chimineas Unit.

The northwestern portion of the North Chimineas Unit is bordered by large private properties used primarily for cattle grazing. Moving counterclockwise from its shared boundary with the American Unit, these include the 27,380-acre protected, private ranch referenced above, and an additional 8,649-acre ranch. From this shared boundary with the American Unit, the North Chimineas Unit extends south and southwest to the midpoint of Township 32 South, Range 19 East of the Mount Diablo Base and Meridian, where it meets the boundary of the South Chimineas Unit. This unit extends south to the Cuyama River, which defines the South Chimineas Unit's southern boundary

The central western boundary of the North Chimineas Unit abuts federal lands managed by the United States Forest Service as part of the Los Padres National Forest. The agency's management mission is "to sustain the health, diversity, and productivity of the nation's forest and grasslands to meet the needs of present and future generations." Management goals include "protecting and enhancing watersheds, providing world-class recreation and wilderness opportunities, and promoting use of the forest as a 'living laboratory' for ecological diversity and scientific research" (USFS 2010). The southern boundary of the North Chimineas Unit and much of the South Chimineas Unit adjoins federal land managed by the BLM based on priorities established in the Bakersfield Field Office Resource Management Plan (BLM 2014).

Land within the USFS and BLM land adjacent to the Chimineas units is grazed by cattle, which have also been used to conduct vegetation management within the Chimineas units of the CPER. Much of the border between the federal and Department lands is not fenced (Section 2.6.4). Instead, fences historically erected to establish pastures for cattle grazing divide the North and South Chimineas units into a series of management units (Figure 5). Unlike the five reserve units, which were established through state regulations (Section 2.8), these management units are referenced for geographic orientation and planning purposes only.

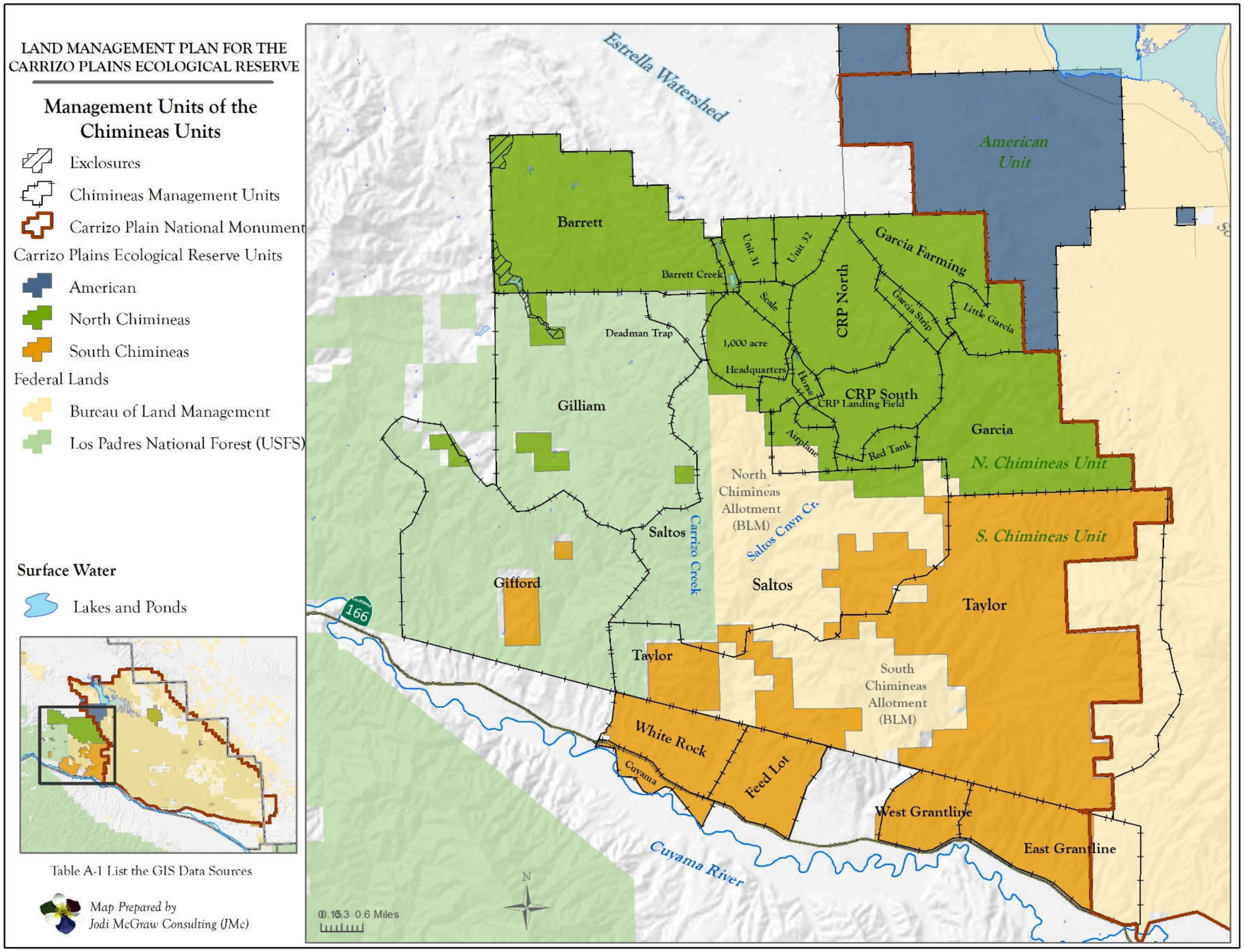


Figure 5: Management units of the Chimineas units

The South Chimineas Unit also abuts private land. This includes an approximately 160-acre private inholding, and along the southern edge of the South Chimineas Unit, a 1,768-acre ranch, a seven-acre parcel, a 2,654-acre ranch, the 1,265-acre El Rancho Español de Cuyama, a 523-acre ranch, and a 208-acre parcel.

2.4 Physical Characteristics

2.4.1 Topography

Located within the southern Inner Coast Range Mountains, the CPER occurs within and west of the Carrizo Plain. The broad, flat expanse of the Carrizo Plain lies in a valley approximately 50 miles long and 15 miles across at its widest point (Figure 1). The topography is generally flat to gently rolling (Figures 6 and 7). Elevation ranges from 1,900 feet at Soda Lake, a seasonal playa in the center of the northern part of the valley (Figure 7), to 2,100 feet (Oster and Vinson 2003).

The Carrizo Plain is bordered by the Temblor Range to the east and northeast, the Elkhorn Plain to the east and southeast, the Transverse Ranges to the south, the Caliente Range to the west and southwest, the La Panza Range to the west, the San Juan Hills to the northwest, and the California Valley to the north. The southern San Joaquin Valley is to the east, just beyond the Temblor Range (Figures 6 and 7). These mountain ranges are mostly steep, rugged mountains with some rolling foothills adjacent to the plain. Elevations range from 1,600 to 5,106 feet (Caliente Mountain) in the Caliente Range, 1,950 to 4,332 feet (McKittrick Summit) in the Temblor Range, and from 1,900 to 4,054 feet in the La Panza Range (Oster and Vinson 2003, BLM 2010b). The northeastern slopes of the Caliente Range drain into the Carrizo Plain, while southwestern slopes drain to the Cuyama River. Within the plan area, the Temblor Range drains into the Carrizo Plain (southwestern slopes) while the La Panza Range drains into San Juan Creek (northeastern slopes) and the Cuyama River (southwestern slopes).

The Elkhorn Plain is a small, narrow plain 20 miles long and two miles wide that parallels the eastern margin of the Carrizo Plain. The two plains are separated by the Panorama Hills, Elkhorn Scarp, and Elkhorn Hills, which run northwest to southeast. The Elkhorn Plain, which has an elevation between 2,300 and 2,800 feet, is bounded to the northeast by the Temblor Range. The Elkhorn Plain drains into the Carrizo Plain on the Elkhorn Plain's northwest end (Oster and Vinson 2003, BLM 2010b).

2.4.1.1 Elkhorn Unit

The Elkhorn Unit is the easternmost unit of the Reserve. It is situated on relatively flat ground in the Elkhorn Plain at approximately 2,300 feet elevation (Figure 6). The hills of the Elkhorn Scarp lie to the southwest and the foothills of the Temblor Range are to the northeast. Terrain within the unit slopes gently to the southwest. It is flat except for two approximately 10-foot-deep channels carved by ephemeral drainages that converge just southwest of Elkhorn Road.

2.4.1.2 Panorama Unit

Located about seven miles northwest of the Elkhorn Unit, the Panorama Unit is situated largely on gently sloping land on the eastern edge of the Carrizo Plain on the northwestern limit of the Elkhorn Scarp (Figure 6). Elevations range from 1,930 feet in the southwestern corner to approximately 2,300 feet at the unit's northern edge where it begins to rise into the Panorama Hills. The San Andreas Fault bisects the northeastern quarter of the Panorama Unit from southeast to northwest.

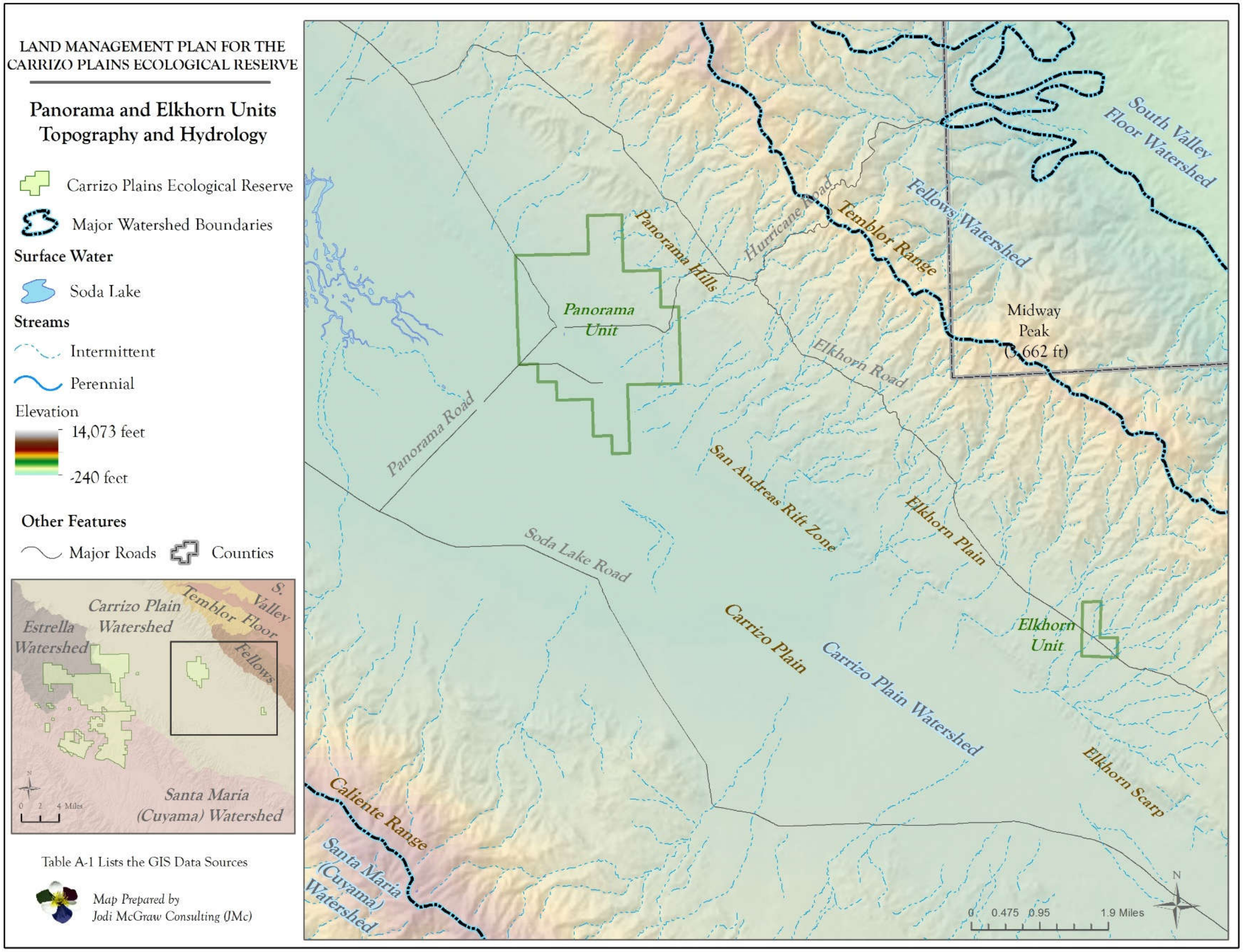


Figure 6: Topography and hydrology of the Panorama and Elkhorn units

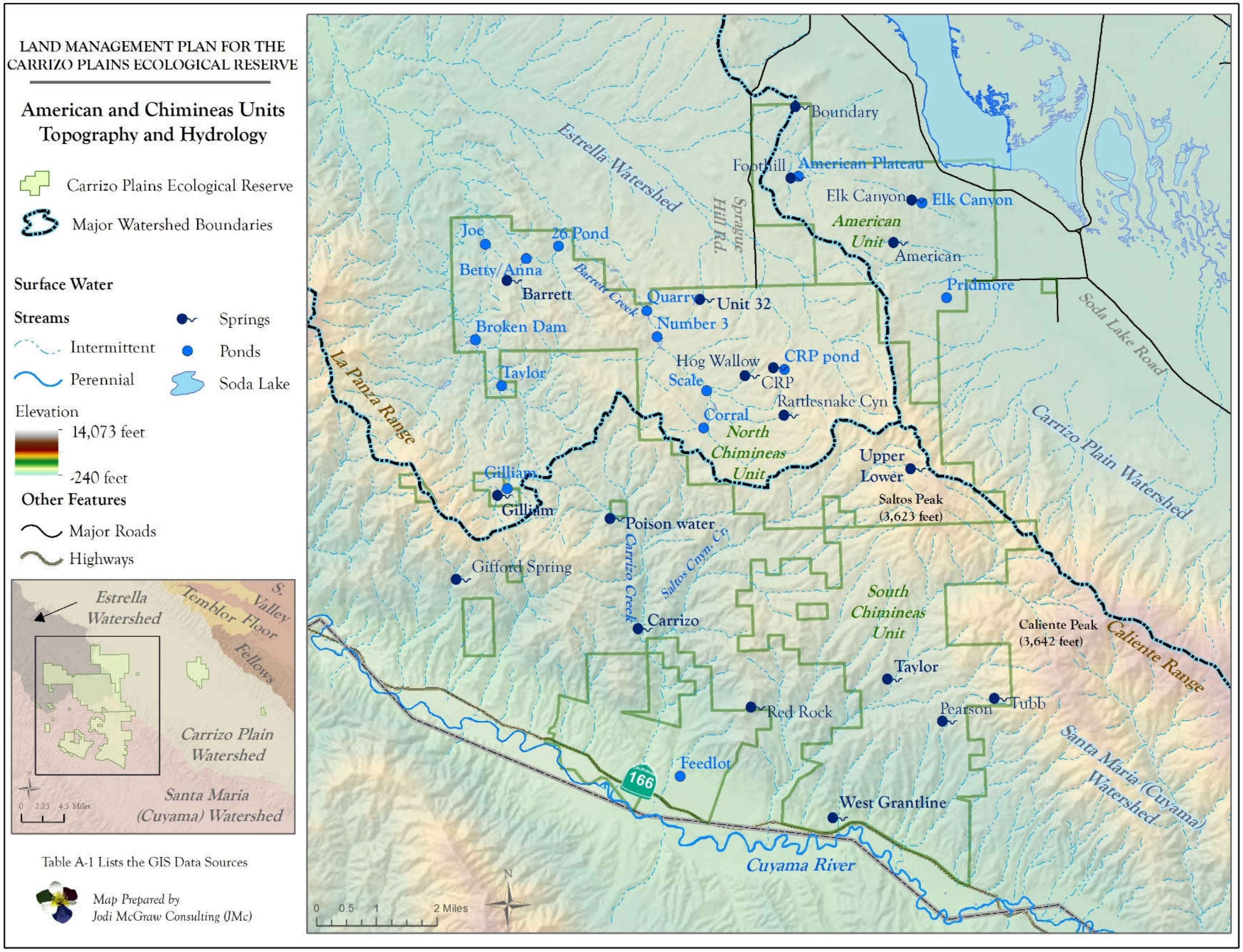


Figure 7: Topography and hydrology of the American and Chimineas units

2.4.1.1 American Unit

The American Unit lies approximately seven miles due west of the Panorama Unit across the Carrizo Plain. The northeastern portion of the unit lies on the plain itself and includes southern parts of Soda Lake (Figure 7). Much of the remainder of the unit features the rolling foothills of the Caliente Range. Elevations range from roughly 1,900 feet within Soda Lake to 2,700 feet near the unit's southernmost edge where it adjoins the North Chimineas Unit. The American Unit also features the disjunct 40-acre Painted Rock Ranch parcel: an area of flat terrain located at 1,960 feet elevation, which is located one mile to the east on the Carrizo Plain.

2.4.1.2 Chimineas Units

The North Chimineas Unit features relatively gentle terrain in the northeast, while the South Chimineas Unit features gently sloping river terraces and rolling hills in the southern portion of the unit along Highway 166. Much of the remainder of these two contiguous units is rugged and features steep slopes with varying slope aspects, which create a range of microclimate conditions. Elevations range from 3,623 feet at the summit of Saltos Peak along the eastern edge to approximately 1,500 feet along the Cuyama River (Figure 7).

The Chimineas units feature a series of canyons that drain the southern portion of the La Panza Range and western slope of the Caliente Range mountains. Saltos Canyon runs southwest through the Saltos Management Unit near the center of the boundary of the two Chimineas units. It turns south and joins Carrizo Canyon, which runs north-south at the boundary of the Saltos and Taylor management units on the southern side of the Caliente Range. To the east, Red Rock and Taylor canyons in the Taylor Management Unit, which also originate near the boundary between the Chimineas units and run southwest, ultimately converging on private land between the Feed Lot and West Grantline management units before descending to the Cuyama River.

2.4.2 Geology

Land within the CPER was formed through a complex series of geological processes that collectively produced a diversity of geological formations, soil types, and topographic features. Shaped over millions of years, this variation in the physical environment is a fundamental determinant of patterns of distribution, abundance, and diversity of the plants and animals observed within the Reserve today.

2.4.2.1 Evolution

Approximately 180 million years ago (MYA), the lands associated with eastern San Luis Obispo County, including those currently within the CPER, were below sea level and were part of the continental shelf of North American. At the present location of the Coast Ranges, a marine trench occurred where the eastward-moving Pacific Plate was subducted under the North American Plate. This trench had previously been located near the base of what are now the Sierra Nevada Mountains, but shifted westward at the end of the Jurassic Period. Sediments that ultimately became the Great Valley Sequence were deposited in the space between these two trenches: volcanically-derived Great Valley Ophiolite overlain by terrestrial runoff and organic layers produced by the accumulation of dead marine planktonic organisms. At the subduction zone, differences in the physical properties of various sediment types, changes in pressure, and variation in the degree of actual subduction and re-extrusion created a 'mélange' that ultimately became the Franciscan Formation, which is relatively abundant in the present-day Coast Range Mountains. This concurrent creation and deposition of the Great Valley and Franciscan formations occurred towards the end of the Jurassic Period and beginning of the Cretaceous Period. As the rate of subduction began to decrease, the resulting production of Franciscan sediments decreased and marine-derived sediments and terrestrial runoff continued to accumulate (Chipping 1987).

Sandstone Outcrop, North Chimineas Unit (Photograph by Jodi McGraw)

Around 40 MYA, a combination of tectonic uplift (mountain building) and dropping sea levels brought lands associated with this continental shelf to the surface and into the terrestrial environment. Changes in plate motion between 25 and 20 MYA gave rise to the San Andreas Fault and a transition from a subduction plate boundary to a pattern of slip/strike lateral movement with the Pacific Plate traveling north past the North American Plate (Chipping 1987).

Intrusion of the ocean via low-lying areas near Santa Cruz and Santa Barbara led to the inundation of most of the Central Valley and the deposition of marine-derived sediments that ultimately formed the Vaqueros and Rincon formations. Increasing volcanic activity to the east at the end of the Oligocene and start of the Miocene (about 16 MYA) produced ash that created the Obispo Formation. The Monterey Formation was also created around this time through mixing of terrestrial runoff and marine organic sediments of the Pismo Formation, which was subsequently deposited over the Monterey Formation.

Most of the Coast Range Mountains were still submerged during this period (late Pliocene and Pleistocene) but mountain building was underway and the extent and depth of marine intrusion into this inland sea were gradually decreasing. Land was folded, faulted, and pushed upwards and sea levels fell as ice caps formed during the ice ages. The uplift was relatively slow, however, allowing time for erosion of elevated surfaces to accumulate as alluvium, as in the Paso Robles Formation (Table 5). The movement of water across highly variable geologic formations, which differed in their degree of resistance to erosion, created a rugged and varied topography and several deep valleys. Additionally, the uplift occurred in bursts with erosion in intervening periods often creating broad terraces, further adding to the topographic heterogeneity of the area (Chipping 1987).

The Carrizo Plain itself initially drained north via the ancestral Salinas River but as uplift continued to elevate the northern end of the valley, this drainage was cut off and water was forced to flow south towards to lowest part of the plain at Soda Lake—a closed drainage basin created by warping of the bedrock along the San Andreas fault (Chipping 1987, BLM 2010b). The saline lake contains the salts dissolved from the weathering of rocks, which concentrate on the lake floor as the water evaporates (Chipping 1987).

2.4.2.2 Faults

Eastern San Luis Obispo County is an area of considerable seismic activity, and several tectonic faults crisscross the landscape (Table 4, Figure 8). The most notable fault in the CPER region is the San Andreas Fault—an 800-mile-long right-lateral strike-slip fault, which represents the boundary at which the Pacific Plate is moving northwest past the North American Plate (Chipping 1987). This fault traverses the foothills

Table 4: Faults within the CPER

Fault Name	Fault Zone	Age of Last Suspected Movement (Years)	Estimated Slip Rate (Inches/Year)	Fault Type[1]
Chimineas fault	San Juan	<1,600,000	<0.008	Moderately constrained
Chimineas fault	San Juan	<1,600,000	<0.008	Inferred
La Panza fault	La Panza	<1,600,000	<0.008	Moderately constrained
La Panza fault	La Panza	<1,600,000	<0.008	Inferred
San Andreas fault	San Andreas (Cholame-Carrizo section)	<150	>0.2	Inferred
San Andreas fault	San Andreas (Cholame-Carrizo section)	<150	>0.2	Well constrained
San Juan fault	San Juan	<1,600,000	<0.008	Moderately constrained
San Juan fault	San Juan	<1,600,000	<0.008	Inferred

[1] Well constrained: fault location is based on nearly continuous geomorphic features, such as fault scarps, or extensive geophysical surveys

Moderately constrained: fault location is based on mostly discontinuous geomorphic features

Inferred: fault location is constrained by large scale geomorphic features and considered poorly located as source map scale

of the Temblor Range between the Carrizo Plain and the Elkhorn Plain, where it passes through the northeastern quarter of the Panorama Unit and within a quarter of a mile of the Elkhorn Unit. In the Carrizo Plain region, the San Andreas Fault has been active within the last 150 years and has an estimated slip rate of more than 0.2 inches per year.

Three faults are present within the Chimineas units (Figure 8). The San Juan and Chimineas faults are roughly coincident and run along the eastern base of the Caliente and La Panza ranges southwest of the Carrizo Plain. They enter the North Chimineas Unit near its northwestern corner and continue southeast to the southern portion of the unit. The La Panza Fault runs through the southwestern Caliente and La Panza ranges and crosses through the southern portion of the South Chimineas Unit before terminating near the Cuyama River. All three of these faults are believed to have last been active sometime within the past 1.6 million years and have an estimated slip rate of less than 0.008 inches per year (County of San Luis Obispo 2001).

Three additional faults believed to have last been active sometime within the past 1.6 million years and have an estimated slip rate of less than 0.008 inches per year occur within the vicinity of the CPER but do not directly underlie the units (Figure 8). Just north of the San Juan and Chimineas faults, the Big Spring Fault runs northwest to southeast and comes within approximately two miles of the northwestern corner of the American Unit. The Morales Fault has a similar orientation to, and is in-line with, the San Juan and Chimineas faults but is located approximately five miles southeast of the eastern border of the South Chimineas Unit. The South Cuyama fault runs northwest to southeast through the Cuyama Valley and passes within one mile of the South Chimineas Unit (Figure 8).

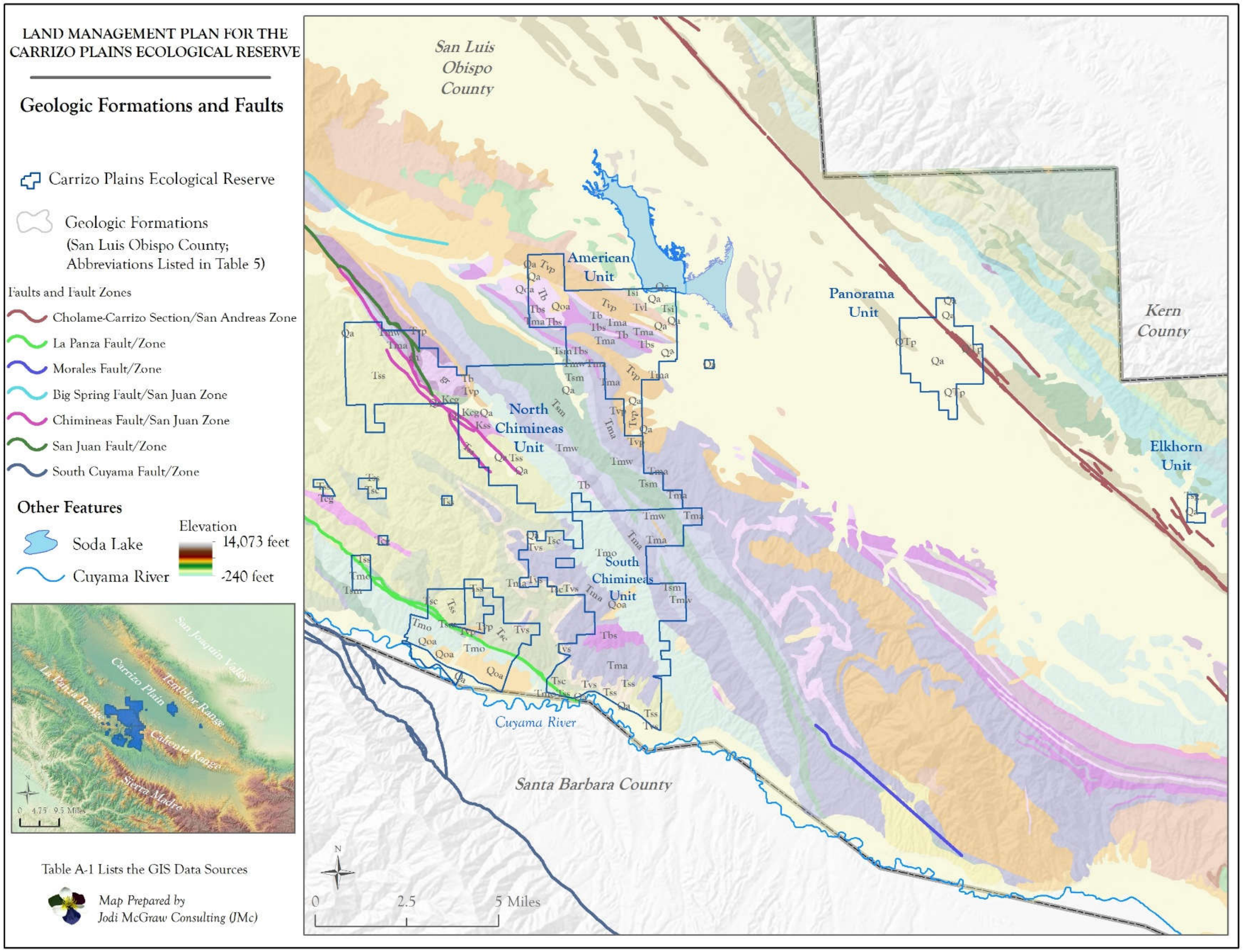


Figure 8: Geologic Formations and Faults (geologic formation abbreviations are listed in Table 5).

Table 5: Geologic formations of the Carrizo Plains Ecological Reserve, showing area covered and abbreviations used in Figure 8.

Geological Formation	Map Code	Era	American		Chimineas		Elkhorn		Panorama		CPER (Total)	
			Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
Alluvium	Qa	Holocene	1,112	17.5	1,592	5.3	154	95.7	2,717	93.8	5,575	14.1
Older alluvium	Qoa	Pleistocene	181	2.9	801	2.7					982	2.5
Basalt, extrusive and intrusive	Tb	Miocene	713	11.2	74	0.2					787	2.0
Branch Canyon Sandstone	Tbs	Miocene	533	8.4	537	1.8					1,070	2.7
Gneissic rocks	gn	Mesozoic or older			473	1.6					473	1.2
Granitic rocks	gr	Mesozoic or older			468	1.6					468	1.2
Marine clastic sedimentary rocks, conglomerate	Kcg	Late Cretaceous			174	0.6					174	0.4
Marine clastic sedimentary rocks, conglomerate	Tcg	Paleocene			40	0.1					40	0.1
Marine clastic sedimentary rocks, sandstone	Kss	Late Cretaceous			191	0.6					191	0.5
Marine clastic sedimentary rocks, sandstone, clay shale and minor conglomerate	Tss	Eocene and Paleocene			5,520	18.3					5,520	13.9
Monterey Shale Saltos Shale Member	Tma	Miocene	1,259	19.9	6,145	20.4					7,404	18.7
Monterey Shale Whiterock Bluff Shale Member	Tmw	Miocene	74	1.2	2,655	8.8					2,729	6.9
Morales Formation Valley sediments	Tmo	Pliocene			5,506	18.2			4	0.2	5,510	13.9
Paso Robles Formation	QTp	Pliocene and Pleistocene							176	6.1	176	0.4
Playa clay	Qc	Holocene	16	0.3							16	0.0
Santa Margarita Formation, conglomerate and breccia	Tsg	Miocene					7	4.2			7	0.0

Table 5: Geologic formations of the Carrizo Plains Ecological Reserve, showing area covered and abbreviations used in Figure 8.

Geological Formation	Map Code	Era	American Acres	American %	Chimineas Acres	Chimineas %	Elkhorn Acres	Elkhorn %	Panorama Acres	Panorama %	CPER (Total) Acres	CPER (Total) %
Santa Margarita Formation, sandstone	Tsm	Miocene	15	0.2	3,198	10.6					3,212	8.1
Simmler Formation, mostly conglomerate	Tsc	Oligocene			1,696	5.6					1,696	4.3
Simmler Formation, mostly sandstone	Tsi	Oligocene	114	1.8							114	0.3
Unnamed marine sediments sandstone and siltstone	Tu	Pliocene					0	0.1			0	0.0
Vaqueros Formation, Painted Rock Sandstone Member	Tvp	Oligocene and Miocene	2,063	32.5	405	1.3					2,469	6.2
Vaqueros Formation, sandstone	Tvs	Oligocene and Miocene			708	2.3					708	1.8
Vaqueros Formation, Soda Lake Shale Member	Tvl	Oligocene and Miocene	259	4.1							259	0.7
		Total	**6,339**		**30,182**		**161**		**2,898**		**39,580**	**100**

2.4.2.3 Formations

As a result of the complete geologic history including tectonic activity associated with the area, the CPER and surrounding lands feature numerous geologic formations of varied origins (Table 5, Figure 8). The majority of the Carrizo Plain is alluvium, while the foothills and mountains that border it are associated with a variety of geologic formations that run roughly northwest to southeast, paralleling the faults and boundary between the Pacific and North American plates in eastern San Luis Obispo County.

2.4.2.3.1 Elkhorn and Panorama Units

Located within the Carrizo and Elkhorn plains, the Elkhorn and Panorama units are primarily underlain by Quaternary alluvium—a relatively young formation comprised of river-deposited sediments. Minor occurrences of Santa Margarita Formation along the northern edge of the Elkhorn Unit and a few narrow outcrops of Paso Robles Formation running through the Panorama Unit interrupt this geological homogeneity (Figure 8).

Just northeast of the Elkhorn and Panorama units are bands of Santa Margarita Formation and Morales Formation Valley Sediments, respectively. In this area, the Santa Margarita Formation is very conglomeratic and contains a basal unit with masses of very large granite bounders of unknown origin (Chipping 1987). This conglomerate, which also includes lenses of breccia and sandstone, is as much as 2,500 feet thick (Dibblee 1973). Morales Formation Valley sediments are dominated by light gray, crumbly sandstone and conglomerate, and gray to red siltstones. In the Panorama Hills these sediments, which are roughly 2,500 feet thick, overlay conglomerates of the Santa Margarita Formation (Chipping 1987).

2.4.2.3.2 American Unit

Lying near the western edge of the Carrizo Plain, the American Unit's geology reflects its association with both the valley floor and adjacent hills and mountains. Most of the eastern edge of the American Unit, including the disjunct Painted Rock Ranch parcel, feature alluvium (Figure 8). In the northeast corner of the unit, a large deposit of playa clay exists in and around Soda Lake (Figure 8). Adjacent to this is a swath of Vaqueros Painted Rock Sandstone, a light-colored, medium-grained, thick-bedded sandstone that forms distinctive outcrops and can be up to 6,000 feet thick in the northwestern Caliente Range (Chipping 1987). A pocket of this formation also covers much of the southern part of the unit.

Running roughly through the center of the unit are bands of Saltos Shale Member of the Monterey Formation: an approximately 2,150-foot-thick formation featuring a lower layer (approximately 1,000 feet thick) composed of gray clay shale and siltstone, and an upper layer (approximately 1,100 feet thick) consisting of soft fissile shale and hard, brittle siliceous shale, which are separated by frequent thin beds of dolomite and an approximately 75 feet thick boundary sill of basalt (Dibblee 1973).

This Saltos Shale is near the northern edge of a large deposit of this formation that lies within the foothills and higher elevations of the Caliente Range southeast of the CPER and that extends down towards the floor of the Carrizo Plain. Fingers of Vaqueros Painted Rock Sandstone and Branch Canyon Sandstone also interdigitate here. Branch Canyon Sandstone is a nearshore, marine, coarse to medium grained eastern equivalent of the Monterey Saltos Shale. It contains thick bedded, locally cross-stratified, light gray to yellow gray sandstones that are interbedded with green gray siltstones. The stratum can be up to 3,000 feet thick in this area (Dibblee 1973). A sizable outcrop of Basalt bordered by patches of older alluvium underlies an area near the northwestern corner of the unit.

2.4.2.3.3 Chimineas Units

The northeast corner of the North Chimineas Unit features a series of narrow, adjacent bands of different geological formations (Figure 8):

- A band of Monterey Saltos Shale which is an extension of the previously mentioned formation in the American Unit.
- A thin band of Monterey Shale Whiterock Bluff Shale, which consists of hard, brittle, thin-bedded siliceous shale averaging approximately 1,200 feet thick, which grades downward into the Monterey Shale Saltos Shale member (Dibblee 1973).
- A relatively wide band of Santa Margarita Formation sandstone, consisting of nearly white, coarse, arkosic sandstones interbedded with small amounts of mudstone, siltstone, diatomite, and conglomerate. The sandstones are commonly massively cross bedded, a feature characteristic of deposition associated with high energy marine bottom currents. Mineral content suggests a granitic origin of the sand (Dibblee 1973).
- A band of Monterey Saltos Shale associated with a deposit that runs from the Cuyama Valley across the Caliente Range and through the Chimineas units.
- A relatively wide band of Morales Formation Valley sediments. These sediments are continental beds dominated by light gray, crumbly sandstone and conglomerate, and gray to red siltstones.
- Outcrops of granitic and gneissic rocks are present at the northern edge of this band near the northwestern corner of the North Chimineas Unit.

Another sizable deposit of Morales Formation Valley sediments is found on the western edge of the South Chimineas Unit along the terraces associated with the Cuyama River. Here it is almost 3,000 feet thick, with the upper half dominated by coarse grained sediments and the lower half by gray clays that were deposited in a lake bed (Chipping 1987).

Between the previous two deposits of Morales Formation Valley sediments is a large triangular wedge that extends northwest from the unit's southeastern corner, underlying most of the La Panza Range, and is disproportionately marine clastic sedimentary rocks, sandstone, clay shale and minor conglomerate (Chipping 1987). This stratum, composed of interbedded arkosic sandstone, siltstone, clay shale, and granitic conglomerate, appears to be derived from rapid erosion of a nearby granitic terrane and subsequent deposition in a shallow sea (Dibblee 1973). This thick series is not differentiated into members because it contains no consistent lithographic units other than a basal conglomerate which overlies a granitic base in the La Panza range (Dibblee 1973).

In the southern part of the wedge these sediments are replaced by deposits of Simmler Formation conglomerates, Monterey Shale Saltos Shale, and sandstone associated with the Vaqueros Formation. The Simmler formation here is approximately 3,000 feet thick and consists of hard red and greenish-gray well-bedded sandstone, siltstone, and local basal conglomerate. This coloration, and the absence of marine fossils suggest a terrestrial origin and the potential presence of lacustrine beds. It is overlain by the Vaqueros Formation (Dibblee 1973), which is overlain by the Vaqueros formation sandstone. Also called the Quail Canyon Sandstone Member, this formation is characteristically gray-white, massively bedded, fine to medium grained, well sorted, and very firmly indurated (Dibblee 1973). Bands of recent and older alluvium lie along the present-day banks of the Cuyama River.

2.4.3 Soils

Soils of the Carrizo Plain and surrounding regions are highly variable due in part the distinctly different parent materials brought together at the confluence of the Pacific and North American plates (BLM 2010b). Soils within the CPER have been classified and mapped as part of three separate soil surveys:

1. **Eastern San Luis Obispo County (Oster and Vinson 2003)**: This survey covers 33,818 acres (85.4%) of the CPER including all of the American, Panorama, and Elkhorn units and all but the southern and western portions of the Chimineas units (Figures 9 and 10).
2. **Northern Santa Barbara Area (Shipman 1972):** This survey covers 12% of the CPER in the South Chimineas Unit (Figure 10).
3. **Los Padres National Forest (O'Hare and Hallock 1980)**: This survey covers 2.6% of the CPER, on the western side of the Chimineas units (Figure 10).

Following the organizational scheme used in a soil survey conducted in and around the Carrizo Plain (Oster and Vinson 2003), soils of the CPER can be classified into general soil map units: soils on the valley floor, soils on alluvial flats, alluvial fans, flood plains, and terraces, and soils on hills and mountains. Soils on the valley floor account for approximately 529 acres or just over 1% of the total area of the CPER. They account for 13% of the Panorama Unit, 2% of the American Unit, and are essentially unrepresented in both the Elkhorn and Chimineas units. Soils on alluvial flats, alluvial fans, flood plains, and terraces account for roughly 7,188 acres, or 18% of the CPER, and cover 93% of the Elkhorn Unit, 78% of the Panorama Unit, 23% of the American Unit, and 11% of the Chimineas units. Soils on hills and mountains account for 30,372 acres or just under 77% of the total area of the CPER. These soils make up the vast majority of the area within the Chimineas (84%) and American (75%) units but represent only about 10% of both the Elkhorn and Panorama units (Table 6, Figures 9 and 10).

In general, approximately 72% of soils within the larger CPNM are classified as sandy or loamy while the remaining 28% are clay soils associated with the valley floor, Elkhorn Plain, and in isolated belts within the Caliente Mountains (BLM 2010b). The following sections highlight key soil conditions within the units and their influence on the plant communities (vegetation), which are described in greater detail in Section 3.

2.4.3.1 Elkhorn Unit

The Elkhorn Unit features 149 acres (93%) of Padres sandy loam soil: a very deep, well-drained soil generally found on nearly level to moderately sloping alluvial flats and fans, which is derived from sedimentary rocks (Figure 9). This soil primarily supports grassland vegetation but also features desert scrub dominated by California ephedra (*Ephedra californica*).

Located in s a small outcrop in the northernmost corner of the unit, the remaining 11 acres (7%) of the unit features Beam-Panoza-Hillbrick complex soils: a group of shallow to moderately deep, well drained soils formed in residuum weathered from sedimentary rocks and located on strongly sloping to very steep hills and mountains. The generally loam, stony loam, sandy loam, and fine sandy loam complex of soils (Oster and Vinso 2003) supports a mosaic of desert scrub dominated by yellow mock aster (*Eastwoodia elegans*), and coastal scrub vegetation dominated by California buckwheat (*Eriogonum fasciculatum*).

Table 6: Soils of the Carrizo Plains Ecological Reserve, showing area covered in terms of acres and percent of total area

	American		Chimineas		Elkhorn		Panorama		CPER (Total)	
Soil Type	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
Alluvial Flats, Alluvial Fans, Flood Plains, and Terraces										
Arbuckle sandy loam			199.0	0.7					199.0	0.5
Botella loam			473.8	1.6					473.8	1.2
Capay clay	80.6	1.3	346.6	1.1					427.3	1.1
Mocho fine sandy loam			363.2	1.2					363.2	0.9
Padres sandy loam					149.3	93.0	1,164.8	40.2	1,314.1	3.3
Padres-Wasioja complex			407.2	1.3			61.8	2.1	469.1	1.2
Panoche loam			46.3	0.2					46.3	0.1
Panoche sandy loam			0.6	0.0					0.6	0.0
Pleasanton cobbly sandy loam			240.3	0.8					240.3	0.6
Pleasanton sandy loam			592.6	2.0					592.6	1.5
Pleasanton very fine sandy loam			3.9	0.0					3.9	0.0
Polonio clay loam	133.4	2.1	39.3	0.1			1,025.0	35.4	1,197.7	3.0
Positas fine sandy loam			14.8	0.0					14.8	0.0
Riverwash			127.3	0.4					127.3	0.3
Sandy alluvial land			44.2	0.1					44.2	0.1
Sorrento sandy loam			58.3	0.2					58.3	0.1
Sorrento sandy loam			0.0	0.0					0.0	0.0
Thomhill loam	170.6	2.7	328.5	1.1					499.2	1.3
Wasioja loam	11.0	0.2							11.0	0.0
Wasioja sandy loam	271.2	4.3	1.2	0.0					272.3	0.7
Wasioja-Polonio complex	801.7	12.6							801.7	2.0
Xerofluvents-Riverwash association			31.9	0.1					31.9	0.1
Subtotal Alluvial Soils	1,468.5	23.2	3,319.2	11.0	149.3	93.0	2,251.6	77.7	7,188.6	18.2

Table 6: Soils of the Carrizo Plains Ecological Reserve, showing area covered in terms of acres and percent of total area

	American		Chimineas		Elkhorn		Panorama		CPER (Total)	
Soil Type	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
Bolson Floor										
Chicote complex	81.9	1.3					384.4	13.3	466.2	1.2
Playas ponded	54.1	0.9							54.1	0.1
Yeguas-Pinspring complex			8.3	0.0					8.3	0.0
Subtotal Bolson Floor	136.0	2.1	8.3	0.0			384.4	13.3	528.6	1.3
Hills and Mountains										
Aido clay	383.4	6.0	1,070.9	3.5					1,454.3	3.7
Ayar clay	117.4	1.9							117.4	0.3
Balcom-Nacimiento complex			44.0	0.1					44.0	0.1
Beam-Panoza-Hillbrick complex	141.3	2.2	7,142.7	23.7	11.3	7.0			7,295.3	18.4
Bellyspring-Panoza complex	219.4	3.5							219.4	0.6
Bellyspring-Saltos-Rock outcrop complex			751.6	2.5					751.6	1.9
Calleguas-Balcom complex			43.2	0.1					43.2	0.1
Gaviota-Rock outcrop complex			611.4	2.0					611.4	1.5
Gaviota-Saltos-Rock outcrop complex			1,461.2	4.8					1,461.2	3.7
Hillbrick-Rock outcrop complex	284.4	4.5							284.4	0.7
Kilmer-Hillbrick complex	129.2	2.0	911.7	3.0					1,041.0	2.6
Kilmer-Nacimiento Families association			133.6	0.4					133.6	0.3
Kilmer-Nacimiento-Aido complex			21.5	0.1					21.5	0.1
Millerton-Millsholm-Agua Dulce Families association			314.2	1.0					314.2	0.8
Modesto-Rincon-Millsholm Families association			175.5	0.6					175.5	0.4

Table 6: Soils of the Carrizo Plains Ecological Reserve, showing area covered in terms of acres and percent of total area

	American		Chimineas		Elkhorn		Panorama		CPER (Total)	
Soil Type	**Acres**	**Percent**	**Acres**	**Percent**	**Acres**	**Percent**	**Acres**	**Percent**	**Acres**	**Percent**
Modesto-Yorba-Agua Dulce Families association (sandy loam)			392.3	1.3					392.3	1.0
Nacimiento clay loam			355.5	1.2					355.5	0.9
Panoza-Beam complex	1,879.6	29.6	165.5	0.5			261.7	9.0	2,306.7	5.8
Rock Outcrop-Lithic Torriorthents complex			527.6	1.7					527.6	1.3
San Timoteo-San Andreas-Bellyspring complex			2,561.0	8.5					2,561.0	6.5
Saucito-Akad-Rock outcrop complex			1,104.7	3.7					1,104.7	2.8
Seaback-Calleguas-Panoza complex			792.8	2.6					792.8	2.0
Seaback-Panoza-Jenks complex	1,581.8	24.9	2,072.1	6.9					3,653.9	9.2
Shedd silty clay loam			1,749.3	5.8					1,749.3	4.4
Tajea-Saltos complex			2,853.8	9.5					2,853.8	7.2
Xerorthents-Badlands complex			107.0	0.4					107.0	0.3
Subtotal Hills and Mountains	4,736.5	74.7	25,363.3	84.0	11.3	7.0	261.7	9.0	30,372.8	76.7
<u>**Unclassified**</u>										
Rough broken land			556.5	1.8					556.5	1.4
Sedimentary rock land			684.7	2.3					684.7	1.7
Terrace escarpments			259.1	0.9					259.1	0.7
Water			6.4	0.0					6.4	0.0
Subtotal Unclassified			1,506.7	5.0					1,506.7	3.8
Grand Total	**6,341.0**		**30,197.5**		**160.6**		**2,897.7**		**39,596.8**	

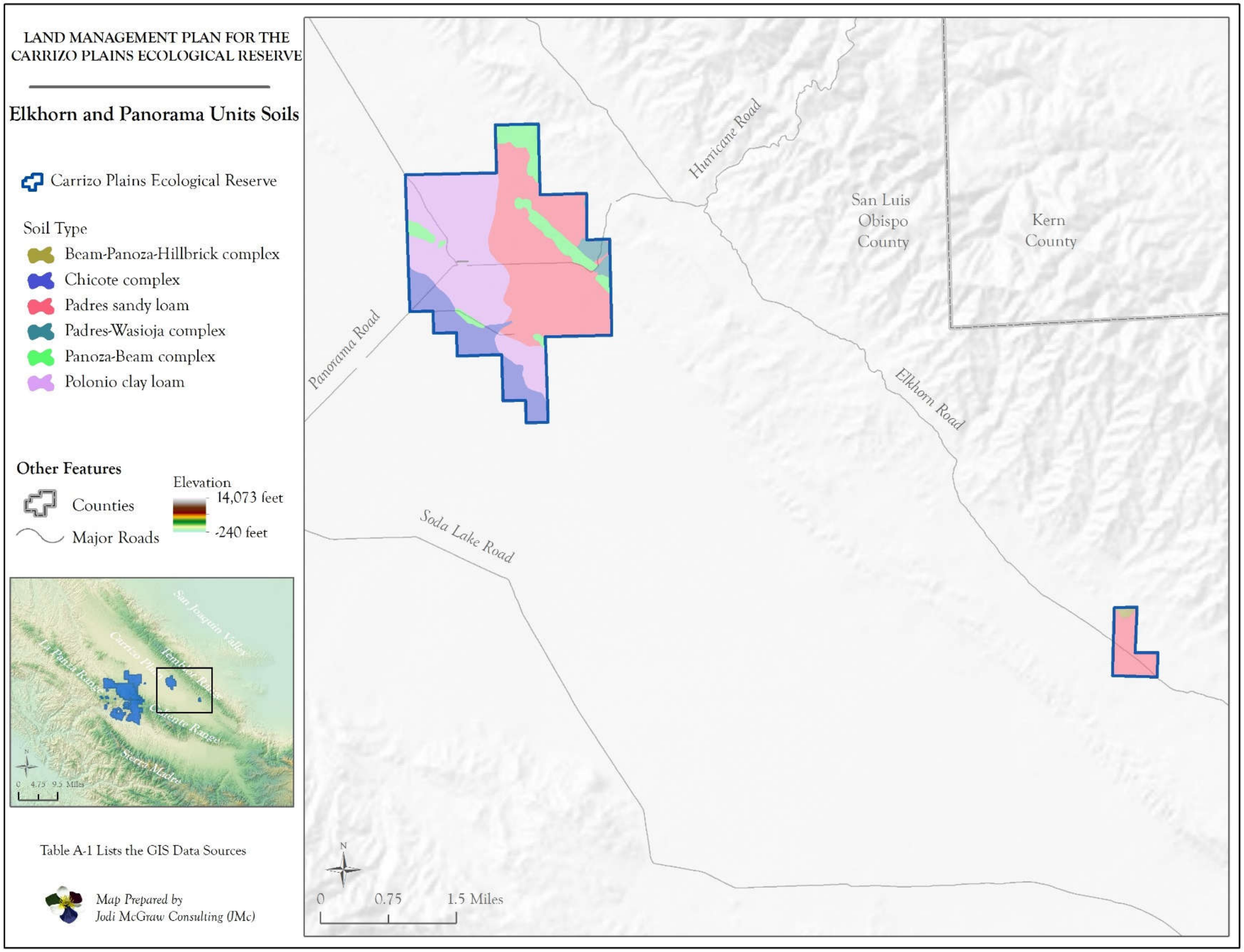


Figure 9: Soils of the Elkhorn and Panorama units

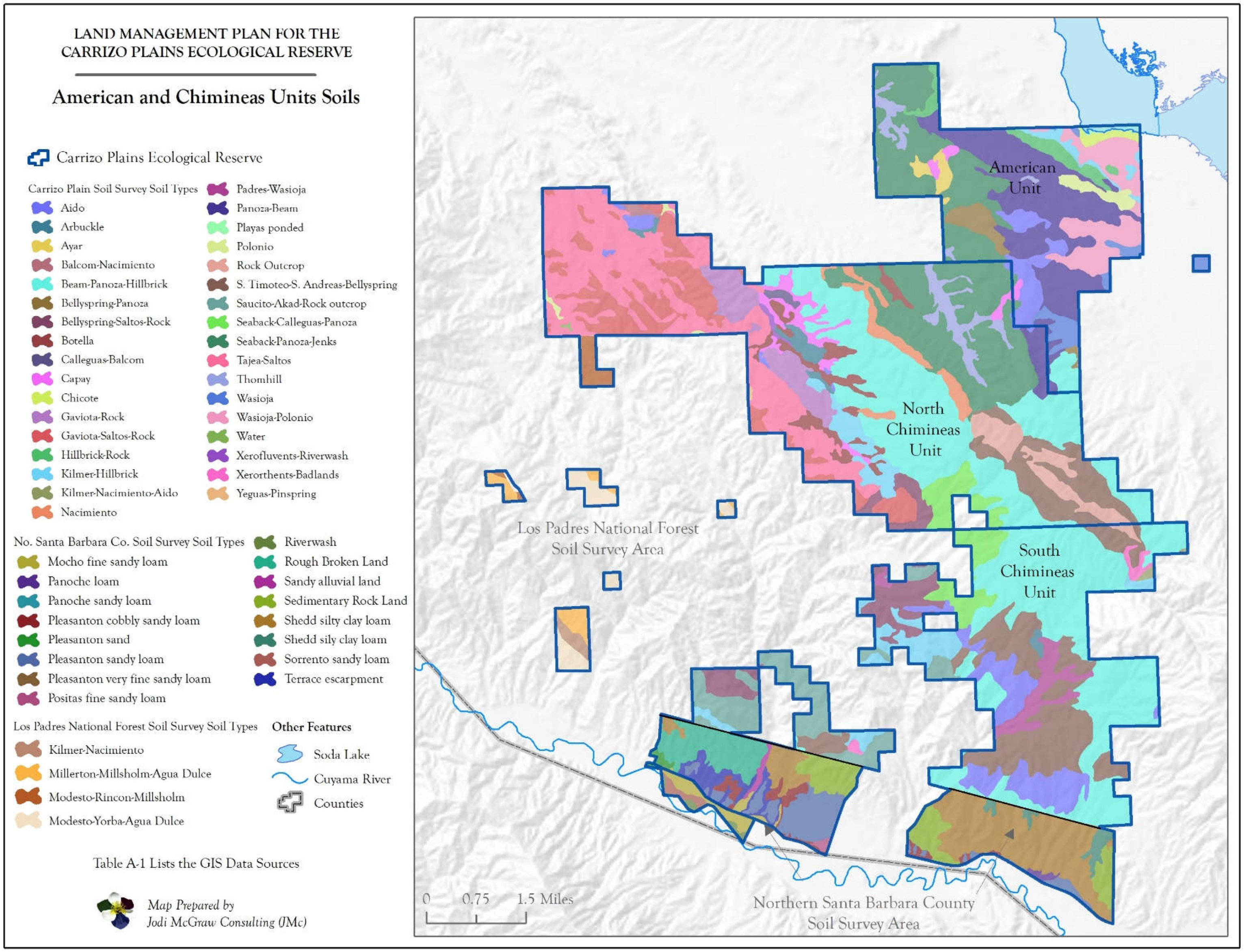


Figure 10: Soils of the American and Chimineas units

2.4.3.2 Panorama Unit

The eastern portion of the Panorama Unit contains 1,165 acres (40%) of Padres sandy loam, while the western portion of the unit features 1,025 acres (35%) of Polonio clay loam. This latter soil is a very deep, well drained clay and gravelly loam generally found on nearly level to moderately sloping alluvial fans, and derived from calcareous sedimentary rocks. These soils support primarily annual grasslands dominated by native herbaceous plant species featuring a high abundance of native forbs such as California goldfields (*Lasthenia californica*).

The southern portion of the unit features 384 acres (13%) of Chicote complex soils, which are very deep, somewhat poorly drained silty clay loams and silt loams that are derived from lacustrine (lake) sediments and alluvium of sedimentary rocks and are found on nearly level to moderately sloping lake plains adjacent to playas. Saline to 40 inches in depth, Chicote soils in the Panorama support the alkali desert scrub communities dominated by spiny saltbush (*Atriplex spinifera*) and allscale saltbush (*Atriplex polycarpa*).

The eastern foothills of the Panorama Hills feature 262 acres (9%) of Panoza-Beam complex of loam soils, which supports a fine scale mosaic of subshrub dominated vegetation, including coastal scrub featuring California buckwheat and desert scrub dominated by California ephedra.

2.4.3.3 American Unit

The American Unit features a complex mosaic of at least 16 soils types. The north, west, and central portions of the unit feature soils associated with hills and mountains. These soils account for 4,747 acres (75% of the unit) and include:

- Panoza-Beam complex of loam soils (1,880 acres, 30% of unit), which occur in discrete patches across the length of the unit's north-south axis;
- Seaback-Panoza-Jenks complex soils (1,582 acres, 25%), which are well drained loam and clay loam soils formed in residuum weathered from soft, calcareous sandstone, shale, or conglomerate, and occur in the center and along the western border of the unit; and
- Aido clay (383 acres, 6%), which is a moderately deep, well drained clay soils found on moderately steep to very steep hills and mountains, and is formed in residuum weathered from calcareous shale and fine-grained sandstone. Aido clay occurs in the central and southern portions of the American Unit.

These soils primarily support grasslands dominated by non-native annual grasses including red brome (*Bromus madritensis* ssp. *rubens)* and slender wild oats (*Avena barbata).* Within these non-native grasslands, there are patches of native grassland dominated by nodding needle grass *(Stipa cernua*) and native perennial herbs including longstem buckwheat (*Eriogonum elongatum),* as well as small patches of coastal scrub dominated by California buckwheat and silver bush lupine (*Lupinus albifrons*). Prior cultivation of much of the flat and rolling terrain within this unit has likely affected soil conditions as well as plant community composition (Section 3.1.1.3)

Six soils types associated with alluvial flats, fans, flood plains, and terraces make up 1,469 acres (23%) of the American Unit (Figure 10). Located in the eastern portion of the unit, these soils also support a mosaic of grassland dominated by non-native annual species but contain small patches of native-dominated perennial grasslands and coastal scrub communities. These soils are as follows:

- Wasioja-Polonio complex soils (802 acres, 13% of unit), a very deep, nearly level to moderately sloping, well drained soils that formed in alluvium from sedimentary rocks on alluvial flats and fans. These soils are present as a large outcrop in the eastern and northeastern areas of the unit.

- Wasioja sandy loam (271 acres, 4%): very deep, well drained loam and sandy loam soils found on nearly level and gently sloping alluvial flats and fans formed in alluvium from mixed rock types. These loamy soils are part of a large deposit to the east that crosses into the unit near its southern edge.

Along the shore of Soda Lake, the American Unit features 82 acres of the Chicote complex soils, which support desert scrub dominated by spiny saltbush and iodine bush (*Allenrolfea occidentalis*).

2.4.3.4 Chimineas Units

The Chimineas units features 47 soil types; however, only six types from hills and mountains constitute at least 5% of the total area of these adjacent units (Table 6, Figure 10).

Located on the eastern slopes of the La Panza Range Mountains, the northwestern portion of the North Chimineas Unit features primarily two soil complexes: Tajea-Saltos and Gaviota-Saltos Rock Outcrop. Tajea-Saltos complex soils (2,854 acres, 10%) are very shallow to moderately deep, well drained, loam, clay loam and sandy clay loam soils found on moderate to very steep slopes and formed in residuum weathered from sandstone. Gaviota-Saltos-Rock outcrop complex soils, which occur on 1,461 (5% of the units), are shallow, well drained loam, sandy loam, and sandy clay loam soils found on moderately steep to very steep hills and mountains and are formed in residuum weathered from sandstone.

These two soils occur on a range of slope aspects, and thus microclimate conditions, which support a relatively fine-scale mosaic of blue oak (*Quercus douglasii*) woodland, chaparral dominated by chamise (*Adenostoma fasciculatum*), and coastal scrub featuring California buckwheat and purple sage (*Salvia leucophylla*).

Located primarily west of the border with the American Unit, the Seaback-Panoza-Jenks complex of loam soils occur on 2,072 acres (7%) of the North Chimineas Unit. As in the American unit, these loam soils have been historically cultivated and support primarily grassland dominated by non-native annual grasses but feature small patches of native perennial grass and forb-dominated herbaceous communities.

The Beam-Panoza-Hillbrick complex of typically fine, sandy loam soils derived from the weathering of soft, calcareous shale, conglomerate, or sandstone occurs on 7,143 acres (24% of the units) as a relatively wide and continuous band running southwest to northeast from the southern end of the La Panza Range to the northern Caliente Range Mountains. This band of soils primarily supports grasslands dominated by non-native annual grasses and forbs, but that features small pockets of shrubs including linear-leaved goldenbush (*Ericameria linearifolia),* silver bush lupine, and small California juniper (*Juniperus californica*).

Adjacent to the Beam-Panoza-Hillbrick soils in the northern Caliente Range, San Timoteo-San Andreas-Bellyspring complex soils occur on 2,561 acres (9%) in the eastern portion of the Chimineas units. These moderately deep, well drained sandy loam soils formed from weathered sedimentary rocks and support juniper woodland dominated by California juniper.

The southern slopes of the Caliente Mountains near the southern boundary of the South Chimineas Unit in the Cuyama River Valley feature 1,749 acres (6% of the units) of Shedd silty clay loam: well drained, calcareous silty clay loams underlain by calcareous shale bedrock. These soils are near an additional 1,070 acres (3.5%) of Aido clay soils, which are similarly formed from weathered calcareous shale or fine-grained sandstone. These soils support primarily grassland, with smaller patches of desert scrub and coastal scrub occurring on south-facing slopes.

The central portion of the South Chimineas Unit features primarily sandy loam soils derived from weathered sandstone including the Saucito-Akad-Rock outcrop complex, which covers 2,561acres (8.5% of the units) and the Pleasanton sandy loam, which covers 592 acres. Located on the uplifted stream terraces above the Cuyama River, these areas support a fine-scale mosaic of grasslands dominated by non-native grasses, coastal scrub dominated by California buckwheat and purple sage, with small patches of blue oak woodland and savannas occurring in the canyons. The lower river terraces feature predominantly Mocho fine sandy loam characteristic of alluvial valleys in the region, which supports riparian communities dominated by arrow-weed (*Pluchea sericea*).

The portions of the Chimineas units that are surrounded by the Los Padres National Forest land (i.e., the forest inholdings) feature soil complexes comprised primarily of sandy loams that are derived from weathered conglomerate, sandstone, shale, and siltstone (Agua Dulce), calcareous shale (Kilmer), sedimentary rocks (Millerton), and sandstone (Modesto). These mountain soils support a fine-scale mosaic of blue oak woodland, grassland, coastal scrub, and chaparral communities that reflect the variation in hydrologic and microclimatic conditions in the mountainous terrain.

2.4.4 Climate

2.4.4.1 Current Climate

The CPER features a Mediterranean climate characterized by hot, dry summers and cool, comparatively wet winters. Precipitation primarily occurs between November and April, mainly in the form of rain but occasionally as snow at higher elevations. Within the region, precipitation exhibits three main gradients according to latitude, longitude, and elevation; precipitation is greater in the north and west than south and east, and greater at higher elevation than at lower elevation.

Winter storms generated over the Pacific Ocean that move northwest to southeast across the region are typical. This directionality results in a lower rainfall in the Inner Coast Range Mountains when compared to the Outer Coast Range Mountains. In addition, a greater amount of rain falls on the Caliente and La Panza ranges, leaving the Carrizo Plain and Temblor Range Mountains in the rain shadow and receiving less precipitation, particularly in south and southeast.

Electrical Storm over the CPER
(Photograph by Al Schmierer)

Temperatures generally vary inversely with elevation and tend to be highest on the valley floor and lower in mountain and foothill regions.

Temperature and precipitation data collected by the National Weather Service Cooperative Observer Network meteorological sensor located at the New Cuyama fire station (elevation 2,160 feet, along State Highway 166 on the southern side of the Caliente Range) between January 1974 and December 2015 were obtained from the Western Regional Climate Center (WRCC 2016) were analyzed to generate monthly averages. Summer high temperatures are generally near 90°F, winter highs near 60°F. Average temperatures range from approximately 75°F to 46°F. Mean annual rainfall over the survey period was 7.3 inches. Monthly averages ranged from 1.5 inches in February to 0.04 inches in June (Table 7, Figure 11).

The climate varies among the CPER units, and greatly influences the communities and species they support (Section 3). As noted above, due to orographic precipitation, the western portion of the Chimineas units receives more rainfall than the eastern portion of the unit and the American Unit, which in turn receive greater rainfall than the Panorama and Elkhorn units, which are in the rain shadow of the Caliente Mountains. There is also a north-south precipitation gradient: the American and Northern Chimineas Unit receive greater precipitation than the South Chimineas Unit, while the Panorama Unit receives more rainfall than the Elkhorn Unit. Temperature also varies along latitude, longitude, and elevation gradients.

The eastern-most and lowest elevation units, Panorama and Elkhorn, are hotter in the summer and warmer in the winter, than the western units, where cooler temperatures are associated with higher elevation peaks. Rainfall varies greatly between years, and this interannual variability has important implications for the biological systems of the Reserve and their effective management. Of particular importance is the interannual variability in precipitation, which during the period of record has ranged from just 16% of average or 1.2 inches in 2013 to 248% of average or 18.1 inches in 1998. Consecutive years of below-average rainfall are not uncommon, as was observed between 1984-86, 1988-90, 1999-2000, 2002-2004, 2006-09, and most recently 2011-2015. These drought periods alter the structure and species composition of the vegetation, particularly the herb-dominated grasslands, by influencing plant productivity. They can have important implications for animal populations, particularly small mammals such as the endangered giant kangaroo rat, and their predators including the endangered San Joaquin kit fox (Section 3).

Table 7: Mean monthly and annual daily maximum and minimum temperature and precipitation at the New Cuyama weather station from January 1974-December 2015 (WRCC 2016)

Variable	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Maximum Temperature (°F)	60.9	62.1	65.4	70.8	79.8	88.3	94.4	93.1	87.7	78.0	66.6	60.7	75.5
Minimum Temperature (°F)	32.6	34.3	36.7	39.0	44.6	50.5	56.2	54.8	51.1	43.4	35.5	31.7	42.4
Precipitation (inches)	1.36	1.49	1.43	0.44	0.22	0.04	0.08	0.10	0.34	0.29	0.52	1.00	7.3

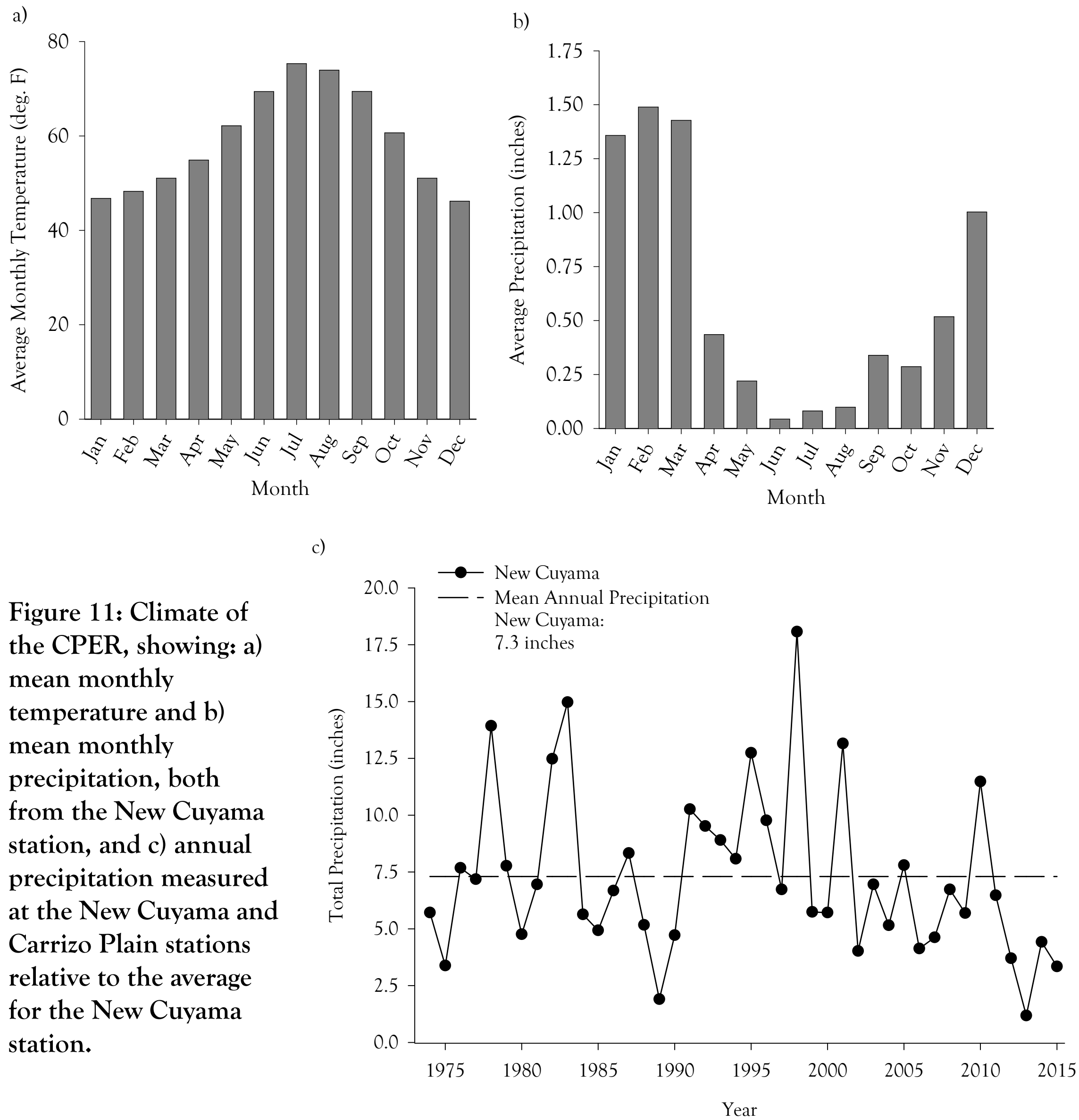


Figure 11: Climate of the CPER, showing: a) mean monthly temperature and b) mean monthly precipitation, both from the New Cuyama station, and c) annual precipitation measured at the New Cuyama and Carrizo Plain stations relative to the average for the New Cuyama station.

2.4.4.2 Climate Change Predictions

In a recent analysis of the effects of global climate change for San Luis Obispo County, Koopman et al. (2010) found that annual temperature is predicted to increase between 2.1°F to 3.9°F (3.6% and 6.8%, respectively) between 2035 and 2045 and from 4.1°F to 7.6°F (7.1% and 13.0%) by 2075 and 2085. These increases are relative to a mean annual temperature of 58.3°F within a historical reference period spanning 1961 and 1990 (69.9°F and 47.3°F during summers and winters, respectively).

Changes in precipitation were not as consistent among models and projections ranged from -4.2 in. to +1.5 in. (-26.9% and +9.6%, respectively), relative to current averages, between 2035 and 2045 and -4.7 in. to +0.9 in. (-30.1% and +5.8%) between 2075 and 2085. Historical values for the reference period include a mean annual precipitation of 15.6 inches and summer and winter averages of 0.06 inches and 2.8 inches per month, respectively (Koopman et al. 2010).

The predicted hotter and likely drier climate can have important implications for management of the biological systems within the Reserve. Increased temperature and potential decreased rainfall would likely cause plant species to shift further north or west, or up in elevation, in response to the climatic water deficit—lack of sufficient soil moisture due to greater evapotranspiration. Plant species at the edge of their temperature or precipitation tolerances within the region may be extirpated from the Reserve, while climate change could promote the spread of other species adapted to the hotter or drier conditions.

Shifts in plant species distributions are expected to interact with alterations to the fire regime to result in dramatic shifts in plant species composition and structure of the vegetation within the Reserve. Analysis for northern California found that warmer, windier and somewhat drier conditions in the Inner Coast Ranges are expected to increase fire spread rates and impacts, resulting in more frequent fast-spreading fires in grasslands and shrublands (Fried et al. 2004). By 2070, the areal extent of chaparral and coastal scrub in the Central Coast Ecoregion are expected to decline by 19 to 43%, blue oak woodlands are predicted to decline by 44%, and the extent of grassland is expected to increase by 85% to 140% (PRBO 2011).

Climate change can similarly affect the abundance and distribution of animal species, both directly and indirectly (via vegetation changes). Site-specific impacts of climate change for the CPER are difficult to predict not only because of uncertainty in the magnitude and direction of climate change, but also because of the myriad indirect effects and complex interactions that will ultimately determine the impacts of climate change on individual plant and animal species. However, specific impacts can include:

1. reduced plant productivity, particularly in the herb-dominated systems including the grasslands where interannual variability in rainfall greatly influences plant species composition, plant cover and height, and the residual dry matter that accumulates on the soil surface, which affects numerous soil and plant processes. This can reduce populations of herbivores and granivores relying on plant production, and thus reduced populations of predators of these species;
2. reduced density of shrubs and trees, which require greater moisture, thus reducing important food sources and critical habitat features for animals adapted to shrublands and woodlands; and
3. reduced flow in drainages, springs, and seeps, and shorter hydroperiod in ponds, which can influence their use by aquatic species including pond-breeding amphibians and reptiles such as western pond turtle, as well as numerous terrestrial species that rely on them for a source of free water, including mule deer and tule elk.

The Department will monitor the CPER using approaches designed to detect responses to climate change, as resources allow. Such changes may influence whether prescribed management elements are appropriate and necessitate adjustments as part of the adaptive management approach incorporated in this plan.

2.4.5 Hydrology

Water in the Carrizo Plain region is relatively scarce, owing to its location in the rain shadow of the Coast Range Mountains. It plays an important role in distributions of the communities, including wetland and riparian vegetation, and several special-status species such as the western pond turtle, as well as many wide-ranging species such as tule elk.

2.4.5.1 Hydrologic Regions and Groundwater Basins

The CPER lies within the central coast hydrologic region of California (CDWR 2003) and is associated with three named groundwater basins.

1. **Carrizo Plain Basin:** This173,000-acre basin along the western margin of the Temblor Range underlies the Elkhorn and Panorama units and the eastern approximately 1,100 acres of the American Unit.
2. **Cuyama Valley Basin**: This 147,000-acre basin consists of two extensions that run northwest to southeast along the foothills of the Caliente Range and merge near the southeast corner of the South Chimineas Unit, before widening in a southerly direction and extending southeast into northern Santa Barbara and Ventura counties. Just over 7,400 acres of this basin underlie central and southern sections of the South Chimineas Unit.
3. **Big Spring Area Basin:** This 7,320-acre basin in the foothills of the La Panza and northern Caliente Ranges west of Soda Lake underlies approximately 66 acres in the northwestern corner of the American Unit and approximately 345 acres running roughly north-south through the northeastern portion of the North Chimineas Unit, mostly within the Garcia Farming Management Unit (Figure 5).

In addition, the approximately 3,000 acre Rafael Valley Basin is located within the San Juan Creek drainage beginning at the confluence of Barrett and San Juan creeks, approximately one mile north of the North Chimineas Unit.

2.4.5.2 Drainages and Surface Waters

The CPER spans three watersheds (Figures 6 and 7). The Panorama and Elkhorn units, as well as much of the American Unit, are in the Carrizo Plain Watershed, which encompasses the entire Carrizo Plain and extends to the crest of the Caliente Range, where it incorporates a small area on the eastern edge of the Chimineas units (Figure 7). Much of the North Chimineas Unit is within the Estrella Watershed, which contains the western edge of the American Unit. The southern part of the North Chimineas Unit, as well as the entire South Chimineas Unit, is in the Cuyama Watershed.

The following sections describe the drainages and surface waters within each of the CPER units.

Ephemeral Drainage within the Elkhorn Unit (Photograph by Jodi McGraw)

2.4.5.2.1 Elkhorn Unit

Located within the Carrizo Plain Watershed, the Elkhorn Unit features several short, unnamed intermittent streams, totaling approximately 1.2 stream miles, which convey seasonal rainfall from the Temblor Range down to the Elkhorn Plain (Figure 6).

2.4.5.2.2 Panorama Unit

The eastern portion of the Panorama Unit features five mapped seasonal drainages totaling 2.7 linear miles that deliver water from the Temblor Range, Elkhorn Plain, and Panorama Hills to the northeastern and eastern portions of the Panorama Unit (Figure 6). No mapped drainages occur in the gently sloping western half of the unit.

2.4.5.2.3 American Unit

Running primarily east to west, approximately 16 linear miles of unnamed, ephemeral streams drain the foothills of the Caliente Range within the American Unit (Figure 7). Of these, 14 miles drain the eastern slopes and occur in the Carrizo Plain Watershed while two drain the western slopes within the Estrella Watershed.

The American Unit contains four known springs (Table 8): one in the northwestern portion of the unit, one near the northern border, and the other approximately a half mile west of the former American Ranch area. The Painted Rock Ranch parcel contains no streams, creeks, or seasonal drainages (Figure 7).

The American Unit contains a small portion of Soda Lake in its northeastern corner (Figure 7). Though the lake's dimensions vary seasonally and inter-annually, the Reserve incorporates an approximately a 42-acre portion of the 2,540-acre saline lake, including 2.14 miles of shoreline (USGS 2010). This saline lake dries completely during years with average or below average precipitation, leaving the lake bed covered with sulfate and carbonate salts (BLM 2010b). Owing to its occurrence along the lake's perimeter, the portion of the lake bed within the American Unit is often dry.

The American Unit features three ponds (Table 9, Figure 7). The 0.1-acre Pridmore Pond is a perennial pond supplied by pumped well water that is located in the southeastern portion of the unit. It was created by the Department to provide water for native animals including elk. Elk Canyon Pond is a 0.6-acre pond which was similarly created by the Department in partnership with the Rocky Mountain Elk Foundation and California Deer Association in 2008, which is fed by an adjacent, unnamed spring. American Plateau Pond is an approximately 0.3-acre seasonal pond located in the west part of the unit.

2.4.5.2.4 Chimineas Units

The Chimineas units feature 111 linear miles of drainages, which are associated with four main streams (Figure 7). All of the drainages are intermittent or ephemeral, except the Cuyama River—a perennial stream in the South Chimineas Unit, which is fed by 66.4 miles of drainages on the western slopes of the Caliente Range. The 5.3-mile long Carrizo Creek drains the central portion of the South Chimineas Unit, which includes the confluence with Saltos Canyon Creek. These streams are within the Cuyama Watershed (Figure 7). In the northern portion of the North Chimineas Unit, which is within the Estrella Watershed, San Juan Creek drains the southern La Panza Mountains and features 34.7 miles of drainages. These include the mainstem of San Juan Creek on the west of the unit as well as the 21.1-mile Barrett Creek within the north-central portion of unit.

The Chimineas units feature 14 known seeps and springs. Six of the springs have been developed to supply water to native animals as well as cattle used for vegetation management (Table 8, Figure 7).

Pearson Spring in the South Chimineas Unit
(Photograph by Jodi McGraw)

Table 8: Mapped seeps and springs within the CPER, noting whether they have been developed for use as a water supply

Unit	Watershed	Spring	Developed
American	Estrella	Boundary	No
	Carrizo Plain	Foothill	No
	Carrizo Plain	American	Yes
	Carrizo Plain	Elk Canyon	Yes
North Chimineas	Estrella	Barrett	No
	Estrella	CRP	No
	Estrella	Hog Wallow	Yes
	Estrella	Rattlesnake Canyon	Yes
	Estrella	Unit 32	No
	Estrella	Gillam	Yes
	Cuyama	Upper	No
	Cuyama	Lower	No
South Chimineas	Cuyama	Pearson	Yes
	Cuyama	Taylor	No
	Cuyama	Poison Water	Yes
	Cuyama	Tubb	Yes
	Cuyama	West Grantline	No
	Cuyama	Red Rock	No

The Chimineas units contain 12 ponds, 11 of which were created by prior landowners to supply livestock with water (Table 9, Figure 7). Of these, ten are located within the drainages of San Juan and Barrett creeks in the North Chimineas Unit, while the other is supplied by a pump and is in the Feed Lot Management Unit within the South Chimineas Unit (Table 9). In 2007, the Department worked with the California Deer Association to line CRP Pond with clay, so that it would hold more water for native animals.

Betty/ Anna Pond, North Chimineas Unit
(Photograph by Jodi McGraw)

The ponds range in area from 0.1 to 13.4 acres, based on the Department's mapping of their wetted perimeter in 2007; however, their wetted area varies greatly due primarily due to interannual variability in rainfall.

Table 9: Ponds of the CPER

Unit	Management Unit	Pond	Hydrology	Source	Acres[1]
American	None	American Plateau	Seasonal	Natural	0.3
	None	Pridmore	Perennial	Pump	0.1
	None	Elk Canyon	Perennial	Spring	0.57
North Chimineas Unit	Barrett, Gillam	Broken Dam	Perennial	Natural	13.4
	Barrett Creek	Number 3	Seasonal	Natural	4.6
	Barrett Creek	Quarry	Seasonal	Natural	2.2
	Barrett	Betty/Anna	Perennial	Natural	2.0
	Barrett	Joe	Perennial	Natural	1.2
	CRP	CRP	Perennial	Spring	0.25
	Gillam	Taylor	Seasonal	Natural	1.2
	1,000 Acre, Scale	Scale	Seasonal	Natural	1.1
	1,000 Acre, Headquarters	Corral	Perennial	Natural	0.9
	Barrett	26 Pond	Seasonal	Natural	0.6
	Gillam	Gillam	Seasonal	Natural	0.4
South Chimineas Unit	Feed Lot	Feed Lot	Perennial	Pump	0.1

[1] The estimated acreage includes adjacent wetland area, as well as wetted area.

2.4.5.3 Water Rights

A query of the California Water Resources Control Board's electronic water rights information management system database (eWRIMS) yielded 12 water rights claims within the boundaries of the CPER: 11 within the North Chimineas Unit and one in the American Unit (Table 10). Within the North Chimineas Unit, three of the claims had been cancelled, five were certified, two were licensed, and one is pending. Primary owners include the Chimineas Ranch Ltd. Corporation, the California Department of Fish and Wildlife, and Kenneth Eng. The claim in the American Unit is certified and associated with Kenneth Eng. All claims are either appropriative or for stock ponds (CWRCB 2010).

Table 10: Water rights claims located within the CPER (CWRCB 2010)

Unit	Parcel APN	Point of Diversion (POD) Identifier	Source name	Type	Primary Owner	POD Status	Diversion Storage Acre-Feet Per Annum
American	094-271-003	16828	Unstated	Stock pond	Kenneth Eng.	Active	2.6
North Chimineas	094-121-008	45816	Unstated	Stock pond	Kenneth Eng	Active	8
	094-121-009	27373	Unstated	Appropriative	CA. Dept. Fish and Wildlife	Active	15
	094-121-003	1485	Unstated	Appropriative	CA. Dept. Fish and Wildlife	Active	14
	094-161-001	7726	San Juan Creek	Stock pond	Chimineas Ranch Ltd.	Active	3
	094-121-005	19035	Unstated	Stock pond	Chimineas Ranch Ltd.	Active	3
	094-291-005	19036	Barrett Creek	Stock pond	Chimineas Ranch Ltd.	Active	9
	094-291-005	24664	Barrett Creek	Stock pond	Chimineas Ranch Ltd.	Active	4
	094-321-002	45597	Barrett Creek	Stock pond	Chimineas Ranch Ltd.	Active	2
	094-321-002	11421	Barrett Creek	Stock pond		Cancelled	2
	094-291-005	40102	Barrett Creek	Stock pond		Cancelled	10
	094-121-005	22634	San Juan Creek	Stock pond		Cancelled	10

2.4.6 Fire History

The CPER region has experienced a variable fire history that reflects the natural disturbance regimes of the various communities and the influences of human activities. Prior to the arrival of European and Mexican settlers in California, the Chumash people who inhabited the region used fire to promote the growth of various herbs, bulbs, seed plants, and green shoots for consumption (Timbrook et. al. 1982). The effects of such frequent burning by Native Americans on the structure and dynamics of plant communities have been debated. While some suggest that burning maintained grasslands and savannas in areas that otherwise converted to chaparral during periods of fire suppression, as occurred following arrival of European settlers in California, others have argued this floristic transition is the result of more frequent fires in recent times (Burchman 1974, p 119-120, cited in Timbrook 1982)

The recent history of fire in the region has been catalogued by the California Department of Fire Protection and Forestry (CalFire 2015). Though not complete, the database generally includes fires of at least 300 acres, with fires on US Forest Service land that are least 10 acres also include.

There have been no historic mapped fires in the Panorama Unit. A portion of the Elkhorn Unit east of Elkhorn Road was burned in 1998 or 1999 by a fire that spread from the Temblor Mountains (R. Stafford, pers. comm. 2010, BLM 2010b). This fire is not included in the CalFire database used to prepare Table 11 and Figure 12.

Three fires have been recorded within the American Unit (Table 11, Figure 12). In 1981, the Washburn Ranch fire, which was ignited by equipment use, burned 2,813 acres in the central portion of the unit. In 1996, 2,230 acres in roughly the same area burned in the Overlook fire, which was an escaped prescribed fire. A power line sparked the American Fire in 1997, which burned 860 acres in the southern half of the unit.

The Chimineas units have experienced 18 recorded fires (Table 11, Figure 12). Between 1917 and 1957, five unnamed fires burned between 43 and 8,396 acres of land occurring within the present-day Chimineas units. In 1979, the Spanish Ranch fire burned 751 acres in the South Chimineas Unit. The Washburn Ranch fire of 1981 burned 137 acres of the northeastern corner of the North Chimineas Unit. The Spanish fire of 1982 burned 220 acres in the Cuyama Management Unit of the South Chimineas Unit. The Spanish fire of 1998 and the Spanish fire of 2003 burned 100 and 23 acres, respectively in the West Grantline Management Unit of the South Chimineas Unit. The Overlook and American fires that largely affected the American Unit also burned 1 and 180 acres, respectively, in the North Chimineas Unit. In 1997, the Logan fire burned 4,596 acres of land across both Chimineas units, and included portions of the CRP South, Cuyama, Garcia, Gifford, Gillam, Red Tank, Saltos, Taylor, and White Rock management units. The Cuyama fire of 2006 burned 379 acres is the East Grantline Management Unit of the South Chimineas Unit. The Rancho 2 fire, which was sparked by equipment use in 2006, burned 112 acres along the Cuyama River in the Cuyama Management Unit. The 2010 Cotton fire, which was ignited by a vehicle traveling Highway 166, burned 730 acres in the East Grantline and Taylor management units of the South Chimineas Unit. A portion of this area burned in a fire in 2008 that was not mapped by CalFire presumably due to its small size. The 2012 Caliente Fire, which was ignited by lightening, burned 144 acres on the western slope of the Caliente Mountains in the South Chimineas Unit (Figure 12). The 2013 Branch Fire, which burned a total of 490 acres mostly on the Los Padres National Forest, affected a small portion (approx. 2 acres) of the North Chimineas Unit.

Table 11: Fires mapped within the CPER (CalFire 2015)

Fire Name	Year	Cause	Acres Burned		
			American Unit	Chimineas Units	Fire Size
Unnamed1	1917	Miscellaneous		43	956
Unnamed2	1921	Unknown		707	12,351
Unnamed3	1922	Miscellaneous		8,396	25,637
Unnamed4	1956	Miscellaneous		168	2,781
Unnamed5	1957	Miscellaneous		162	16,628
Spanish Ranch	1979	Miscellaneous		751	1,191
Washburn Ranch	1981	Equipment Use	2,813	137	3,110
Spanish	1982	Unknown		220	879
Overlook	1996	Escaped Prescribed Burn	2,230	1	2,231
American	1997	Powerline	860	180	1,631
Logan	1997	Miscellaneous		4,596	49,491
Spanish	1998	Arson		100	120
Spanish	2003	Equipment Use		23	23
Cuyama	2006	Miscellaneous		379	926
Rancho 2	2006	Equipment Use		112	183
Cotton	2010	Automotive		730	2,040
Caliente	2012	Lightening		144	144
Branch	2013	Miscellaneous		2	490
		Total	**5,903**	**16,851**	**120,812**

Though it can be difficult to generalize aspects of the fire regime of the region based on the available data, Highway 166 and the associated ranches along it may continue to provide ignition sources for fires affecting the Chimineas units of the Reserve. It also appears that fires burning within densely vegetated Los Padres National Forest to the west can spread into the Chimineas units, fanned perhaps by the prevailing westerly winds. Though there have been no recorded fires in the Panorama Unit and only a single known fire in the Elkhorn Unit, small fires (<2,000 acres) occasionally occur within the Carrizo Plain. The lower frequency of fire likely reflects the reduced flammability of the desert scrub and sparser grassland vegetation in this area, relative to the coastal scrub, and chaparral in the western portion of the Chimineas units.

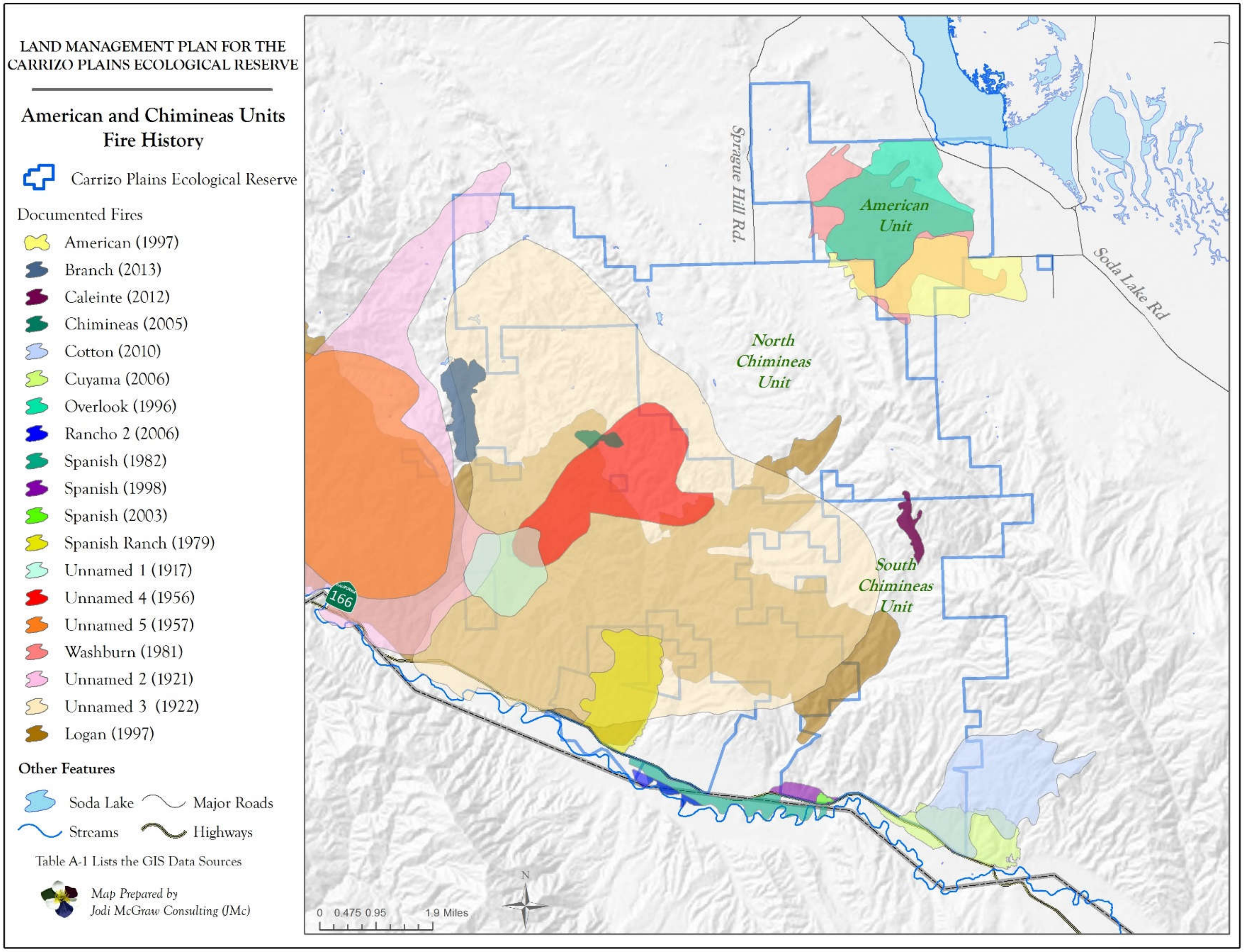


Figure 12: Fire History of the American and Chimineas Units

2.5 Cultural History and Resources

The CPER is located within a region with a relative rich and diverse human history. As a result, it features high cultural resource conservation value as well as exceptional biological conservation values.

2.5.1 Prehistory

2.5.1.1 Chronology

The prehistory of south-central California, including the CPER, has been defined in terms of a four-part cultural chronology (Whitley 2011). The Paleoindian Period (before about 8,500 years before present [YBP]) appears to represent the earliest occupation of this portion of California, but it remains poorly understood due to a paucity of identified sites dating to this early epoch. A possible Paleoindian site has been discovered on the nearby CPNM, however, suggesting that the CPER region has been occupied and utilized since that time. The Early Millingstone Period, from about 8,500 to 4,000 YBP, was marked by a heavy reliance on plant foods, primarily seeds, shown by a dominance of groundstone plant processing tools in archaeological sites. A single possible Early Millingstone site has also been identified within the CPNM, indicating that the region continued to be occupied, although by a relatively small population.

A major expansion in prehistoric population, marked by a proliferation of large sites, occurred at the start of the Middle Period, which lasted from about 4,000 to 800 YBP. This is believed to correlate with the introduction of the acorn-processing economy, and the subsistence stability that this promoted, along with improving environmental conditions. Within the CPER region, Middle Period villages are typically located along now-dry drainages, often some distance from existing springs.

Prehistoric population is believed to have collapsed at the start of the Late Prehistoric Period (800 to 220 YBP), with a 90% reduction calculated for the CPNM (Whitley et al. 2007). Late Prehistoric villages are small and few, relative to the earlier Middle Period, and are associated with existing sources of water. This population collapse is hypothesized to be the result of deteriorating environmental conditions, specifically the periodic droughts that have characterized the last millennium or so in western North America.

2.5.1.2 Ethnography and Land Use

Ethnographically, the CPER lies in the territory of the Chumash, close to their boundaries with the Salinan, to the north, and the Yokuts, to the east (Whitley 2011). Each of these tribes subsisted by hunting and gathering rather than farming. This involved periodic movements typically from larger aggregated villages, occupied during the winter, followed by spring and summer dispersal across the landscape into smaller groups (often individual families) to exploit ripening plant species. Acorns from various species of oak (*Quercus* spp.) were the primary staple, augmented by a variety of different plants and seeds, such as chia (*Salvia columbariae*). Acorns were gathered during the fall and processed by leaching to remove tannins; they provided a reliable staple that could be stored and could support the dozens of occupants residing in the winter aggregation villages. In interior regions, away from the coast or lakeshores, hunting emphasized deer but most the animal protein in the diet was obtained from small mammals, such as hares and rabbits, which were often captured with traps and nets.

Although there is archaeological and documentary evidence that a small population of Chumash (approximately 30 people) lived within the Carrizo Plain area during the historical period (after about AD 1770), and may have hunted and gathered within the CPER, no historical villages are known to exist within the Reserve.

2.5.2 History

The CPER region was used historically, starting in the second half of the nineteenth century, for ranching and, in some cases, large-scale farming (Whitley 2011). Initial livestock practices involved Hispanic ranchers who used the territory for grazing, but filed no known land claims in the immediate region. Small holdings owned by homesteaders were common but, following the drought of 1895-1896, most of these occupants were bought-out and large-scale ranching became the norm. Large-scale wheat farming became common on the open flats on the wetter, western side of the Carrizo Plain after the turn of the century. The following describes in greater detail the regional land use history and the transitions from livestock grazing, to homesteading, to large-scale farming.

Historically Cultivated Grasslands in the Panorama Unit (Photograph by Jodi McGraw)

2.5.2.1 18th and 19th Centuries

During the late 18th and early 19th centuries grazing animals from ranches situated east of the Carrizo Plain occasionally ventured onto the plain for forage but no permanent human settlements were established. Early Mexican and Spanish settlements, and the movement of people and goods between them, also occurred predominantly in coastal areas to the north and west of the Carrizo. The La Panza and Caliente ranges to the west of the Carrizo Plain, and the Temblor Range and marshes of the Tulare Basin to the east, acted as formidable barriers to the establishment of permanent settlements on the plain (Eichel 1971).

Following the admission of California to the union in 1850, large areas of the Carrizo Plain became available for purchase and were acquired by land speculators under the California Land Act of 1851. A small handful of San Franciscans, including James and Richard McDonald, George Schultz, and Henry von Bargen, came to own much of the north and considerable acreage in the southern half of the plain (Eichel 1971). The paucity of small parcels of land available for purchase, a condition that persisted until the 1880s, reduced the attractiveness of the Carrizo Plain for settlers.

In the late 1800s, the southern San Joaquin Valley and Tulare Basin were being settled rapidly due to the development of agriculture and construction of a railroad to provide access to markets in San Francisco. The population of western San Luis Obispo County also grew as land previously associated with large Mexican land grants became available for purchase. Because so little land on the Carrizo Plain was available for purchase, however, the area remained essentially unpopulated. This situation changed in 1885 when the Atlantic and Pacific Railroad Company was forced to forfeit rights to land in the northern Carrizo Plain after failing to follow through on plans to build a line connecting Los Angeles and San Francisco (Eichel

1971). Settlers quickly began to move onto and develop 160-acre homesteads on the plain and a few tenant farmers also worked sections of the large, privately owned parcels. The first permanent settlement on the Carrizo Plain, the El Saucito Ranch in the southwestern part of the plain, was built in 1865. Until 1885, seasonally grazed herds of cattle and sheep represented the only commercial use of the plain (Eichel 1971).

Commercial isolation and a challenging local climate constrained the use of agriculture as a viable livelihood on the Carrizo Plain. In the early 1890s the only path to market was a two-day trip along a crude wagon road over the La Panza Mountains to Santa Margarita, the nearest location of a rail connection to San Francisco (Eichel1971). Productivity of farms on the Carrizo Plain was also limited by the arid climate. Situated in the rain shadow of the Caliente and La Panza mountains the Carrizo Plain receives little rainfall and the hot, dry conditions (Section 2.4.4) and scarcity of permanent sources of year-round water represent considerable challenges for agricultural endeavors and basic subsistence. Between 1885 and 1900, cattle grazing remained the primary form of land use with some dry farming of grain to feed the family and livestock (Eichel 1971). A sequence of severe droughts during this period created great hardships for the settlers, driving the majority to leave the plain by 1900.

2.5.2.2 Early 20th Century

Between 1900 and 1940, mining of sodium sulphate deposits around Soda Lake and oil exploration along the southwestern margin of the plain brought new transportation and infrastructure developments that slowly improved commercial connectivity of the Carrizo Plain (Eichel 1971). A rail line through McKittrick and across the northern edge of the plain was of particular significance; following its completion large wheat farms began to displace cattle grazing as the primary commercial activity on the Carrizo Plain. Patterns of land ownership on the plain, however, remained largely unchanged. While tractors made large-scale wheat farming possible, their costs were economically prohibitive for most settlers given the low yield of small homesteads. As these residents abandoned their fields, their homesteads were absorbed into larger properties.

Roads out of the plain to McKittrick and over the Pozo Grade were paved in the 1930s, further connecting the plain with outlying regions and markets. In the 1940s more tenant farmers began to arrive in the northern parts of the plain, where some of the large, privately owned land parcels were divided into smaller farms averaging approximately 6,000 acres (Eichel 1971). Most of these farmsteads were located on or near the east-west state road crossing the northern Carrizo Plain. In the southern parts of the plain settlement patterns did not change significantly. There, large holdings were held intact and not rented to tenant farmers so population density remained low.

Laws passed in the 1960s that regulated agricultural production had a profound impact on land use. The Federal Wheat Program of 1967 imposed acreage limitations and price control provisions and thereby restricted farming of the primary cash crop of the Carrizo Plain (Eichel 1971). The result was a depressive economic impact and a shift to the growth of barley. Between 1965 and 1970 much of the central and southern portions of the plain were purchased by Oppenheimer Industries, further consolidating land ownership (Eichel 1971).

In the late 1960s, the previously rural California Valley began to be developed intensively for residential use. Spurred by hope that the California State Water Project would bring water to the area, developers created over 7,000 2.5-acre parcels (Figure 4). However, the water project was ultimately located north of the Carrizo Plain and, in the absence of sufficient clean water to support the development, the parcels remain largely undeveloped.

2.5.2.3 Late 20th Century

In recognition of the high conservation value of the Carrizo Plain, owing to its vast area and habitat supporting several endangered species, state and federal agencies and conservation organizations began work to protect the region from future, intensive development. In 1984, TNC and the BLM began exploring the possibility of acquiring extensive lands in the Carrizo Plain region for conservation and restoration for rare and endangered San Joaquin Valley species, as well as other components of San Joaquin Valley vegetation and wildlife. Strategies for acquisition and management of the lands were developed through workshops including TNC, BLM, the Department, and the USFWS (BLM 2010b).

In 1985, the USFWS, BLM, and the Department signed a Memorandum of Understanding to establish the Carrizo Plain Natural Area (CPNA). The objectives of the CPNA were developed by the partners, which convened a steering committee that included local, state, and federal government officials and representatives of the ranching, oil, gas and mining industries, and environmental groups (BLM 2010b).

Staff from the Department and Partner Organziations in the CPER (Photograph by Jodi McGraw)

In 1988, TNC completed the first conservation acquisition within the Carrizo Plain when it purchased 82,000 acres owned by Oppenheimer Industries. In 1988 and 1989, BLM received funding from Congress to acquire 23,000 acres and 28,500 acres, respectively (BLM 2010b).

The Department, which had protected the 166-acre Elkhorn Unit in 1983, collaborated with TNC to create and expand the CPER through acquisitions of portions of the American Unit and the entire Panorama Unit in 1988 and 1989, respectively (Section 1.2). In the ensuing 15 years, the Department worked with TNC to assemble the additional lands of the CPER through expansion of the American Unit and protection of the North and South Chimineas units (Section 1.2).

2.5.2.4 Early 21st Century

Just after the turn of the century, federal and State incentives to develop alternative energy sources led to considerable interest in the development of large scale photovoltaic electrical generating stations (i.e., solar energy plants) in the Carrizo Plain and western Kern County. The Topaz Solar Farm was developed on approximately 4,100 acres north of California Valley near the intersections of Highway 58 and Soda Lake Road. An additional 2,000 acres was developed for the California Valley Solar Ranch further east, along Highway 58. Five additional solar power plants are proposed for development on the western edge of the San Joaquin Valley just over the Temblor Range Mountains from the Carrizo Plain (DLM 2015; Appendix J).

Relative to cattle grazing, the intensive land use associated with these solar plants negatively impacts special-status species populations and landscape connectivity in the region. To mitigate these and other impacts, approximately 10,000 acres of mitigation lands will be protected and managed in the Carrizo Plain region (DLM 2015, Appendix J). These include land that will be included in the North Carrizo Ecological Reserve—a new ecological reserve to be managed by the California Department of Fish and Wildlife.

2.5.3 Land Use History of the CPER Units

2.5.3.1 Elkhorn Unit

There is no available information about the historic use of the Elkhorn Unit, which was acquired by the Department in 1983 from a private individual. It was likely grazed by livestock including cattle and sheep as part of one or more wide-ranging livestock operations in the 19th and early 20th centuries. There is no evidence of historical cultivation, such as infrastructure or furrows indicating tillage.

Since acquired by the Department, the Elkhorn Unit has been used primarily for research on the rare San Joaquin Valley species. The Department fenced the property to exclude cattle that graze the adjacent Temblor-Caliente BLM allotment. As a result, the Elkhorn Unit has served as a control (ungrazed) site for regional studies examining the effects of grazing on the populations of species including giant kangaroo rat and blunt-nosed leopard lizard. The unit is also used for upland game hunting, particularly for dove and quail (Section 2.8.3).

2.5.3.2 Panorama Unit

When acquired by TNC in the 1980s, land within the Panorama Unit was under cultivation. An estimated 2,390 acres of the 2,840-acre unit was being cultivated in the 1980s (BLM 2009). This approximately 84% of the unit in cultivation excluded the southwestern portion where saline soils of the Chicote complex occur. Irrigation line left in the shed suggests that the land was irrigated. The unit also features a closed approximately 1.5-acre gravel borrow pit south of the county road (R. Stafford, pers. comm. 2010). Prior to cultivation, land within the Panorama Unit was likely grazed by livestock that ranged throughout much of the region.

Recent use of the Panorama Unit include wildflower viewing, as displays can be spectacular in appropriate rainfall years, and low frequency of hunting, particularly for upland game (R. Stafford, pers. comm. 2010).

2.5.3.3 American Unit

Land within the American Unit was formerly part of the American Ranch. Little specific information is available about its history. However, the site was in cultivation for dry-land barley when it began to be acquired by TNC in 1988. Regional mapping indicates that 4,300 acres of the 6,341-acre unit was cultivated in the 1980s (BLM 2009). This estimated 68% of the unit excluded the central area around the historic ranch headquarters, and the southernmost portion of the unit which is in steep terrain. Livestock grazing, particularly by cattle, likely occurred on the land within the American Ranch since the 1800s.

Former Amercan Ranch House
(Photograph by Jodi McGraw)

As land within the American Unit was incorporated into the CPER between 1988 and 2003 (Section 1.2), it was taken out of cultivation and has been ungrazed. In the 2000s, the Department has enhanced habitat for wildlife by removing the interior fencing to facilitate movement, particularly for pronghorn and creating an artificial pond to supply water. The American Unit is used for both upland game and big game hunting (Section 2.8.3).

2.5.3.4 Chimineas Units

Land within much of the Chimineas units has likely been grazed by cattle throughout its recent history. Federal property until 1883, land within the units was part of a 20,000-acre area purchased by J. H. Hollister and Frederick Adams that created the Chimineas Ranch, which was named for the remains of an old hearth and chimney located at the ranch headquarters. By 1888, the Chimineas Adobe, which is part of the present-day Chimineas Unit Headquarters house, was erected. In the late 1800s, the Reis family acquired the Chimineas Ranch and held it until the 1930s, when it was purchased by Claude Arnold. The Arnold family expanded the ranch until 1972 when it was sold to the Robertson Family from Texas. In 1999 the Robertson Family sold the Chimineas Ranch to Dr. Neil Dow, who renovated the ranch house and operated the cattle ranch.

Chimineas Unit Headquarters (Former Chimineas Ranch House)
(Photograph by Jodi McGraw)

Cattle grazing operations on the Chimineas Ranch have historically included both the private lands now included within the CPER, as well as grazing allotments on adjacent federal lands. These include the following (Figure 5):

1. **Gifford (USFS):** An approximately 5,700-acre allotment on the western portion of the South Chimineas Unit;
2. **Gillam (USFS):** An approximately 5,300-acre allotment located on the western border of the North Chimineas Unit;
3. **North Chimineas (BLM):** a 3,914-acre allotment including Saltos and the central portion of Carrizo Canyon; and
4. **South Chimineas (BLM):** a 4,386-acre allotment including Red Rock Canyon and southern Carrizo Canyon.

Dry-land farming for grain (wheat and barley) also historically occurred on the rolling terrain in the North Chimineas Unit, as well as the ancient river terraces in the South Chimineas Unit. An estimated 6,585 acres of the North Chimineas Unit was in cultivation in the 1980s (BLM 2009). The methods used to map cultivation are unknown but the coarse nature of the spatial data suggest it might be fairly generalized and thus overestimate the area cultivated.

Examination of aerial images suggests that the river terrace within the Cuyama Management Unit, as well as the lower, flatter terrain within the White Rock and Feed Lot management units, were cultivated until the 1960s or perhaps 1970s. The CRP North, CRP South, and CRP Landing Field management units were cultivated until 1987, when Mr. Robertson enrolled them in the federal Conservation Reserve Program (CRP). These CRP lands have not been grazed since they were enrolled (R. Stafford, pers. comm. 2010). Cultivation continued into the mid-1990s within the Garcia Farming, Garcia Strip (lower portion), Unit 31, Unit 32, and Scale management units (Figure 5).

As part of a project conducted with the Natural Resources Conservation Service to improve range conditions for livestock and wildlife, Dr. Dow planted native clovers (*Trifolium* spp.) and orchard grass (*Dactylis glomerata*) on hundreds of acres in the Scale, CRP, and Garcia Farming management units between 2001 and 2003 (R. Stafford, pers. comm. 2010).

Since acquiring the South Chimineas Unit in 2002 (14,314 acres) and the North Chimineas Unit in 2004 (15,882 acres), the Department has continued to graze portions of the units, in order to maintain habitat conditions that support several rare and endangered species for which the property was acquired, including San Joaquin kit fox and burrowing owl. Continuance of grazing also enabled the Department to assess the role of grazing in influencing the distribution and abundance of these and other species as part of the initial resource evaluations conducted following acquisition.

In 2005, the Department entered a cooperative agreement with the Cachuma Resource Conservation District and the owner of the Russell Ranch, which adjoins the southern border of the South Chimineas Unit, to enhance riparian habitat along a four-mile portion of the Cuyama River along the shared boundary of the two properties. In this Cuyama River Riparian Enhancement project, four miles of fencing were installed on the north and south sides of the river to exclude cattle from the riparian vegetation. Cattle from the Russell Ranch graze approximately 200 acres of upland habitat within the South Chimineas Unit as needed, including during dry years when forage on their ranch is limited. The agreement includes a management plan which sets forth stocking levels, standards for residual dry matter, and stock rotation.

The Department has installed fences to exclude cattle from sensitive communities, including the riparian systems and ponds within the San Juan Creek, Barrett Creek, and Carrizo Creek drainages, and conducted a suite of other management activities to promote wildlife including installation of additional water sources (e.g., ponds and troughs) that support wildlife including tule elk and mule deer.

The Chimineas units are used for upland and big game hunting, including special hunt programs sponsored by the Department (Section 2.8.1). The Chimineas units have also been used for several research studies, workshops, and other education designed to promote regional conservation of the rare biological systems (Section 2.8.4).

2.5.4 Legacies of Historic Human Land Use

Historic human uses of the CPER influence the biological systems and their effective management. It is not possible to reconstruct the pre-human or even pre-settlement landscape or definitively link current conditions to prior activities. However, the Reserve's historic uses are likely to have caused impacts that must be considered in designing and implementing successful management programs. Specifically, cultivation of the flat and rolling terrain altered the soil profile and biota, as well as vegetation through tillage and seeding which displaced native plant species directly, and reduced their populations indirectly by promoting the invasion and spread of non-native plants. In these cultivated areas, as well as steeper more densely vegetated areas accessible by sheep and cattle, livestock grazing may have promoted the invasion and spread of non-native plants which, in turn, have reduced the cover and richness of native plants. Development of water to support livestock in the xeric region altered the natural hydrological systems. Seeps and springs were developed and drainages impounded to provide water. These activities have promoted populations of amphibians and reptiles that occupy the created ponds as well as many terrestrial species including native ungulates and bats that require free water. These hydrologic modifications may have potentially negatively impacted certain riverine species. Development of the other ranch infrastructure including roads and buildings has also altered hydrology and vegetation. Meanwhile, harvesting of trees for fences and fuel wood may have affected the structure in the woodlands.

Finally, historic cattle grazing has no doubt influenced plant community structure and species composition within the Reserve's communities. Specifically, it maintained relatively open and short-stature conditions in grazed grasslands, as well as in the understory of oak woodlands. Grazing may have also influenced the density of shrubs and cover of herbaceous plants in other communities utilized by livestock, particularly coastal scrub and desert scrub.

2.5.5 Cultural Resources

In some cases, the lasting evidence of prior human habitation and uses of land contained within the Reserve represent cultural resources. The entire CPER has not been systematically surveyed for archaeological sites and other historical resources. However, a limited amount of systematic surveying has occurred within the American Unit as part of studies on the CPNM and more recently, studies have been conducted on the Chimineas units.

In addition, a GIS model was developed to predict prehistoric archaeological site locations within the Chimineas and American units, based partly on the site data collected on the adjacent CPNM and in part on the locations of recorded sites (Whitley 2011). The model predicted CPER site locations at an accuracy rate of 78%, and was used to generate a site sensitivity map for these two units. In general terms, areas with high sensitivity for cultural resources include springs, terraces along drainages, and the confluences of drainages. Some sites occur in unpredicted locations, however, and project specific surveys should be conducted for any activities that will result in ground-surface disturbance within the CPER. A systematic inventory of the built environment or structures has not yet been completed within the CPER.

The following sections describe the prior studies and known and potential cultural resources within each unit of the CPER. As per CEQA Guidelines § 15120, site locations are confidential and not specifically described in this document.

2.5.5.1 Elkhorn and Panorama Units

No archaeological surveys have been conducted on the Panorama or Elkhorn units, and no sites have been previously recorded in either unit. Systematic surveys of surrounding areas within the CPNM have failed to result in the discovery of sites (Whitley 2003, 2004, 2007); however, suggesting that archaeological sensitivity in these areas is low.

2.5.5.2 American Unit

Five archaeological surveys have systematically covered portions of the American Unit, primarily because of site inventories for the CPNM (Whitley 2003, 2004, 2007). Six archaeological sites have been previously recorded within the unit. Five of the six known sites are prehistoric; one is historical. All of the sites are believed to be in good condition.

2.5.5.3 Chimineas Units

California State University, Bakersfield, Center for Archaeological Research conducted a reconnaissance-level assessment of cultural resources within the Chimineas units, primarily focused on recording known historical locales (Orfila and Draucker 2008). ASM Affiliates, Inc., conducted a second reconnaissance in 2009, emphasizing additional known but unrecorded prehistoric sites (Whitley 2011). In 2011, a systematic survey of all areas of potential high intensity cattle use (e.g., troughs and corrals) was conducted on the Chimineas units (K. Ballantyne pers. comm. 2011).

Twenty-two archaeological sites are known within the Chimineas units. Some of the sites include both prehistoric and historical components. All but two sites appear to be in good condition. The two exceptions, both prehistoric villages, have been damaged due to trampling by livestock which occurred prior to the Department acquiring the property. Additional information provided in a technical report is included in a confidential Appendix F. The technical report is not included in the public version of this plan due to the sensitive archaeological site and tribal cultural resource information conatained therein.

2.6 Existing Structures and Features

The existing infrastructure of the CPER was developed when the lands contained therein were privately held and utilized for cattle grazing, farming, and private residential use. The Department has not conducted a comprehensive inventory of the infrastructure within the Reserve; however, the BLM previously compiled a spatial database of infrastructure within the CPNM and adjacent lands, which was used along with reconnaissance-level assessments to prepare this plan, to prepare the initial description below (Figures 13 and 14).

The following sections identify the infrastructure, including structures, roads, fences, and grazing facilities, within each unit. Developed trails are limited to a single foot path within the CPER, which is the Caliente Mountain Trail on the southeastern corner of the South Chimineas Unit, though natural surfaced roads provide the primary access routes for visitors in units open for public access (Section 2.8).

2.6.1 Elkhorn Unit

The 166-acre Elkhorn Unit of the CPER features a 0.6-mile segment of Elkhorn Road—a county maintained road that traverses the Elkhorn Plain (Table 12, Figure 13). An additional 0.4-mile-long dirt road provides access to the eastern edge of the parcel on the southern side of the main drainage.

The entire 2.5-mile perimeter of the Elkhorn Unit is fenced by four-strand barbed wire and cattle guards are in Elkhorn Road where it intersects the unit. A water line traverses the Elkhorn Unit parallel to and 750 feet east of Elkhorn Road (Figure 13).

Table 12: Roads within the CPER

Maintenance	Road Type	Units				
		American	Chimineas	Elkhorn	Panorama	Total
County	Primary/Secondary	1.1		0.6	2.6	4.3
Department	Primary/Secondary	14.2	63.0	0.4	2.2	79.8
	All-terrain Vehicle		38.2			38.2
	Total	**15.3**	**101.2**	**1.0**	**4.8**	**122.3**

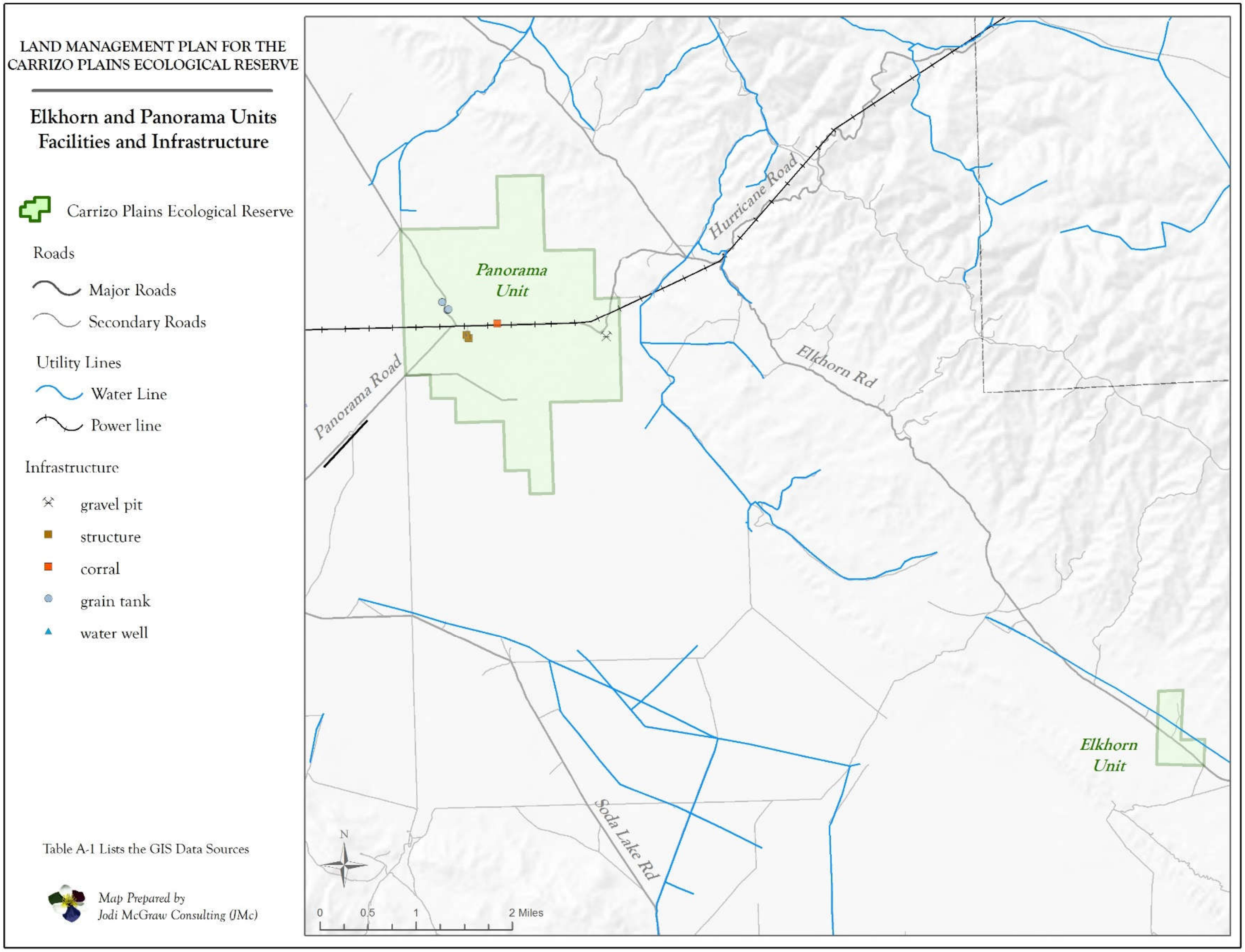


Figure 13: Facilities and infrastructure of the Elkhorn and Panorama units

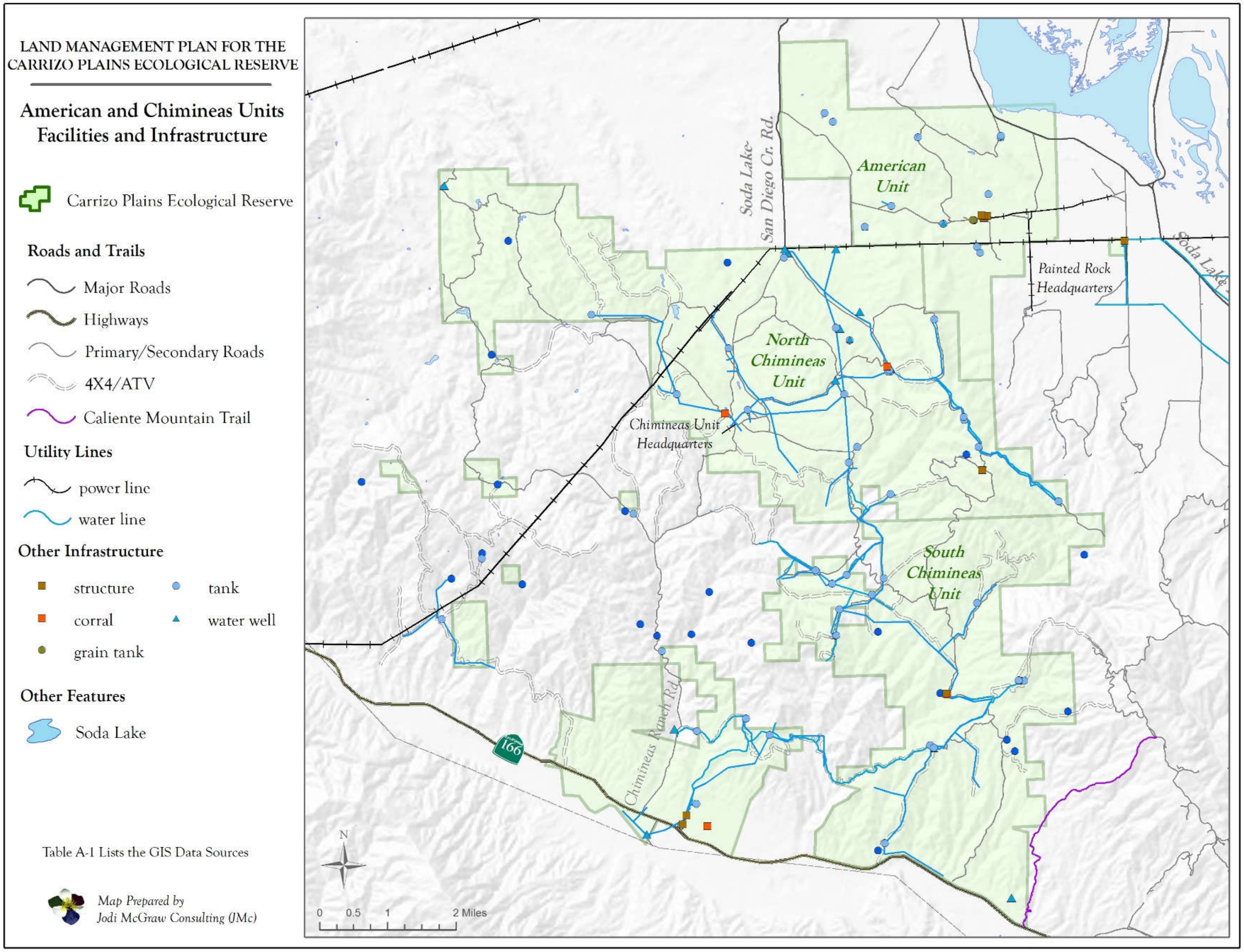


Figure 14: Facilities and infrastructure of the American and Chimineas units

2.6.2 Panorama Unit

Panorama Unit features a 2.6-mile long segment of the County-maintained Elkhorn Road, which traverses the unit (Table 12, Figure 13). Panorama features an additional 2.2 miles of roads that provide access to the north and west property boundaries. Power transmission lines that bisect Carrizo Plain largely follow Elkhorn Road through the Panorama Unit.

The 11-mile perimeter of the property is fenced with four-strand barbed wire. In addition, a chain link fence surrounds the buildings at the former RC Farm headquarters.

Additional infrastructure associated with prior landowners' farming and livestock operations has not been maintained and is in generally poor condition. This includes:

- An old residence constructed of pumice blocks, which is in disrepair;
- a 7,200 ft^2 (60 feet x 120 feet) metal storage shed with a dirt floor;
- six grain storage tanks;
- a steel pipe corral (150 feet x 150 feet);
- one trough;
- one water tank; and
- a 250-foot-deep water well with a two-horsepower submersible pump.

2.6.3 American Unit

The American Unit features approximately 15.1 miles of roads, including a 1.1-mile section of the paved, County-maintained Soda Lake Road in the northeast corner of the property, and 14.2 miles of natural surface roads maintained by the Department within the fenced portion of the property (Table 12, Figure 14).

The American Unit is fenced along much of its 19-mile perimeter. The main exception is in the northeast corner near Soda Lake, where the fence follows the eastern and southern boundaries of Section 24 south of Soda Lake Road, rather than on the property line. Over the past 10 years, the Department has partnered with non-profit organizations to remove cross-fencing used as part of the former livestock operations on the property, to facilitate movement by pronghorn and other animals.

Unnecessary Fence Removed from CPER and adjacent BLM lands (Photograph by Bob Koch)

The main portion of the American Unit features infrastructure primarily associated with farming and livestock operations as part of the former American Ranch. Mapped infrastructure on the unit, much of which has not been maintained, includes:

- five dilapidated structures at the former ranch headquarters (houses, trailers, etc.);
- three grain storage tanks just west of the former ranch headquarters;
- three water wells, two of which feature windmills;
- eight water tanks; and
- seven troughs.

Power transmission lines enter the American Unit near its southwestern boundary with the North Chimineas Unit, and exit the American Unit at the road providing access to the Painted Rock Ranch parcel.

The 40-acre Painted Rock Ranch parcel contains infrastructure associated with the former ranch as well as current facilities used by the Department for its operations. Located within the approximately 2.5-acre developed portion of the property in the northeast corner, adjacent to the BLM's Goodwin Education Center, the Painted Rock Ranch Headquarters infrastructure includes:

- one mobile home;
- three small outbuildings (e.g., storage sheds);
- one water well; and
- one water trough.

2.6.4 Chimineas Units

2.6.4.1 Roads and Trails

The Chimineas units feature approximately 101 miles of roads, 63 miles of which are passable with a four-wheel drive passenger vehicle; the remaining 38 miles require all terrain vehicles such as a jeep or quad (Table 12, Figure 14). In addition to these roads within the boundaries of the Reserve, the Department utilizes 56 miles of roads that are on adjacent federal land managed by the USFS and BLM to access the Reserve. The Department has maintained 110 miles of the 157 miles of roads that are on or directly access the CPER.

The southeast corner of the South Chimineas Unit features a 1.25-mile-long segment of the Caliente Mountain Trail, which provides public access from Highway 166 to the namesake peak via Caliente Mountain Road to the east of the Reserve (Figure 14). The trail meanders in and out of the Reserve, such that the total length on the reserve property is approximately 0.4 miles.

2.6.4.2 Fences

The Chimineas units feature both perimeter and interior fencing installed as part of the livestock operations. Though the Department's lands are largely fenced on the northern and southern boundaries, portions of the eastern and western boundaries are not fenced where the Chimineas Units abut federal lands owned by the USFS and BLM. Similarly, the Reserve's boundary with the Los Padres National Forest inholdings and the BLM land, are unfenced. Instead, the existing fences were installed and maintained by prior owners of the Chimineas Ranch to include the federal allotments used for grazing (Section 2.5.3.4). The fences have not been comprehensively mapped; however, based on the approximate location of the various management unit boundaries (Figure 5), an estimated 120 miles of fence were present within the Chimineas units when they were acquired by the Department.

The Department has installed new fencing to limit access by cattle to the following sensitive aquatic resources:

1. Cuyama River: An estimated 4.1-mile reach of the Cuyama River was fenced to prevent cattle accessing the stream and adjacent riparian area from either side of the river.
2. Taylor Pond: An estimated 1.2 miles of fence surround the Taylor pond area in the northwestern part of the North Chimineas Unit;
3. Broken Dam: An estimated 3.1 miles of fence surrounds Broken Dam Pond, located in the northwestern portion of the North Chimineas Unit; and
4. San Juan Creek: An estimated 1.8 miles of fence surround a reach of San Juan Creek in the northwestern portion of the North Chimineas Unit.
5. 26 Pond: An estimated 1,000 feet of fencing was installed around an ephemeral/seasonal pond in the northern portions of the North Chimineas Unit.
6. Gillam Spring: Approximately 1,200 feet of fencing was installed on Reserve lands around Gillam Spring.
7. Carrizo Canyon: Approximately 2,000 feet of fencing was installed around riparian habitat just before Carrizo Canyon reaches Highway 166.

2.6.4.3 Grazing-Related Infrastructure

In addition to fences, the Chimineas units feature other infrastructure associated with the former livestock operation, some of which is maintained by the Department to utilize cattle grazing for vegetation management. Based on the existing inventory, the grazing infrastructure located within the Department's lands includes:

- Corrals: Holding pens for cattle are located near the Chimineas Unit Headquarters, in the Taylor Management Unit, between the Garcia and Garcia Farming management units, and in the Feed Lot Management Unit.
- Water Wells: The Chimineas units feature nine water wells.
- Water lines: An estimated 47 miles of pipes convey water for its sources in springs and wells to tanks and its ultimate destination, typically troughs and buildings, in the eastern portion of the units.
- Water tanks: There are an estimated 23 water tanks scattered throughout the units.
- Troughs: There are approximately 24 troughs distributed throughout the units.

Additional facilities waterlines, tanks, wells, and troughs occur on the adjacent federal allotments.

Wildlife-Friendly Trough in the CPER
(Photograph by Chimineas Ranch Foundation)

2.6.4.4 Chimineas Unit Headquarters

Located in the southwest portion of the North Chimineas Unit, the Chimineas Unit Headquarters is an approximately 10-acre developed area that features buildings and associated infrastructure created by prior owners of the Chimineas Ranch. This includes:

- A headquarters building featuring the Reserve office, meeting rooms, five bedrooms and four bathrooms;
- two bunk houses;
- a cook house featuring kitchen facilities and a meeting area;
- a three-bedroom, two-bathroom residence;
- a shop;
- a utility house;
- a barn;
- a pole barn;
- a tack room; and
- a swimming pool.

Though the headquarters building is said to encompass the original 1880s era adobe, a fire that burned the structure in the early 1940s, combined with renovations to the house by prior landowners, have eliminated any evidence of this earlier construction (Appendix F).

2.6.4.5 Abandoned Structures

There is a dilapidated trailer parked adjacent to the corral in the Feed Lot Management Unit of the South Chimineas Unit. There are also two train cars at this location; one is used for storage, while the other is empty but occupied by roosting pallid bats (*Antrozous pallidus*; R. Stafford, pers. comm. 2010).

2.6.4.6 Utilities

High-voltage electric transmission lines traverse the northern portion of the disjunct Gifford Ranch parcel of the North Chimineas Unit, and the northern portion of the unit between the 1,000 acre and Unit 32 management units (Figure 14). From there, the power lines follow the border of the section lines and occur along the northern border of the North Chimineas Unit and then cross the American Unit. Unmapped utility lines along Chimineas Ranch Road, which ascends Carrizo Canyon, supply the Chimineas Unit Headquarters with power and telephone service from Highway 166.

2.7 Easements

Land within the CPER is subject to numerous easements: rights granted to other entities for specific use of the property. Easements are transferred with the property from owner to owner. The title documents associated with the Department's various acquisitions of the CPER identify numerous easements that have been granted or reserved by former owners of land within the Reserve. The easements have been compiled in a spreadsheet and spatial database provided to the Department as part of this planning process. In general, the easements include the following:

1. **Utilities:** Easements to construct, maintain, and operate utilities including gas, electrical transmission, and telecommunications facilities and lines;
2. **Minerals:** Interest in the minerals including limestone, gravel, coal, oil, gas, other hydrocarbons, phosphate, or sodium within or under the property, sometimes including the right of ingress/egress (i.e., access) to explore for such resources;
3. **Roads:** Easements for the State of California and County of San Luis Obispo to construct and maintain highways and County roads, respectively;
4. **Ingress/egress:** Easements allowing neighboring landowners to access their properties through the CPER; and
5. **Right-of-ways along ditches or canals**.

2.8 Existing Uses

Wildlife Observers witin the CPER (Photograph by Bob Stafford)

Lands within the CPER were designated by the Fish and Game Commission as an ecological reserve. Section 1580 of the Fish and Game Code states that ecological reserves are established to protect threatened or endangered native plants, wildlife, or aquatic organisms or specialized habitat types, both terrestrial and nonmarine aquatic, or large heterogeneous natural gene pools for the future use of mankind.

The Department manages ecological reserves including the CPER to protect and enhance its unique biological resources while providing the public with compatible, wildlife-dependent educational and recreational opportunities (Section 1.1). Management is consistent with the California Code of Regulations (CCR) Title 14, Chapter 11, Sections 550 et seq., which includes general provisions for all ecological reserves, and Section 630, which contains specific provisions for the CPER. Regulations for CPER and other lands managed by the Department can be found at: https://www.wildlife.ca.gov/lands. Activities outside of those described in the regulations may need to be permitted through the CDFW special-use permit process.

2.8.1 Public Access

The Department provides public access for wildlife-dependent recreation that is compatible with the resource management objectives for the CPER (Table 13, Figure 15). In determining public access and use regulations, the Department works closely with the adjacent federal landowners with the goal of providing seamless public recreation opportunities, to the extent feasible given the agencies respective missions and mandates (Section 1.2).

Unsupervised walk-in public access is allowed between sunrise and sunset within the American, Elkhorn, and Panorama units, and within the South Chimineas Unit between Highway 166 and Sections 22, 23, and 24 of Township 32S Range 19E (Figure 15). The North Chimineas Unit is closed to unsupervised public access; the fence on the boundary between the Chimineas units features signage that indicates this closure.

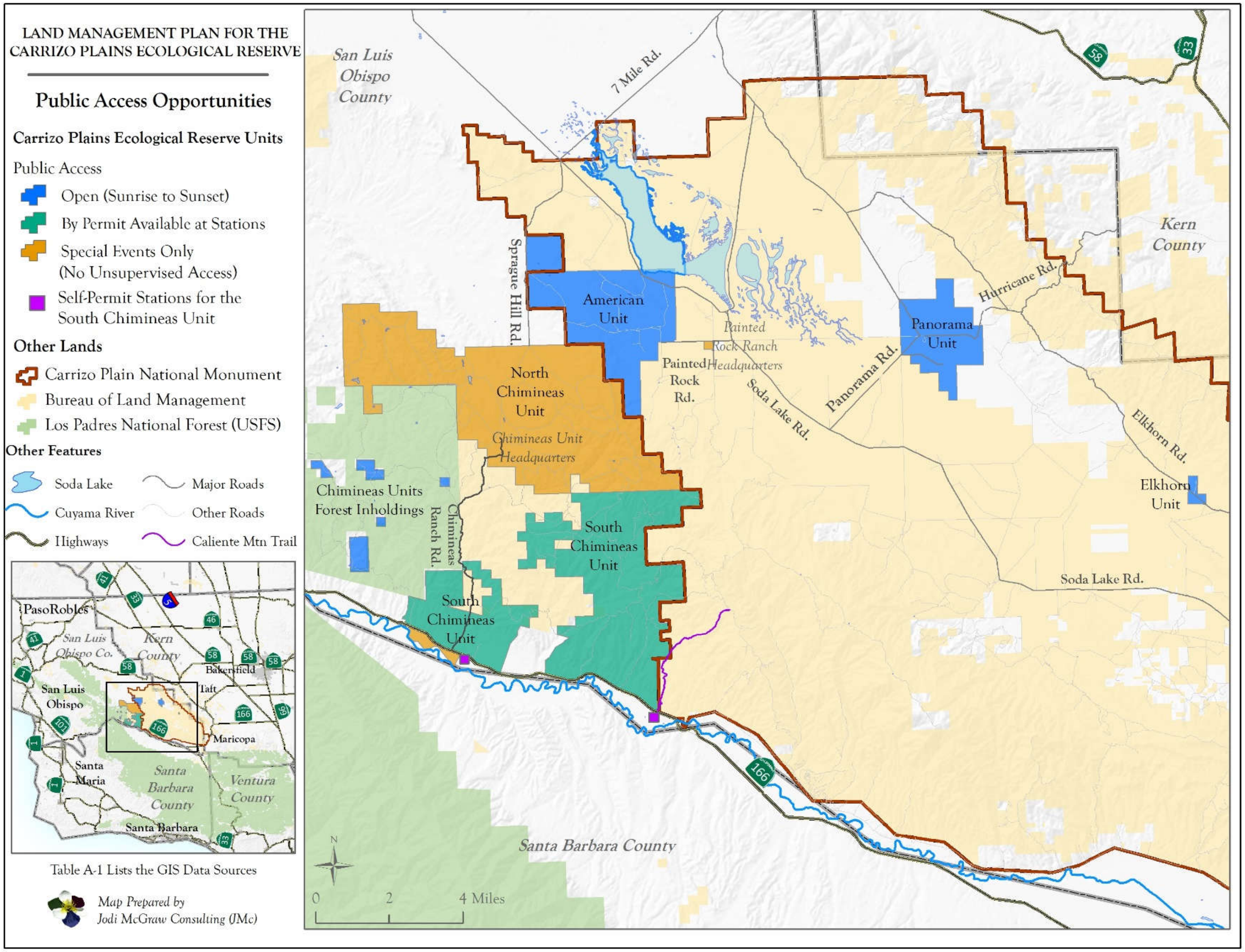


Figure 15: Public access opportunities

Table 13: Unsupervised public access and associated activities allowed within the CPER units

Unit	Access Types	Access Point(s)	Activities Allowed: Upland Game Hunting	Activities Allowed: Big Game Hunting	Activities Allowed: Trail Use and Wildlife Viewing
Elkhorn	Drive-on	Elkhorn Road	✓	✓	✓
Panorama	Drive-on	Elkhorn Road	✓	✓	✓
American	Walk-on only	Soda Lake Road, Sprague Hill Road	✓	✓	✓
South Chimineas	Walk-on only	Hwy 166 at mile marker 45 and Caliente Mtn. trailhead (with free permit).	Wed and Sat. Only	Wed and Sat. only; pig only	✓
North Chimineas	None	None			

Table 14: Average hunting and recreational use (in user days) of the Chimineas units of the Carrizo Plains Ecological Reserve. Numbers will not add up since visitors may engage in multiple activities on a single day.

Hunting (Hunter Days)						Recreation				All Visitor Days
All Hunting	Quail	Dove	Pig	Deer	Elk	Horse Riding	Hiking	Cycling	Total	
425	258	194	83	4	10	29	23	2	54	466

The following sections describe the types of allowable public uses as well as the Department's programs on the CPER. Table 14 lists the annual visitor use for the Chimineas units, based on the Department's records which are derived, in part, from visitor use permits and programs. Similar use information is not available for other units. Public use regulations are subject to change; those seeking to utilize the Reserve should consult the latest regulations which can be found at: https://www.wildlife.ca.gov/lands.

2.8.2 Recreation and Wildlife Viewing

Passive, wildlife-dependent trail use is allowed to hikers on those portions of the Reserve open to public access. The Reserve contains a single foot trail: the Caliente Mountain Trail located in the southeastern portion of the South Chimineas Unit, which provides access from Highway 166 to the namesake peak via Caliente Mountain Road east of the Reserve (Figure 15). The public can also utilize the tens of miles of natural surface roads to access the interior of the South Chimineas, Panorama, and Elkhorn units. These dirt roads provide access to the Reserve from public roads as well as the adjacent federal lands managed by the USFS (Los Padres National Forest) and the BLM (Carrizo Plain National Monument and Caliente Resource Area; Figure 15). Table 14 identifies the estimated annual use of the Reserve for recreation between 2003 and 2012.

Vehicle access is limited to established roads. Unsupervised vehicle access is only allowed within the Elkhorn and Panorama units, except during the Department's hunt programs or by permit, as described below.

2.8.3 Hunting

Hunting of upland game and big game species is permitted within the Reserve. Upland game species hunted on the CPER include California quail (*Callipepla californica*), mourning dove (*Zenaida macroura*), chukar (*Alectoris chukar*), rock dove (*Columba livia)*, Eurasian collared dove (*Streptopelia chinensis*), black-tailed jackrabbit (*Lepus californicus)*, and desert cottontail (*Sylvilagus audubonii*). Big game species hunted on the Reserve are wild pig (*Sus scrofa*), mule deer, and tule elk. Table 14 identifies the use of the Reserve for hunting.

All hunting must follow the regulations established by the Fish and Game Commission, and be consistent with the provisions of CCR Title 14. Notably, only non-lead ammunition may be utilized for hunting on Department lands to protect the California condor (Sections 551, 552, and 630, Title 14, CCR).

Tule Elk Utilize a Department-Created Water Source (Photograph by Craig Fiehler)

Hunting of coyote (*Canis latrans*) and California ground squirrel (*Spermophilus beechyi*) is not permitted within the Chimineas U nits. Unsupervised target shooting is also prohibited, though limited target shooting occurs within the Reserve as part of Department-sponsored special hunts programs described below.

In developing and implementing hunting programs, the Department works closely with local and state-wide hunting organizations including The California Deer Association, Rocky Mountain Elk Foundation, Quail Unlimited, Arroyo Grande Sportsmen, and Santa Maria Valley Sportsmen's Association. The goal of the hunting program within the CPER is to provide high-quality hunting experience by limiting access and hunter numbers. Limiting the animals harvested and number of hunters enhances enjoyment for hunters while sustaining abundant game populations.

Hunting within the Reserve occurs as part of unsupervised public access, as well as Department-sponsored special programs.

2.8.3.1 Unsupervised Hunting

Public access for hunting is limited as with other forms of public access (Section 2.8.1), with the additional restriction within the Chimineas units, where hunting for mule deer and tule elk are allowed only as part of special Department-sponsored programs (Section 2.8.3.2).

Elkhorn and Panorama Units: Upland and big game hunters can drive onto the Elkhorn and Panorama units using Elkhorn Road—the County-maintained road which traverses the units. The Department does not track hunting activity within these units via a permit system; however, the frequency of use for upland game is anticipated to be low due to the low abundance of game species inhabiting these units relative to other public lands in the region. Dove and California quail hunting are thought to occur occasionally, while big game hunting is anticipated to be very rare (R. Stafford pers. comm. 2010).

American Unit: Access to the American Unit for upland and big game hunting is by foot only. Hunters can access the northeastern portion of the unit from Soda Lake Road and the northwestern portion of the unit from Sprague Hill Road (Figure 15). There is no permit system in place to monitor hunter use on this unit; however, use is thought to be infrequent other than during elk hunting season (R. Stafford, pers. comm. 2010).

South Chimineas Unit: Walk-on upland game and wild pig hunting are allowed on Wednesdays and Saturdays during the first two weeks of September and during the months of December, January, and February by permit only. Only species in season may be hunted. In addition to all applicable licenses, hunters within the Reserve must obtain and carry a free access permit, which is available at the two main access points to the Reserve from Highway 166: 1) Caliente Mountain Trailhead, and 2) the 45-mile paddle marker (Figure 15). Table 15 lists the hunter use and harvest for upland game within the Chimineas units, based on hunter self-reporting on the permits.

Table 15: Average annual upland game hunter use and harvest for the Chimineas units of the Carrizo Plains Ecological Reserve (2002-2016).

Quail			Dove			Rabbit	
Hunter Days	Harvest	Harvest/Day	Hunter Days	Harvest	Harvest/Day	Cottontail	Jackrabbit
258	886	3.4	194	565	2.7	23	6

2.8.3.2 Department-Sponsored Hunting Programs

The Department currently provides limited, supervised weekend drive-on hunt opportunities within the Chimineas units of the CPER. The permits for these hunts are issued through drawings. Elk hunters and apprentice hunters must attend an orientation prior to each hunt, in which Department staff review the regulations as well as site-specific restrictions including the drivable routes, which are designed to protect the biological and cultural resources as well as public safety.

Upland Game and Wild Pig: The Department holds two drive-on hunts for upland game and wild pig within the Chimineas units between September and January. Permits are issued to 25 vehicles for each hunt, with up to two hunters allowed in each vehicle. Table 16 indicates the hunter use and take for wild pig, while that for upland game is included in Table 15.

Mule Deer: In partnership with the California Deer Association, the Department hosts apprentice mule deer hunts within the Chimineas units of the CPER, with the number of hunters determined annually based on the Department's assessment of the herd (Table 16). In 2012, three apprentice deer hunters participated in the hunt.

Tule Elk: The Department holds two drive-on tule elk hunts within the Chimineas units each year. The hunts are managed as part of the Department's statewide tule elk program, in which the annual harvest is determined based on the size of the La Panza hunt zone herd and other factors. Table 16 lists the tule elk hunter use and harvest within the Chimineas units.

The hunt is currently divided into two periods: early October (Period 1) and early November (Period 2). In 2010, permits for two bull and one cow elk were issued for each period, with Period 1 cow permit issued to an apprentice hunter as part of a program conducted in collaboration with the Rocky Mountain Elk Foundation. Typically, two bull elk and two cow elk are taken from the South Chimineas Unit and two bull elk are taken from the North Chimineas Unit on an annual basis (R. Stafford, pers. comm. 2012).

Table 16: Average annual big game hunter use and harvest for the Chimineas units of the Carrizo Plains Ecological Reserve (2005-2016)

Wild Pig		Tule Elk			Deer		
Hunter Days	Harvest	Hunters	Harvest	Success Rate	Hunters	Harvest	Success Rate
83	1	6	5	0.91	3	2.5	0.83

2.8.4 Scientific Research and Education

The diverse and intact biological systems of the CPER have attracted researchers to conduct a variety of studies including many examining important conservation and management questions relating to protection of the rare species and unique ecological systems. Prior research within the CPER has been conducted by a variety of institutions including California State Universities at Stanislaus, Bakersfield, Long Beach, and Northridge; Humboldt State University; California Polytechnic University at San Luis Obispo; University of California at Berkeley, Davis, and Santa Barbara; and the US Geological Survey. Research in the Panorama and Elkhorn units has examined the population status and ecology of the endangered San Joaquin Valley wildlife species, including San Joaquin kit fox, San Joaquin antelope squirrel, and blunt-nosed leopard lizards. Recent studies in the Chimineas units have evaluated oak woodland mycorrhizal associations, black bear genetics, western rattlesnake ecophysiology, western fence lizard endocrinology, western pond turtle habitat use, and the California red-legged frog population within the Cuyama River.

The CPER has also provided a classroom for university courses and professional workshops, many of which have utilized the Chimineas units' facilities. These include a series of workshops that have examined bats, reptiles, amphibians, birds, San Joaquin kit fox, and plants. The workshops, which are conducted in collaboration with the Audubon Society, California Native Plant Society, and The Wildlife Society, have advanced the Department's work to inventory and monitor the Reserve's biological resources while providing educational opportunities for the community.

Western Pond Turtle Researchers witin the Chimineas Units (Photograph by Bob Stafford)

The Department permits research and education activities on a case-by-case basis. Department staff members work with permittees to develop guidelines for access and research methods that avoid impacts to the sensitive biological and cultural resources of the Reserve.

2.8.5 Inventorying and Monitoring

Department biologists have conducted studies to inventory and monitor the biological resources within the CPER as well as wide-ranging species inhabiting the region. Region biologists have worked in coordination with statewide biologists including members of the Resource Assessment Program (RAP) on a series of studies designed to achieve a range of objectives including to (Table 17):

- Identify the plant and animal species that occur within the Reserve;
- Characterize and map the plant communities within the Carrizo Plain region;
- Evaluate the distribution and habitat requirements of special-status plant and animal species within the Reserve; and
- Monitor populations of animal species of management concern.

These studies have been facilitated by the Department's collaboration with universities, professional organizations, community groups, and other organizations conducting research and education at the site (Section 2.8.4). Additional information about the methods is provided in Appendices B and D.

Table 17: Surveys and other studies conducted by the Department to inventory and monitor biological systems within the CPER

Type	Subject	Description
Inventories and General System Monitoring	vegetation	Rapid assessment protocol to examine plant species composition and structure throughout the Reserve to create a floristic-based classification and map of the vegetation
	vernal pools	Presence/absence sampling for special-status invertebrates.
	blue oak recruitment	Blue oak size structure surveys in 62 sample sites throughout the Chimineas units, to evaluate recruitment.
	rare plants	Rare plant surveys to document occurrences of special-status plants throughout the Reserve.
	birds	Visual encounter surveys and avian point counts throughout the Chimineas and American units to inventory birds, evaluate distributions and habitat associations, and establish a baseline for abundance. Incidental detections of special status or other important bird species encountered on the Reserve including through Christmas bird counts also recorded.
	amphibians	Acoustic surveys and dip netting of ponds in the Chimineas units.
		Protocol-level surveys for California red-legged frog in all available habitat within the Chimineas units. Also, USGS genetic analysis and chytrid fungus assessment of species on Cuyama River.
	terrestrial reptiles	Visual encounter surveys, cover boards, and drift fences with funnel/pit traps to inventory reptiles in the Chimineas units.
	small mammals	Small mammal trapping to inventory the Chimineas, Panorama, and Elkhorn unit. Aerial monitoring of occupied giant kangaroo rat populations.
	mesocarnivores	Spotlighting and camera and scent stations within the Chimineas units to evaluate distributions and abundance of San Joaquin kit fox, American badger, and other species.
	bats	Acoustic surveys to identify bat species utilizing the Reserve and evaluate their habitat use.
Population Monitoring	western pond turtle	Trapping and marking turtles at ponds; visual count estimates at ponds; and telemetry surveys within the Chimineas units to examine pond and upland habitat use.
	Giant kangaroo rat	Aerial surveys to map burrow locations (precincts).
	San Joaquin kit fox	Quarterly spotlighting for San Joaquin kit fox (and other carnivores) using transects established in 1970 on the Carrizo and Elkhorn plains.
	upland game birds	Hunter take per-unit-effort and sex/age ratio through hunter reporting at the Chimineas units.

Table 17: Surveys and other studies conducted by the Department to inventory and monitor biological systems within the CPER

Type	Subject	Description
	black bear	Hair snare stations in the Chimineas units monitored as part of a statewide study, and camera stations as part of mesocarnivore assessment.
	deer	Aerial surveys to assess abundance following standardized methods employed statewide, as well as roadside surveys of the Chimineas units. Telemetry studies to estimate deer home range size and habitat use. As part of a statewide assessment, Pellet/camera transects using DNA to estimate population sizes.
	pronghorn	Annual survey flights of herd size and fawn production throughout the Carrizo Plain. Telemetry studies to estimate pronghorn home range size and habitat use.
	tule elk	Telemetry surveys to track movement of the elk within two subherds within and around the Chimineas and American units. Flights to survey the herds.

2.8.6 Facility Use

The CPER contains facilities at two locations, which are used to enhance effectiveness of the Department's management of the Reserve and public use opportunities: Painted Rock Ranch Headquarters (American Unit), near the Goodwin Nature Center within Carrizo Plain, and the Chimineas Unit Headquarters, which is in the North Chimineas Unit.

The Painted Rock Headquarters, which features a four bedroom, two-bathroom mobile home, has been used by Department staff and others working within the American, Elkhorn, and Panorama units.

The facilities of the Chimineas Unit Headquarters, which are more expansive and can accommodate larger groups (up to 30 people), are used not only to facilitate management of the Chimineas units, but also to host Department programs. Owing to its remote location (i.e., the Reserve is more than a 45-minute drive from the nearest accommodations in Maricopa or Santa Maria), over-night stays are often required of staff or researchers using the Reserve.

3 Habitat and Species Descriptions

The Carrizo Plains Ecological Reserve supports a diversity of plant communities. Throughout much of the Reserve, these communities occur as a complex mosaic that reflects several factors including:

- **Biogeography:** its location at the contact zone between the San Joaquin and the South Inner Coast Range Mountains biogeographic regions, which results in a broad pool of plant species;
- **Topography and Climate:** the variable topography and landforms including mountains, rolling hills, plains, and river valleys, which feature a variety of meso- and microclimate conditions;
- **Geology, Soils, and Hydrology**: a mosaic of geologic formations interact with the climatic variability to result in diverse hydrologic conditions and soils, which in turn create variable conditions for plant growth;
- **Disturbance:** a complex suite of ecological disturbances including fire, flood, bioperturbation (e.g., giant kangaroo rat diggings and clipping), and landslides and other erosion, which result in multiple successional stages across the landscape; and
- **Land Use History:** Variable prior land uses within the CPER, including primarily cattle ranching and farming, which have introduced species and had differential effects on native plant species.

Diverse Mosaic of Communities in the North Chimineas Unit (Photograph by Jodi McGraw)

These communities support a wealth of plant species, with more than 430 native plants catalogued within the Reserve (Appendix C). The rich flora and variability in plant species composition creates a range of habitats that support diverse animal assemblages, which include more than 285 species of vertebrates (Appendix D).

The richness of plants and animals also reflects the variable habitat conditions that occur within a given community. Most notably, the vast grasslands of the Reserve vary in their plant species composition, including dominant species and life forms, and their structure, which varies from short to tall. While some species occupy grasslands exhibiting a range of conditions, many plants and animals, including several special-status species, preferentially or exclusively utilize grasslands of one condition or another (Section 3.2.1). Conserving the diversity of native plants and animals in the Reserve will require maintaining or enhancing the condition and diversity of habitats.

This chapter describes the distribution, condition, and ecology (e.g., associations with physical factors such as soils) of the natural communities, plants, and animals of the Reserve. It then assesses aspects of the populations of special-status species and other focal animal species for management. This chapter concludes by evaluating factors that affect community composition and the viability of focal species populations, including non-native species, wildlife diseases, and habitat connectivity. The information contained in this chapter, which is expanded upon in Appendices B-E, provides the basis for the plan's management elements, goals, and actions (Chapter 4).

3.1 Vegetation and Plant Species

The Carrizo Plains Ecological Reserve features a diversity of plant communities (vegetation) which reflect the Reserve's variable soils, topography and microclimate, hydrology, disturbance, and land use history (Chapter 2). The communities differ in plant species composition, animal assemblages, disturbance ecology (e.g., fire regime), and occurrences of invasive plants, among other factors. Management of this large, landscape-scale ecological reserve will focus on maintaining or enhancing the condition of the diverse mosaic of communities to promote the viability of the plant, animal, and other species that they support.

To facilitate development and implementation of this plan, the California Department of Fish and Wildlife's Vegetation Classification and Mapping Program (VegCAMP) conducted a site-specific vegetation classification and mapping project (CDFW 2010c). The study identified 57 vegetation types that were mapped throughout the Reserve (Appendix B, Figures B-1 and B-2). These types were categorized into ten habitat elements (Tables 19 and 20, Figure 16)—ecological systems that support similar animal species assemblages, and will generally require similar management owing to similarities in the ecologies of the dominant plant species and disturbance regimes. These habitat elements facilitate the design of ecosystem and multi-species oriented management objectives used for the Department's lands including ecological reserves (Section 4.2.2). The eleventh mapped category, Other, includes developed areas such as roads and buildings, as well as one patch of ornamental planted trees (Table 19).

Thistle Sage, a Species with Desert Affinities, in the South Chimineas Unit (Photograph by Jodi McGraw)

This section combines the results of the vegetation classification and mapping study with the scientific literature, site assessments, and other information available for the region, to characterize the ten main habitat elements according to the following:

1. **Distribution:** occurrence within the CPER, including patterns with respect to geologic formation, soils, and hydrologic features;
2. **Structure:** physiognomy, including dominant layers (i.e., herb, subcanopy, canopy) and plant density, and how these vary in response to disturbance and abiotic factors in ways that can influence their use by animals;
3. **Composition:** dominant plant species including an assessment of the general extent of invasion by exotic plant species and factors that influence their occurrence; and
4. **Disturbance ecology:** the natural processes that remove established plant cover, such as flood, fire, and small mammal diggings, which can influence the structure and species composition in ways that are important for many plants and animals.

The specific community types within each vegetation element, which were characterized at various levels of the hierarchy (e.g., groups, alliances, and associations), are described in Appendix B and mapped in Figures B-1 and B-2. These descriptions identify dominant species, key factors influencing their distribution and species composition, and other aspects of their ecology relevant to management. Additional information about many of these community types is provided in the California Manual of Vegetation (Sawyer et al. 2009).

Table 18: Summary of the habitat elements, showing acres and percent of each unit of the CPER

	American		Chimineas Units		Elkhorn		Panorama		Total	
Element	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
Grassland	5,962.2	94.8%	12,747.2	43.0%	118.8	71.8%	2,477.8	87.0%	21,305.9	54.7%
Chaparral		0.0%	1,250.5	4.2%		0.0%		0.0%	1,250.5	3.2%
Coastal Scrub	102.9	1.6%	4,513.9	15.2%	1.2	0.7%	6.8	0.2%	4,624.7	11.9%
Desert Scrub	122.7	2.0%	4,239.0	14.3%	45.5	27.5%	363.1	12.7%	4,770.4	12.3%
Juniper Woodland	2.4	<0.1%	3,034.8	10.2%		0.0%		0.0%	3,037.2	7.8%
Oak Woodland		0.0%	3,546.7	12.0%		0.0%		0.0%	3,546.7	9.1%
Wetland	84.6	1.3%	21.9	0.1%		0.0%		0.0%	106.5	0.3%
Ponds		0.0%	7.4	<0.1%		0.0%		0.0%	7.4	<0.1%
Riparian and Riverine	0.7	<0.1%	260.3	0.9%		0.0%		0.0%	261.0	0.7%
Cliffs and Rocks	7.3	0.1%	3.1	<0.1%		0.0%		0.0%	10.4	<0.1%
Other[1]	6.8	0.1%	25.5	0.1%		0.0%		0.0%	32.2	0.1%
Total	**6,289.6**	**100.0%**	**29,650.2**	**100.0%**	**165.5**	**100.0%**	**2,847.6**	**100.0**	**38,952.9**	**100.0%**

[1] This category includes areas lacking natural vegetation, including primarily roads and developed areas, and one stand of non-native trees.

Table 19: Summary of the Vegetation Elements of the CPER. Appendix B describes the communities within each element.

Element and Acres	Structure	Dominant Species[1]	Condition	Disturbance Ecology	Other Management Considerations
Grassland (21,305 ac.)	Primarily herbaceous (grasses and forbs) with scattered shrubs and trees. Structure including height, which varies with precipitation and grazing management, influences habitat suitability for many animals.	slender wild oats, wild oat, rattail fescue, vetch, redstem filaree, red brome, fiddlenecks, common monolopia	Much of the area is dominated by exotic species due to historic grazing and cultivation; however, native species occur at low abundance overall and are patchily diverse and abundant.	Herbivory (incl. grazing), burrowing rodents, and fire all influence structure on the grasslands.	Interannual variability in precipitation has a large influence on productivity, structure (e.g., grass height) and species composition
Coastal Scrub (4,625 ac.)	Sparse to moderate cover of soft woody shrubs with herbaceous plants in between	California buckwheat, purple sage, California sagebrush, and silver bush lupine	Herbaceous exotic plants are widespread and patchily abundant, particularly in areas that were recently burned or have burned frequently.	Fire adapted with many dominant species resprouting and/or establishing from seed following fires, which occur at return intervals between 15 and 50 years or more.	Fire can facilitate dense exotic annual grasses which may reduce native shrub cover and promote too-frequent-fire that can convert coastal scrub to grassland.
Chaparral (1,251 ac.)	Moderate to dense cover of sclerophyllous shrubs with herbaceous cover limited to canopy gaps, except following fire. Trees including oaks are scattered in long-unburned patches or those on north-facing slopes.	Chamise, buck brush, bigberry manzanita, black sage, birch leaf mountain mahogany, California juniper, and Tucker oak	Native-plant dominated with exotics limited to open areas created by disturbance.	Fire prone with dominant species adapted to resprouting or recruiting from seed following fires of return intervals, which vary between 15 and 100 years.	Too frequent fire can eliminate obligate seeding species (e.g., bigberry manzanita). Lack of fire can lead to senescence and in cooler microsites, promote conversion to oak woodland.

Table 19: Summary of the Vegetation Elements of the CPER. Appendix B describes the communities within each element.

Element and Acres	Structure	Dominant Species[1]	Condition	Disturbance Ecology	Other Management Considerations
Desert Scrub (4,772 ac.)	Sparse to moderate cover primarily soft-leaved shrubs found in desert and transitional areas, with herbaceous plants in between shrub canopies.	Linear leaf goldenbush, allscale saltbush, shadscale, spiny saltbush, bladderpod, California ephedra, and others	Herbaceous exotic plant species widespread and patchily abundant, particularly in areas that were recently burned.	Most dominant species are fire-intolerant. Some species of saltbush are adapted to establishment following flood or depositional events.	Too-frequent fire facilitated by dense exotic annual grasses may reduce native shrub cover and convert desert scrub to grassland.
Oak Woodland (3,546 ac.)	Sparse to dense cover of trees with relatively shade-tolerate shrubs and herbs in the understory.	Blue oak, Tucker oak, coast live oak, linear-leaved goldenbush, California juniper	Herbaceous exotic plant species are widespread and abundant in the savannas but less abundant in woodlands, particularly Tucker oak woodland. Oak size structure suggests recruitment sufficient to maintain stands. No evidence of sudden oak death.	Blue oak woodland may experience relatively frequent (every 8 to 14 years) low-severity fires in the understory, which would only kill juvenile trees; however, less frequent crown fires kill adults, which do not require fire to regenerate. Tucker oak woodland occurs in more xeric areas that are less fire-prone.	Oak regeneration a concern in California, though mixed-aged stands are common in the CPER. Too frequent fire in Tucker oak woodland could facilitate exotic species.
Juniper Woodland (3,037 ac.)	Moderate to dense cover of trees with shrubs and/or herbaceous plants in the understory.	California juniper, Tucker oak, linear-leaved goldenbush, California buckwheat, and purple stage	Herbaceous exotic plant species widespread and patchily abundant, particularly in areas that recently burned.	Most dominant species including California juniper are fire-intolerant. Fire return intervals are long (100-200 years or more).	Too-frequent fire, which may be facilitated by dense exotic annual grasses, can kill California juniper and associated woody species.

Table 19: Summary of the Vegetation Elements of the CPER. Appendix B describes the communities within each element.

Element and Acres	Structure	Dominant Species[1]	Condition	Disturbance Ecology	Other Management Considerations
Riparian and Riverine (259 ac.)	Sparse to moderate cover (rarely dense) of shrubs with scattered clumps of large trees and herbaceous plants in open areas.	Arrow-weed, scale broom, sand bar willow, mule fat, and Fremont cottonwood	Herbaceous exotic plants widespread and patchily abundant; several patches of tamarisk in the Cuyama River. Historic cattle grazing may have limited woody plant cover.	Many species adapted to flooding and resprout or establish from seed following soil deposition. Most species are relatively fire intolerant, though some (e.g., arroyo willow) resprout vigorously.	Tamarisk control necessary but requires up-stream control to be effective. Limiting grazing may promote shrub and tree density and canopy cover.
Wetland (106 ac.)	Very sparse to moderately dense cover of primarily herbaceous plants.	Saltgrass, southern cattail, spikerushes, and rushes	Exotic plant species adapted to high soil moisture are patchily abundant. Cattle grazing may limit cover in unexclosed areas.	No specific information, though flood and drought likely while fire unlikely.	Limiting grazing may promote herbaceous plant cover.
Ponds (7.4 ac.)	Variable; some feature aquatic species including emergent plants as well as wetland and riparian species on the margins.	Spikerushes, rushes, willows, and pondweeds	Exotic plant species including bull thistle and rabbit's foot grass patchily abundant.	No specific information, though flood and drought likely while fire unlikely.	Balance the need for emergent aquatic species with requirement for some aquatic animals for open water conditions (e.g., California red-legged frog, western spadefoot toad)
Cliffs & Rock Outcrops (10 ac.)	Relative sparse cover of primarily herbaceous species and some shrubs.	California buckwheat, California fuchsia, Lemmon's jewel flower, and woodland threadstem	No detailed information available.	No specific information, though fire likely very infrequent due to low fuel.	Important areas for some cliff-dwelling bats and other species.

[1] Scientific names for species are provided in Table C-1

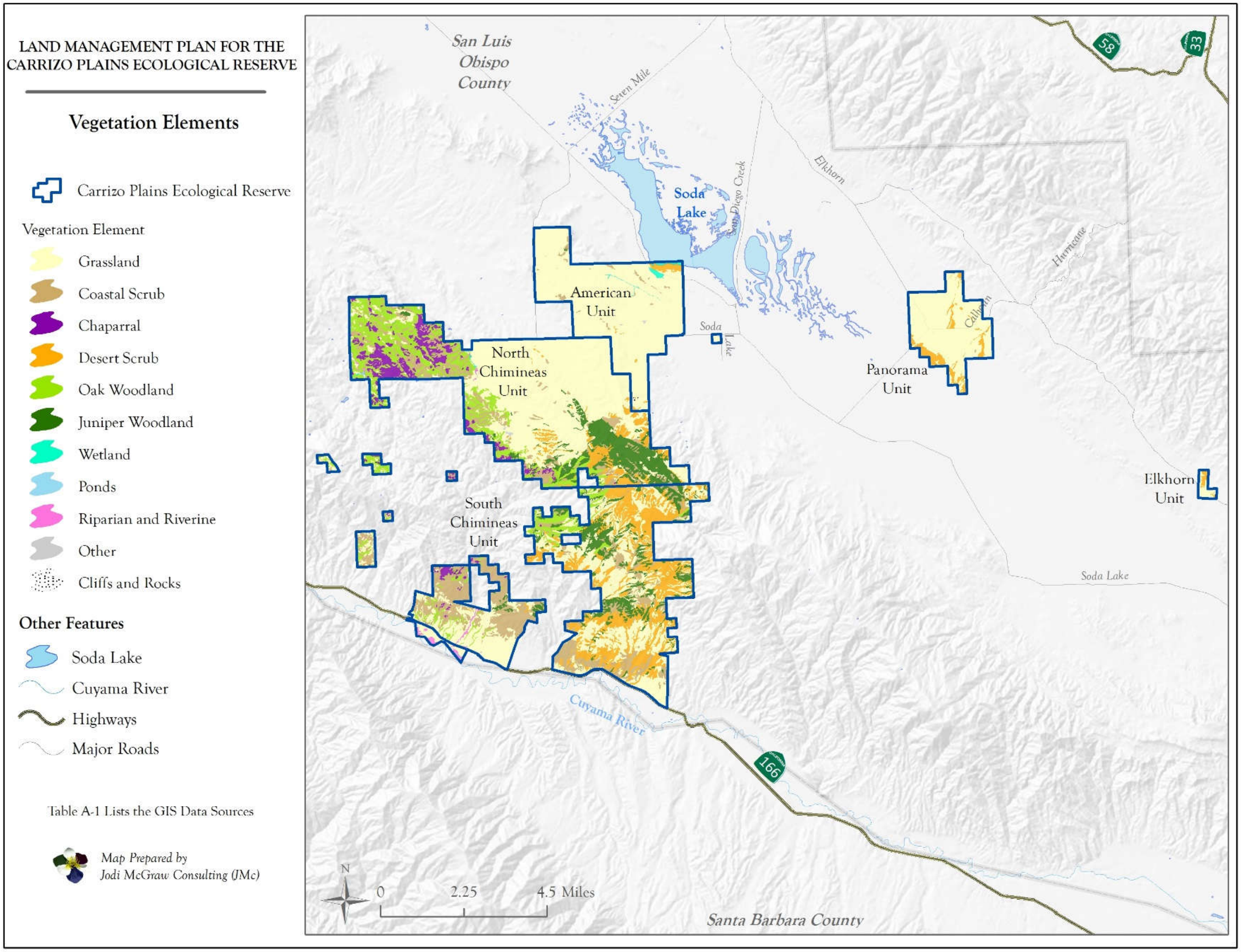


Figure 16: Vegetation Elements

Community types within the vegetation elements were identified as sensitive if they met one or more of the following criteria:

1. Listed as a special community on the Department's current list of sensitive plant communities (CDFW 2010a);
2. Ranked S1 or S2 on The Nature Conservancy Heritage Program; and
3. Identified as locally rare or unique, including disjunct occurrences or more widespread communities (e.g., coast live oak woodland).

The locations of the sensitive communities are illustrated in Figures 17 and 18; their acreage within the CPER units is listed in Table B-1 (Appendix B).

3.1.1 Grasslands

The grassland element features vegetation that is dominated by herbaceous plant species, including graminoids (narrow-leaved herbs such as grasses) and forbs, which are broad-leaved herbs. Shrubs and trees occur patchily in grasslands, where they comprise less than 5% cover.

3.1.1.1 Distribution

Grasslands are the most abundant vegetation element in the CPER, where they cover 21,306 acres (55%) of the Reserve. Grasslands are also the most abundant vegetation element within each of the units, as they cover 72% of the Elkhorn Unit, 87% of the Panorama Unit, and 95% of the American Unit (Table 19, Figure 16). The 12,747 acres of grassland in the Chimineas units (43% of unit total) are concentrated in the northern foothills and the southern river terraces and foothills.

Expansive Grasslands within the Chimineas and American Units (Photograph by Jodi McGraw)

Within the CPER, grasslands occur on a wide variety of soil types but most commonly occur on three complexes of loam soils (Section 2.4.3):

- Beam-Panoza-Hillbrick soils (3,929 acres, 18% of element total), which are shallow to moderately deep, strongly sloping to very steep, well drained sandy, stony, and fine loam soils that formed from the weathering of sedimentary rocks on hills and mountains;
- Panoza-Beam complex soils (2,189 acres, 10% of element total), which are loam soils similar to Beam-Panoza-Hillbrick soils; and
- Seaback-Panoza-Jenks complex soils (3,600 acres, 17% of element total), which well drained, moderately permeable fine to stony loam soils formed from weathered shale, soft sandstone, and/or conglomerate.

Grasslands are associated with a range of geological formations but are relatively well represented on the following (Section 2.4.2):

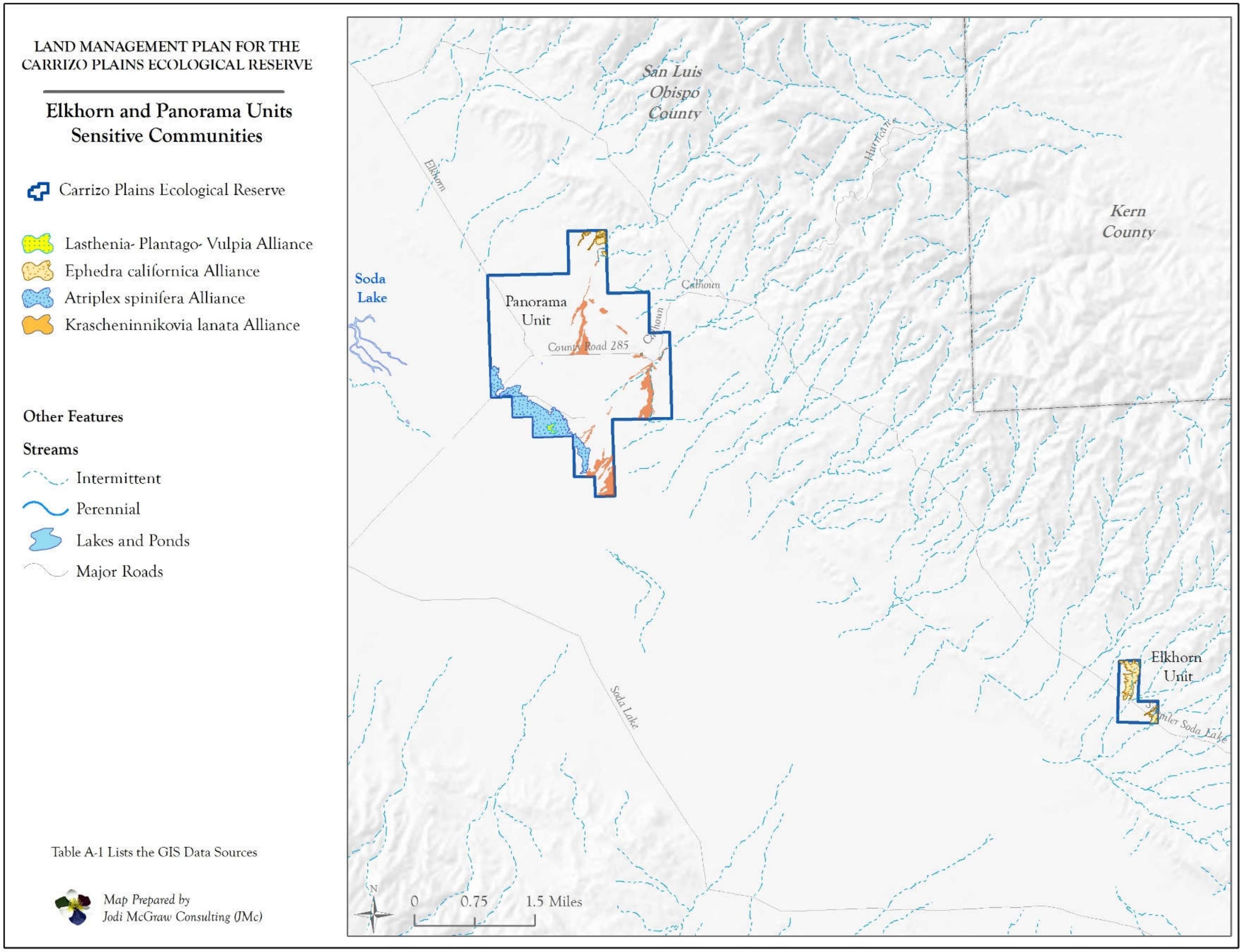


Figure 17: Sensitive communities of the Elkhorn and Panorama units

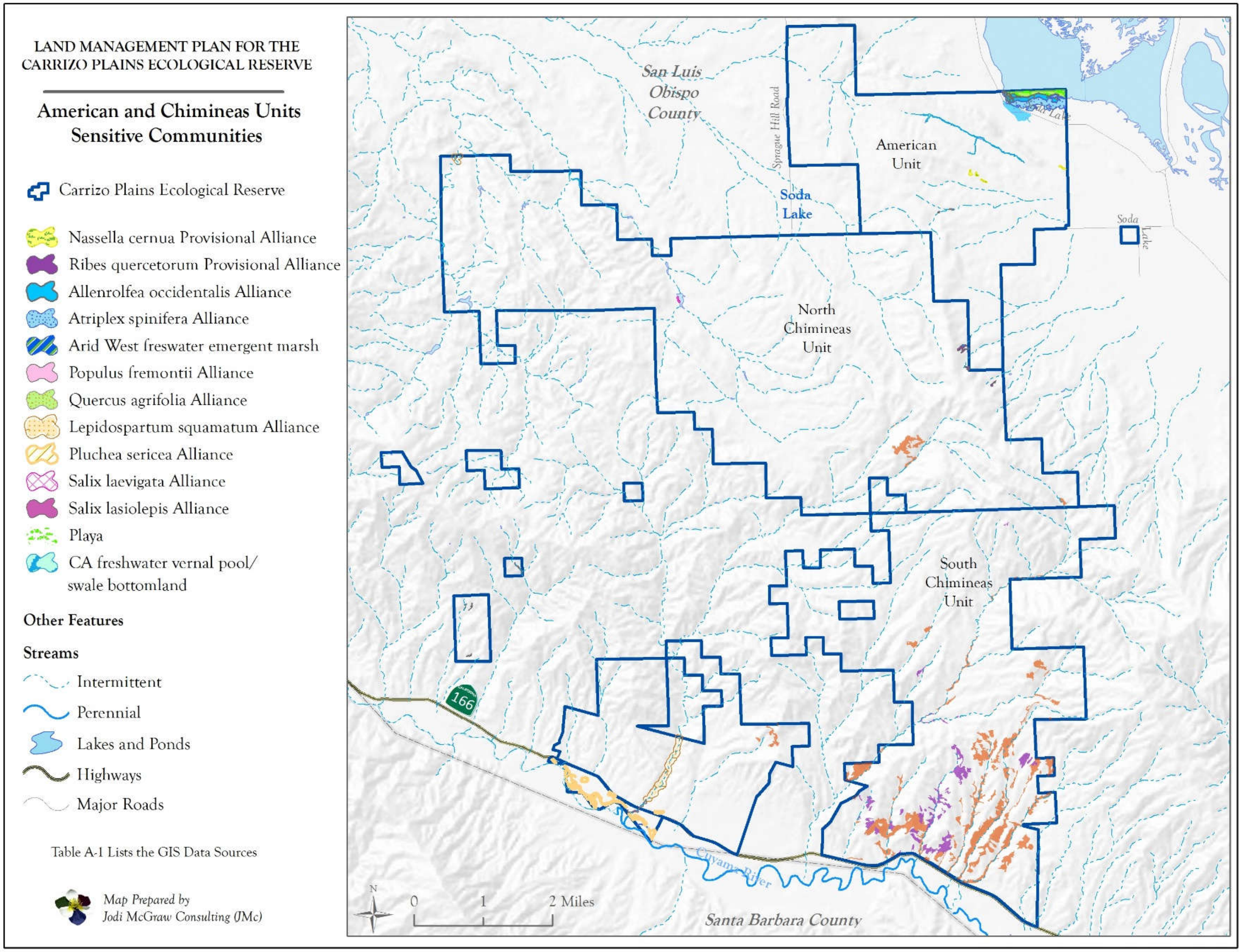


Figure 18: Sensitive communities of the American and Chimineas units

- Monterey Shale Saltos Shale (4,734 acres, 22% of element total);
- Alluvium (4,590 acres, 21% of element total);
- Morales valley formation (2,432 acres, 11% of element total); and
- Vaqueros Formation Painted Rock Sandstone member (2,214 acres, 10% of element total).

3.1.1.2 Structure

The grasslands consist of sparse to moderately dense herbaceous cover dominated by annual grasses and forbs, with perennial grasses and forbs occurring patchily and at overall low abundance. The density of herbaceous cover, or productivity of the grasslands, varies both spatially and temporally due to a variety of factors including:

- **Precipitation:** Gradients of decreasing rainfall from north to south and from west to east affect species composition, structure, and overall productivity. Interannual variability in rainfall in the CPER is high (Section 2.4.4) and results in variable plant density and height, as well as species composition.
- **Soils**: Grasslands on soils with a greater proportion of silt and clay particles, which are located primarily in the north, are more productive than those on sandier or rocky soils in the south
- **Prior Cultivation:** Legacy effects of prior farming including tilling, fertilizing, seeding, and perhaps irrigation, could influence plant structure and species composition through a variety of mechanisms, including altered soil properties and species pools.

Height of the vegetation varies and likely depends on the factors affecting productivity, as well as the species pools and intensity of grazing by cattle, and to a lesser extent tule elk and pronghorn. In portions of the grasslands, subshrubs and shrubs occur at low abundance (<20% cover). In the northern grasslands, these include silver bush lupine and linear-leaved goldenbush, while in the southern grasslands these include shrubs common in coastal scrub, including mule fat (*Baccharis salicifolia*) and California buckwheat (*Eriogonum fasciculatum*).

Native Bunchgrasses and Forbs in the American Unit Grasslands (Photograph by Jodi McGraw)

3.1.1.3 Classification

Within the CPER, plant communities within the grassland element vary greatly in terms of plant species composition, which was used to classify them currently into macrogroup, one group, and three alliances, one of which is provisional. Section B.1 describes the species composition, ecology, and conservation values of each of these assemblages.

Of these, the Needle Grass (*Stipa cernua*) Provisional Alliance is on the Department's list of special communities (CDFW 2010a). The California goldfields –California plantain (*Plantago erecta*) Alliance, which is dominated by native forbs, is also considered a sensitive community, as more detailed floristic analysis may reveal that it consists of several rare community types (Section B.1.5).

3.1.1.4 Condition

Much of the grassland within the Reserve features relatively low abundance and diversity of native plant species and instead is dominated by exotic annual grasses and forbs. This is likely a result of dry-land farming, inappropriate historical grazing, and fire exclusion, which have altered the natural disturbance regime to which native plant species are adapted, and facilitated the invasion and spread of exotic plants.

The low occurrence of native perennial grasses and forbs may be due, at least in part, to prior tilling and seeding associated within dry-land farming. Tilling is expected to remove geophytes—herbs that perennate from underground storage organs, such as bulbs and corms. Geophytes such as blue dicks (*Dichelostemma capitatum)* and brodiaea (*Brodiaea terrestris*) are only infrequently observed in the CPER grasslands.

Research in other California grassland systems has found that cultivation alters species composition, more so than grazing (Stromberg and Griffin 1996). However, in this prior study, as in the Reserve, historic cultivation is confounded by site factors that would otherwise influence species composition, including topography and soil conditions, making it difficult to determine the effects of cultivation.

Despite the low abundance of native plants, several special-status animal species and other species of Department's management concern occur within the grasslands, including burrowing owl (*Athene cunicularia*), grasshopper sparrow, golden eagle (*Aquila chrysaetos*), northern harrier (*Circus cyaneus*), San Joaquin coachwhip (*Masticophis flagellum*), giant kangaroo rat, San Joaquin kit fox, pronghorn, and tule elk (Sections 3.2 and 3.3).

3.1.1.5 Disturbance Ecology

The grasslands have a complex and varied disturbance regime, which includes herbivory, burrowing rodents, and fire. Herbivores including ungulates such as tule elk, pronghorn, and cattle, as well as small mammals including: California vole (*Microtus californicus*) and kangaroo rats (*Dipodomys* spp.) remove plant biomass through herbivory, and in doing so, alter plant height, density, and composition. Burrowing rodents including most notably kangaroo rats, California ground squirrel, and Botta's pocket gopher (*Thomomys bottae*), have dramatic effects on grassland structure and composition through removing and burying vegetation, and through their turning the soil, which affects nutrient cycling and soil moisture availability (Schiffman 2007, Prugh and Brashares 2012). Fire similarly increases nutrient availability, kills colonizing shrubs and trees, and removes other biomass, including thatch that accumulates on the soil surface.

Disturbances interact with the physical conditions of the environment (e.g., topography and soils), the climate, and the grassland species present (e.g., 'species pools') to influence the structure and species composition of the grasslands. The complexity of these interactions, the strong effects of annual climatic conditions, variable land use history, and other factors make it difficult to tease apart the independent and interactive effects of the various factors to prescribe management.

In 2007, a long-term manipulative experiment was established to increase understanding of the independent and interactive effects of giant kangaroo rats and cattle grazing within CPNM grasslands. In

2010, an above-average rainfall year (12 inches), researchers observed that giant kangaroo rats reduced native plant cover, primarily by reducing abundance of native annuals including gold fields and small fescue (*Festuca microstachys*); cover of pine blue grass (*Poa secunda*) was greater in giant kangaroo rat areas (Prugh and Brashares 2010). Cattle grazing did not significantly reduce native plant cover in 2010. During that year, when herbaceous plant cover was much greater than the prior years due to the above-average rainfall, giant kangaroo rat abundance was greater in grazed areas than ungrazed areas. This effect was attributed to increased immigration, as there was no significant difference in giant kangaroo rat survivorship or reproduction among the grazing treatments (Prugh and Brashares 2012).

In drier years of the study (2007-2009, 2012-2015), when rainfall was below average (3.5-6 inches), cattle grazing did not affect giant kangaroo rat abundance, suggesting that perhaps this beneficial effect of cattle on giant kangaroo rats may only occur when rainfall and thus annual plant growth is high, as previously hypothesized (Germano et al. 2001). Contrary to the prior hypotheses, however, the experiment revealed negative effects of cattle grazing on San Joaquin antelope squirrel density, the magnitude of which depended on the year. The effect appears to be due to lower reproduction rates in grazed areas compared to ungrazed areas (Prugh and Brashares 2012).

Animal Burrows Alter Graassland Species Composition in the Panorama Unit (Photograph by Jodi McGraw)

These and other studies examining the interactions between native animals, native and exotic plants, and inter-annual variability in rainfall may continue to inform when and how cattle grazing can serve as an effective vegetation management tool to promote native species.

3.1.2 Coastal Scrub Element

Areas within the CPER that are dominated by short to medium height, soft-woody shrubs are included in the coastal scrub element. When compared with chaparral, coastal scrub supports sparser cover of shorter-statured shrubs that are less woody and oftentimes drought deciduous (Keeley and Keeley 1987b). Coastal scrub differs from desert scrub, which also features soft-woody shrubs, primarily in terms of the species composition (Table 20), which reflects the differing climates in which these communities occur.

3.1.2.1 Distribution

Coastal scrub covers 4,625 acres of the Reserve and is the third most abundant vegetation element in the CPER. Though it is found in all Reserve units, the clear majority of coastal scrub, 4,514 acres or 98% of element, occurs within the Chimineas units. There it occurs primarily in the foothills of the La Panza Range and near the Cuyama River. Specifically, coastal scrub is relatively abundant in the Taylor (1,412 acres), Barrett (776 acres), White Rock (400 acres), Feed Lot (314 acres), and East Grantline (300 acres) management units (Figure 5). Coastal scrub vegetation also occurs on 103 acres in the American Unit, mostly as scattered patches within the matrix of grassland vegetation in the north and northeast (Figure 16).

Throughout the CPER, coastal scrub occurs on a wide range of soils but is often associated with sandstone-derived loam soils and rock outcrops including:

- Saucito-Akad-Rock outcrop soils (720 acres, 15% of element total), which are generally shallow to moderately deep, well to excessively drained, moderately permeable loamy soils resulting from weathering of sandstone;
- Sedimentary rock (483 acres, 10% of element total); and
- Tajea-Saltos complex soils (533 acres, 11% of element total), which are typically shallow to moderately deep, moderately steep to very steep, well drained loam and fine loam soils formed in residuum weathered from sandstone on hills and mountains (Section 2.4.3).

Coastal scrub grows predominantly on three geologic formations:

- Marine clastic sedimentary rocks, sandstone, clay shale and minor conglomerate (1,239 acres, 26% of element total);
- Simmler formation conglomerate (1,031 acres, 22% of element total); and
- Morales Valley formation (860 acres, 18% of element total), which features light gray, crumbly sandstone and conglomerate, and gray to red siltstones (Section 2.4.2).

3.1.2.2 Structure

Coastal scrub consists of sparse to dense cover of soft-wood (mesophyllic) shrubs that produce basal branches from a root crown. Herbaceous plants occur between and to a lesser extent beneath the shrubs, and include annual and perennial grasses and forbs. The abundance of shrubs relative to that of herbs is likely influenced by abiotic factors, including slope, aspect, and soil conditions, as well as fire history, with shrub cover increasing with time since fire.

3.1.2.3 Classification

Within the CPER, plant communities within the coastal scrub element have been characterized into five alliances and four associations, which differ in terms of the plant species that dominate within the shrub canopy. Section B.2 describes the species composition, ecology, and conservation values of each of these assemblages.

Coastal Scrub Dominated by Chaparral Yucca
(Photograph by Jodi McGraw)

3.1.2.4 Condition

Coastal scrub within the CPER varies in terms of cover of exotic species, particularly annual grasses and forbs. The invasion of European annual grasses (red brome, wild oats) has been facilitated by recurring wildfires (Section 2.4.6), which remove dominant shrub cover and temporarily increase soil nutrient availability. Studies in coastal scrub and chaparral have shown herbaceous exotic plant abundance in coastal scrub post fire is greatly influenced by the rate of shrub canopy closure relative to the spread of European annuals (Keeley et al. 2006).

3.1.2.5 Disturbance Ecology

Coastal scrub occurs in fire-prone regions and the dominant plant species exhibit life history adaptations to recurring fire. In mature coastal scrub, characterized by dense shrub canopy cover, fires will remove aboveground shrub biomass, from which many dominant species such as purple sage resprout, while other species California buckwheat and California sagebrush (*Artemesia californica*) re-establish primarily from seed, particularly in inland locations such as the CPER (Malanson and Westman 1985, Keeley and Keeley 1987a, b).

Burned Coastal Scrub Invaded by Exotic Annual Grasses (Photograph by Jodi McGraw)

The estimated fire return interval in coastal scrub communities ranges between 15 and 50 years (Sawyer et. al 2009) and too-frequent fire has been observed to convert coastal scrub to exotic annual grassland by killing the dominant shrubs and depleting the seed source (Westman 1976, Haidinger and Keeley 1993). This pathway toward conversion of shrubland to grassland via fire is often observed in drier coastal scrub sites, where annual grasses are more competitive for soil water than the native shrubs (Keeley et al. 2005).

Competition from European annual grasses post-fire can have important implications not only for coastal scrub shrubs, but also post-fire endemics: herbaceous plants that establish following fire, and then persist between fires as dormant seed (Keeley et. al. 2005). Reduced survivorship and fecundity due to competition from exotic herbs could preclude these species from establishing below ground seed populations sufficient in size to allow persistence in the inter-fire intervals.

In the South Chimineas Unit, coastal scrub occurs as a mosaic with grasslands, a pattern that suggests recurring fires in the region may have facilitated invasion of the coastal scrub, and even converted areas of coastal scrub to grassland. The 1997 Logan Fire burned nearly 4,600 acres within the CPER, including a vast area of coastal scrub in the South Chimineas Unit (Section 2.4.6, Table 11, Figure 12). The area affected was previously burned by several smaller (<1,000-acre) fires that burned following the 1922 fire, which also burned much of the coastal scrub in the Reserve. While coastal scrub shrub cover may continue to increase following fire, exotic annual grasses could inhibit shrub re-establishment and thus convert the shrubland to grassland, as observed elsewhere (Westman 1979, Keeley and Keeley 1981).

In the absence of recurring fire, coastal scrub might convert to blue oak woodland, as blue oak seedlings establish under shrubs, which protect oak seedlings from herbivores. Oaks that grow up eventually shade and outcompete the coastal scrub shrubs. Following shrub mortality, herbaceous plants adapted to the understory of the oaks establish under the oaks, thus converting coastal scrub to oak woodland (Callaway and Davis 1993). This type conversion in the absence of fire occurs at the highest rate on the more mesic north-facing slopes, where desiccation stress for oak seedlings is limited. This may explain the patches of oak woodland found on the north-facing slopes within the coastal scrub in the Chimineas units of the CPER. Coastal scrub in more xeric areas may be less likely to succeed to oak woodland.

3.1.3 Chaparral Element

Chaparral vegetation is dominated by medium to tall, woody shrubs featuring leaves that are hardened by a waxy cuticle (i.e., are sclerophyllous). When compared with coastal scrub, chaparral supports denser cover of taller shrubs that are woodier (Keeley and Keeley 1987b).

3.1.3.1 Distribution

Within the CPER, chaparral occurs only within the Chimineas units where it covers 1,251 acres located primarily in the northwest. The Barrett Management Unit contains 870 acres (70% of element total). Other management units containing appreciable cover of this vegetation element include Saltos (139 acres), Taylor (96 acres), Gillam (82 acres), and Airplane (73 acres).

The Gaviota-Saltos Rock outcrop soil supports 832 acres (67%) of the chaparral, with an additional 184 acres (15%) occurring on the Tajea-Saltos complex soils. These shallow, well-drained loam or sandy loam soils are derived from weathered sandstone and occur on moderately to very steep hills and mountains. Chaparral is associated with three main geologic formations:

- Marine clastic sedimentary rocks, sandstone, clay shale and minor conglomerate (70% of element total);
- Gneissic rock (14% of element total); and
- Granitic rock (9% of element total).

3.1.3.2 Structure

Chaparral consists of a moderate to dense canopy of sclerophyllous shrubs with minimal herbaceous plant cover occurring in gaps within the shrub canopy. Scattered trees including California juniper and oaks may occur amidst the shrubs. Shrub density increases with time since fire until it forms an impenetrable thicket of nearly 100% canopy cover. The exception is in areas of thin soil often on south-facing slopes, where canopy closure does not occur because plant growth is limited by the availability of belowground resources.

3.1.3.3 Classification

Within the CPER, plant communities within the chaparral element have been classified into four alliances and two associations which are differentiated based on the dominant shrub species. Appendix B describes the species composition, ecology, and conservation values of each of these assemblages.

3.1.3.4 Condition

Chaparral communities within the CPER generally feature low diversity and abundance of exotic plants. The relative dense shrub canopy creates low light and often thick leaf litter on the soil surface, both of which inhibit many annual plants. Areas of chaparral that burned in the 1997 Logan Fire feature greater cover of non-native species than unburned chaparral. This suggests that perhaps soil conditions or other factors in areas that support chaparral may limit growth of non-native grasses and forbs.

3.1.3.5 Disturbance Ecology

Chaparral is a fire-prone community and, as in coastal scrub, dominant species within the CPER communities differ in their methods of regenerating post-fire. Chamise resprouts from a lignotuber while big berry manzanita (*Arctostaphylos glauca*) establishes solely from seed (Sawyer et al. 2009).

For one to three years following a fire, chaparral is dominated by herbaceous plant species including many fire-followers—plant species that are aboveground only a few years following fire before the canopy closes. After that period, shrub canopy increases in cover for the next 20 to 60 years, after which shrubs senesce and their cover declines. Senescent chaparral supports a lower diversity and abundance of native plant and animal species, suggesting recurring fire is needed to maintain the chaparral community.

Under the general successional model for chaparral, exotic annual grasses would be outcompeted by re-establishing shrubs, such that their dominance would be short-lived. Alternatively, herbaceous plants may compete with shrubs for scarce soil moisture, thus inhibiting shrub establishment and succession within chaparral and converting shrublands to grasslands (Eliason and Allen 1997). Grasses produce fine fuels which can increase fire frequency, relative to that of the chaparral, thus creating a grass-fire cycle (D'Antonio and Vitousek 1992). Patches of grassland within chaparral in the Coast Range Mountains are thought to have resulted from increased fire frequency (Keeley 2002).

Mosaic of Buck Brush Chaparral and Blue Oak Woodland
(Photograph by Jodi McGraw)

The natural fire return interval within chaparral varies among communities. Where chamise and big berry manzanita co-occur as in the CPER, fire return intervals of less than 20 years favor dominance by the stump-sprouting chamise, while longer intervals promote the obligate-seeding big berry manzanita (Sawyer et al. 2009). This is consistent with the pattern of primarily chamise chaparral occurring in areas affected by the 1997 Logan Fire, whereas bigberry manzanita chaparral is observed in areas that have not burned since 1922 (Figure B-2).

3.1.4 Desert Scrub Element

Desert scrub vegetation is dominated by scale-like, microphyllous (small-leaved), or broad-leaved species, including drought-deciduous and cold-deciduous species, which are generally considered to be part of desert transition, riparian, coastal sage scrub or other more soft-leaved shrub habitats.

3.1.4.1 Distribution

Desert scrub is the second most widespread vegetation element in the CPER, covering a total of 4,770 acres (12% of the Reserve) and occurring in all five units:

- Chimineas Units (4,241 acres, 89% of element total): almost exclusively in eastern and southeastern areas, especially within the Taylor (64% of unit total), Garcia (14% of unit total), and East Grantline (10% of unit total) management units;
- Panorama Unit (363 acres, 8% of element total): along the southwestern border and in outcrops in central and northern parts of the unit;
- American Unit (123 acres, 3% of element total): in the northeastern corner of the unit; and
- Elkhorn Unit (46 acres, 1% of element total): mostly in the northern portion of the unit.

Desert scrub grows on a range of soil types but preferentially occurs on the Beam-Panoza-Hillbrick complex soils (2,495 acres, 51% of element total), which are somewhat shallow, often steep, well-drained loam and sandy loam soils that formed from weathering sedimentary rocks including soft, calcareous sandstone, shale, and conglomerate, on hills and mountains. Additional soils supporting desert scrub include:

- Shedd silty clay loams (584 acres, 12% of element total), which are well-drained loams underlain by calcareous shale bedrock; and
- San Timoteo-San Andreas-Bellyspring complex soils (518 acres, 11% of element total), which are moderately deep, often steep, well-drained coarse to fine loamy soils formed from weathered from sedimentary rocks.

Much of the desert scrub (1,819 acres, 37% of element total) is associated with Monterey Shale Saltos Shale, which underlies the Beam-Panoza-Hillbrick soils. Other associated geologic formations include:

- Whiterock Bluff Shale (588 acres, 12% of element total);
- Morales valley formation (986 acres, 20% of element total), which features a crumbly sandstone and conglomerate, and siltstones; and
- Alluvium (548 acres, 11% of element total), which underlies much of the desert scrub in the Panorama and Elkhorn units.

Mosaic of Desert Scrub and California Juniper Communities on the Western Slope of the Caliente Range (Photograph by Jodi McGraw)

Within the Chimineas units, desert scrub intergrades with grasslands as the hillslopes of the Caliente Range Mountains give way to the alluvial plains of the Cuyama Valley to the south (Figure 16). As the shale formations are replaced by sandstone and conglomerates to the west, desert scrub intergrades with coastal scrub. In the higher elevation portions of the Caliente Range to the north, desert scrub occurs as a mosaic with grasslands and juniper woodland (Figure 16).

3.1.4.2 Structure

Though the structure differs among the 14 constituent community types, desert scrub generally consists of sparse to moderately dense cover of short to moderately tall (less than eight-foot-tall) shrubs. Herbaceous plants occur at varying density between shrubs, as well as beneath sparser canopies, and include annual and perennial herbs and grasses. Trees are absent except for scattered California juniper, which occur primarily on north-facing slopes.

3.1.4.3 Classification

Within the CPER, plant communities within the desert scrub vegetation have been classified into 10 alliances (four of which are provisional), two associations, one provisional community and one mapping unit. Appendix B describes the species composition, ecology, and conservation values of each of these assemblages.

Of the mapped assemblages, five are listed as special communities in the CDFW's list of sensitive plant communities (CDFW 2010a) or otherwise meet the criteria for sensitive communities (Figures 17 and 18):

- **Iodine Bush (*Allenrolfea occidentalis*) Shrubland Alliance:** Found within the American Unit, this alliance features species that can tolerate alkaline soils but are not restricted to them.
- **Spiny Saltbush Shrubland Association:** Endemic to the semi-deserts of California, occurrences in the Carrizo Plain region represent some of the best remaining stands west of the Mojave (T. Keeler-Wolf, pers. comm. 2009).
- **California ephedra Shrubland Association:** While in the Mojave and Sonoran deserts, this association occurs almost exclusively in washes, in the Carrizo Plain it is found primarily in upland areas across a range of slopes (T. Keeler-Wolf, pers. comm. 2009).

- **Winterfat (*Krascheninnikovia lanata*) Shrubland Alliance:** Winterfat stands within the CPER may be relics of a prior climate, as the species is more typically found in cool desert environments of the Great Basin and the Inyo, White, and Panamint Mountains of the northern Mojave Desert bioregion (T. Keeler-Wolf pers. comm. 2009).
- **Rock Gooseberry (*Ribes quercetorum*) Provisional Shrubland Alliance:** This special community is found within rock outcroppings generally on north-facing slopes in the North Chimineas and American units.

3.1.4.4 Condition

Desert scrub has been impacted by non-native annual grasses and forbs, which range from relatively low cover (<5%) to a dominant component of the community (e.g., >30% cover). Common non-native species include red brome, redstem filaree (*Erodium cicutarium*), and soft chess (*Bromus hordeaceus*). Variability in their cover reflects various site factors including the specific community type, proximity to grasslands, and disturbance history, particularly time since fire.

Cattle grazing within desert scrub may have altered the plant community composition by reducing the cover of shrubs and facilitating the invasion and spread of exotic annual herbs. Prior to acquisition by the Department, much of the desert scrub within the CPER was grazed. In areas or years of low annual grass and forb cover, cattle likely foraged on the native shrubs. Excessive grazing of some species including allscale saltbush can cause mortality and reduced shrub cover (Sankary and Barbour 1972). Reduction in shrub cover can increase abundance of exotic annuals such as red brome and redstem filaree, which can then outcompete shrub seedlings for scarce soil moisture, thus reducing shrub establishment (Sankary and Barbour 1972).

3.1.4.5 Disturbance Ecology

Unlike the other shrublands of the CPER, desert scrub communities do not naturally experience recurring fire. Prior to invasion by exotic annuals grasses and forbs, the sparse shrubs and limited native forbs created discontinuous fuel conditions that would carry a fire only under high-wind conditions, or in years of high rainfall when native herbs would create dense fine fuels. The invasion of European annual grasses and forbs could facilitate more frequent fire which would likely reduce the cover of native shrubs within the desert scrub shrubs, most of which do not feature lignotubers or other adaptations for resprouting following fire. Reduction in the cover of shrubs would facilitate the establishment of exotic annuals, including red brome, the increased abundance of which can facilitate a

Desert Scrub Following a Small Fire Along Highway 166
(Photograph by Jodi McGraw)

grass-fire cycle which converts arid shrublands to grasslands in arid systems (Brooks et al. 1999).

Prior to 2006, only a small portion of the desert scrub within the CPER had burned in recent history. Then the Cuyama fire (2006) followed by the Cotton fire (2010) burned 380 and 730 acres of desert scrub, respectively, with a portion of the burned areas overlapping (Table 11, Figure 12). Examination of shrub regeneration in these areas could be used to evaluate the effects of frequent fire on this community.

Cattle grazing has been identified as a management technique to reduce the density of fine fuels within desert scrub communities in the southern San Joaquin Valley, thus promoting rare and endangered plants and animals endemic to these areas (Germano et al. 2001). Results of recent studies to evaluate grazing effectiveness of cattle grazing in these systems have been equivocal. A seven-year experiment manipulating cattle grazing was conducted within saltbush scrub communities in the Lokern Reserve in western Kern County to determine whether it can benefit endangered plants and animals, including San Joaquin antelope squirrel, blunt-nosed leopard lizard, giant kangaroo rat, and Kern mallow (*Eremalche parryi* ssp. *kernensis*; Germano et al. 2003). A wildfire combined with numerous years of low rainfall were credited with precluding significant herbaceous plant growth and thus grazing treatment effects for most response variables in most years (Germano et al. 2003).

Recent research examining the interactions between giant kangaroo rats and cattle grazing within the grasslands of the CPNM (Section 3.1.1.4), may provide insights into the disturbance ecology and management of open, herb-dominated areas within desert scrub.

3.1.5 Oak Woodland Element

The oak woodland element includes areas within the CPER that are dominated by oak species (*Quercus sp.*).

3.1.5.1 Distribution

Oak woodland covers approximately 3,547 acres (9%) of the CPER, where it is found only within the center and western portions of the Chimineas units. In the North Chimineas Unit, oak woodlands occur west of Barrett Creek in the Barrett, 1,000 Acre, and Saltos management units, while they occur west of Taylor Canyon in the Taylor, White Rock, Feed Lot, Saltos, and Gifford management units in the South Chimineas Unit. In the CPER, oak woodlands often occur as a fine-scale mosaic with chaparral, coastal scrub, and grassland, with oak woodlands preferentially occurring on the cooler and moister north and east-facing slopes and in the canyons.

Blue Oak Woodland showing Abundant Oak Recruitment in the North Chimineas Unit (Photograph by Jodi McGraw)

Oak woodlands grow on a variety of loam soil types including:

- Tajea-Saltos complex soils (1,702 acres, 48% of element total), which are generally shallow to moderately deep, well-drained loam and sandy loam soils formed from weathered sandstone on relatively steep hills and mountains;
- Bellyspring-Saltos-Rock outcrop complex soils (10% of element total), which are typically very shallow to moderately deep, well-drained loam to fine loam soils formed from the weathering of sandstone on hills and mountains; and
- Seaback-Calleguas-Panoza complex soils (9% of element total), which are typically very shallow to moderately deep, well-drained loam and fine loam soils formed in weathering of soft calcareous sandstone, shale, or conglomerate on hills and mountains (Section 2.4.3).

Oak woodlands within the CPER are associated primarily with two geological formations:

- Marine clastic sedimentary rocks, sandstone, clay shale and minor conglomerate (1,956 acres, 56% of element total); and
- Morales Valley formation (452 acres, 13% of element total), which features light gray, crumbly sandstone and conglomerate, and gray to red siltstones (Section 2.4.2).

3.1.5.2 Structure

The structure of communities within the oak woodland element varies. The blue oak woodland alliance in the North Chimineas Unit features sparse to moderate cover of blue oaks. The density of blue oaks depends largely on water availability, which can be influenced by topography and slope aspect. Tree density is generally greatest on slopes with a northerly aspect, while blue oaks occur as a savanna (<10% oak canopy) on valley floors and ridges.

The understory within blue oak stands is variable. Where blue oak intergrades with chaparral in the CPER, chaparral shrubs occur within the understory. In the blue oak savanna understory, shrubs are largely absent and instead annual grasses and forbs dominate, with perennial grasses and forbs occurring at low abundance.

Located near the boundary of the Chimineas units, the Tucker oak woodland alliance features relatively dense cover of large shrub-sized Tucker oak (*Quercus john-tuckeri*) and California juniper. Tree density is lower on south-facing slopes and in areas that burned in the 1997 Logan fire, which have high cover of herbaceous plants dominated primarily by exotic species such as red brome.

3.1.5.3 Classification

The oak woodland element is composed of three different alliances, which are differentiated by the dominant species of oak: blue oak, Tucker oak, and coast live oak (*Quercus agrifolia*). Appendix B describes the species composition, ecology, and conservation values of each alliance. Blue oak and Tucker oak hybridize within the Chimineas units, producing taller, largely evergreen trees in some places. Coast live oak woodland is considered sensitive, as this is a disjunct occurrence of this species which primarily occurs within the Outer Coast Range Mountains in central and northern California.

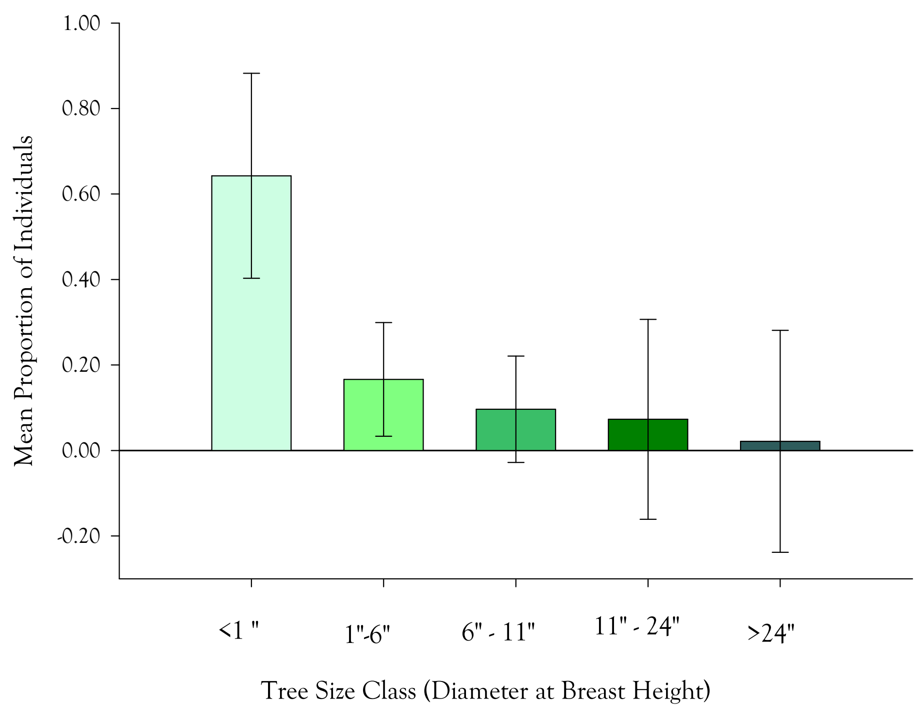
3.1.5.4 Condition

The blue oak woodlands within the CPER appear to be in good condition in terms of their age structure. A sampling study conducted in 62 plots located in the Chimineas units revealed that the mean tree density when plotted against oak size class exhibits a typical 'inverse J'-shaped curve; the proportion of trees is greatest in the smallest size class, and decreases to the largest size class (Figure 19). These data, which illustrate the relatively high abundance of oak seedlings and saplings in stands with fewer adult trees, indicate that recruitment is occurring within the population.

Limited recruitment in blue oak woodlands elsewhere in California, including the Central Coast, has led to widespread concern that the mortality of old blue oaks will lead to population extirpations and conversion of blue woodlands and savannas to other community types. Competition from dense annual grasses and grazing by cattle have been implicated as two of the causes of reduced recruitment (Tyler et al. 2006). However, a recent analysis of the patterns of blue oak recruitment suggests that even low levels of seedling establishment may be sufficient to maintain blue oak populations and communities, as adult mortality is very low (Tyler et al. 2006). More research is needed to understand the population age structure and dynamics of the blue oak woodlands and the role of grazing in influencing blue oak recruitment within the CPER; however, observations of seedlings and saplings suggest senescence risk might not be a factor in the Reserve.

As elsewhere in the region, the understory of the oak savannas, and to a lesser extent the oak woodlands, features high cover of exotic annual grasses and forbs including ripgut brome (*Bromus diandrus)*, soft chess, red brome, and redstem filaree. However, as described in greater detail below, the blue oak woodland associations exhibit some of the highest diversities of native herbaceous plant species in any vegetation group within the Reserve (T. Keeler-Wolf pers. comm. 2009).

Figure 19: Size structure of blue oaks sampled within 62 stands located in the Chimineas units of the CPER. Error bars are +/- 1 standard deviation.



3.1.5.5 Disturbance Ecology

Blue oak woodlands experience fire and are thought by some to naturally experience relatively frequent, low-severity grassland fires every 8-14 years (Mensing 1992). Larger, taller trees with thick protective bark are resistant to such ground fires, whereas crown fires resulting from dense ladder fuels can kill blue oaks (Horney et al. 2002). Seedlings and saplings are often top-killed by fire, and do not resprout. Because they do not require fire to establish, blue oaks are regarded as tolerant of, but not dependent upon, fire.

While information about the fire ecology of Tucker oak is limited, the species' distribution within areas of lower precipitation and sparser vegetative cover, relative to blue oak, and its co-occurrence with California juniper, a fire-intolerant species, suggest that it experiences less frequent fire than other oak and chaparral types. Increased cover of exotic annual grasses, which can create continuous, fine fuel that can promote fire frequency, is thought to potentially threaten persistence of stands of this species (Sawyer et al. 2009).

California Juniper Woodland on the Western Slope of the Caliente Range (Photograph by Jodi McGraw)

3.1.6 Juniper Woodland Element

Areas within the Reserve that are dominated by California juniper comprise the juniper woodland element, which consists of four associations that were differentiated based on understory species structure and species composition (Appendix B).

3.1.6.1 Distribution

The juniper woodland element covers 3,037 acres (8%) of the Reserve, and occurs almost exclusively within the Chimineas units, where it is concentrated in the Garcia, Saltos, and Taylor management units. A small, 2.4-acre patch also occurs in the northern tip of the American Unit.

Juniper woodlands grow predominantly in shallow and sandy or silty soils including (Section 2.4.3):

- San Timoteo-San Andreas-Bellyspring complex soils (1,283 acres, 42% of element total), which are moderately deep, strongly sloping to very steep, well-drained, loamy soils formed in weathered sedimentary rocks;
- Beam-Panoza-Hillbrick soils (534 acres, 18% of element total), which are generally shallow to moderately deep, strongly sloping to very steep, well drained sandy, stony, and fine loam soils that formed in residuum weathered from sedimentary rocks on hills and mountains; and
- Rock outcrop-lithic torriorthents (410 acres, 14% of element total), which are rock outcroppings typically found in mountainous regions, consisting largely of exposed sandstone bedrock which may feature sandy loam on the upper layers.

Juniper woodlands are primarily associated with four geologic formations (Section 24.2):

- Santa Margarita sandstone formation (999 acres, 33% of element total);
- Morales Valley formation (762 acres, 25% of element total);
- Monterey Shale Whiterock Bluff Shale (425 acres, 14% element total); and
- Monterey Shale Saltos Shale (319 acres, 11% of element total).

As elevation within the Caliente Mountains decreases and hill slopes become more gradual to the north, the density of California juniper decreases and the juniper woodland gives way to grassland. To the west, the shift in soils derived from shale to that derived predominantly from sandstone and conglomerate creates a transition to chaparral, in which scattered California juniper are not uncommon. To the south, the lower-elevation mountains of the Caliente Range are dominated by desert scrub, within which patches of juniper woodland occur on north- facing slopes (Figure 16).

3.1.6.2 Structure

Juniper woodland consists of sparse to moderate cover of California juniper, the abundance of which appears to depend primarily on slope aspect, though fire history may also play a role. California juniper density is greatest on north-facing slopes, where it co-occurs with other shrubs and trees including John-Tucker oak to create woody vegetation canopy often exceeding 50%, with herbaceous plants confined largely to the spaces between trees. Juniper density is much sparser and, in some cases, absent from adjacent south-facing slopes, many of which **lack** shrub cover as well and are instead dominated by herbaceous plants. East-facing slopes, west-facing slopes and valleys feature intermediate cover of woody plants including juniper, no doubt illustrating the intermediate water availability, relative to the hotter, drier south-facing slopes, and cooler, moister north-facing slopes.

Areas that burned more recently also have lower cover of juniper and other woody plants, than long-unburned areas. The eastern area of the juniper woodland within the CPER has not burned in recent history (Figures 12 and 16). Approximately one third of the community type in the west burned in 1922, and in 1997, approximately 10% in the northwest burned again. Aerial imagery reveals reduced tree density in the area that burned in 1997, irrespective of slope aspect; however, there is no discernible difference in tree density between areas thought to have burned in 1922 (but not 1997) compared to those that have not burned in recent history. The precision of the 1922 fire boundary is unknown. Moreover, aspects of the location of the burns with respect to unburned areas, including elevation and soils type, confound efforts to attribute the observed difference in canopy cover to fire.

3.1.6.3 Classification

Within the CPER, juniper woodlands have been classified into four associations, which differ in terms of the dominant shrub species with which California juniper co-occurs. Appendix B describes the species composition, ecology, and conservation values of each association.

3.1.6.4 Condition

The juniper woodland within the CPER is in good condition, as the communities generally feature relatively low cover of exotic plant species and trees of varying sizes.

3.1.6.5 Disturbance Ecology

California juniper woodland is generally regarded as a non-fire adapted community. Moderate fires kill small to moderate-sized trees and California junipers do not resprout following fires; they regenerate solely from seed. The fire return interval within the community is expected to range between 100 and 200 years, though in the Coast Ranges, stands adjacent to coastal scrub and chaparral can experience stand-replacing crown fires (Sawyer et al. 2009).

California Juniper Woodland Recovering Following the 1997-Logan Fire (Photograph by Jodi McGraw)

As with the desert scrub, another fire intolerant element of the CPER, the invasion and spread of exotic annual grasses and forbs may increase fire frequency, thus threatening persistence of juniper woodland (Sawyer et al. 2009). The eastern stands within the CPER have no history of fire and a long-term forest monitoring plot monitored by the US Forest Service within the Reserve is said to contain individual trees that exceed 1,000 years in age (R. Stafford, pers. comm. 2010). The western portion of the juniper woodland burned in the unnamed 1922 fire and then again in the 1997 Logan fire (Section 2.4.6). Snags of California juniper killed in the most recent fire occur within a matrix of non-native annual grasses and forbs. These fine fuels can promote subsequent fires in the juniper woodland types, resulting in a grass-fire cycle that has the potential to result in type conversion of juniper woodlands within the CPER. As a result, effective fire management may be critical to the persistence of this sensitive community.

3.1.7 Riparian and Riverine Element

Areas within the CPER that contain flowing water for at least part of the year constitute the riverine systems, while areas adjacent to the streams that are influenced by the hydrology are referred to as riparian. Most stream reaches either flow during and after rainfall events (ephemeral), or during the rainy season (intermittent). The stream hydrology is largely influenced by the size of the watershed (i.e., the area drained), the surface and subsurface geology of the stream course, including whether it is underlain by sand or other sediment versus bedrock, and the quantity and distribution of precipitation, which varies greatly from year to year (Section 2.4.4.1). The Cuyama River, which is located on the southern border of the South Chimineas Unit, is the only perennial stream on the Reserve (Section 2.4.5.2).

Riparian areas support plant species that are adapted to greater soil moisture availability, and thus differ in structure and species composition from adjacent upland communities. Within the CPER, riparian and riverine systems were mapped as part of seven alliances, one macrogroup, two habitat types, and one informally designated plant grouping (Appendix B).

3.1.7.1 Distribution

Riparian and riverine habitat accounts for 261 acres (0.7%) of the Reserve. Aside from a less than one-acre occurrence located in the American Unit west of the historic American Ranch, the riparian and riverine habitat occurs within the Chimineas units, primarily along the Cuyama River, and San Juan, Barrett, and Carrizo creeks. Other smaller occurrences are found along Saltos Creek, upper Sycamore Creek, and in Taylor Canyon (Section 2.4.5). The Panorama and Elkhorn units lack riverine or riparian habitats.

Riparian and riverine communities are primarily associated with river wash soils (105 acres, 42% of element total), which are water-deposited sand, gravel, cobblestones, and stones in active stream channels. Other soils underlying these systems include:

- Mocho fine sandy loams (62 acres, 25% of element total): well-drained developed from recently deposited alluvium that occur on alluvial fans and flood plains;
- Sorrento sandy loam soils (21 acres, 8% of element total): typically, very deep, well drained fine loams associated with alluvium derived from sedimentary rocks; and
- Saucito-Akad rock outcrop soils (20 acres, 8% of element total): generally shallow to moderately deep, well to somewhat excessively drained loamy soils with moderately slow permeability formed in residuum from weathering of sandstone.

The geological formations underlying this vegetation type are predominantly alluvium (198 acres, 80% of element total) and marine clastic sedimentary rocks, sandstone, clay shale and minor conglomerate (39 acres, 16% of element total).

3.1.7.2 Structure

The riparian communities of the CPER vary in structure, though most are relatively open shrublands. This reflects the arid climate and intermittent hydrology of most of the drainages, which are generally not conducive to the dense tree growth observed along perennial streams in more mesic climates. Small patches of woodland occur along the Cuyama River, which is a perennial stream, in impounded areas, and in association with springs, where water availability is greater. Within the Chimineas units, herbivory by ungulates including cattle may also contribute to the sparse woody plant growth in riparian areas. Installation of fences to exclude cattle from grazing along the Cuyama River in 2005 (Section 2.5.3.4) has dramatically increased the density of riparian shrubs in the stream reaches that flow through the Reserve.

Riparian Woodland along Lower Carrizo Creek in the South Chimineas Unit
(Photograph by Jodi McGraw)

Ongoing monitoring of riparian areas where the Department has installed fences to exclude cattle can be used to evaluate the potential vegetation and recruitment of additional riparian species including trees within these areas (Section 2.5.3.4).

3.1.7.3 Classification

Within the CPER, riparian woodlands have been classified into seven alliances, one macrogroup, two habitat types, and one informally designated plant grouping. All except one, tamarisk (*Tamarix* spp.) semi-natural shrubland stands, are native. Appendix B describes the species composition, ecology, and conservation values of each mapped riparian community type. Of the mapped assemblages, five are listed as special communities in the CDFW's list of special plant communities (CDFW 2010a, Figures 17 and 18), reflecting their overall rarity within the state:

- Scale Broom *(Lepidospartum squamatum)* Shrubland Alliance;
- Arrow weed *(Pluchea sericea)* Shrubland Alliance;
- Red Willow *(Salix laevigata)* Woodland Alliance;
- Arroyo Willow *(Salix lasiolepis)* Shrubland Alliance; and
- Fremont Cottonwood *(Populus fremontii)* Forest Alliance.

3.1.7.4 Condition

Riparian communities within the CPER likely have been impacted by hydrologic modifications, historic land uses, and the invasion and spread of exotic plants. Installation of dams to create ponds in the Barrett and San Juan drainages, has concentrated water in a few reaches along the streams, creating opportunities for the growth of trees including willows (e.g., *Salix* spp.). Diverting water from streams and springs to water cattle may also have influenced growth of riparian plants. As noted above, cattle grazing may have directly affected riparian communities through herbivory.

Wild pigs have recently been observed to remove riparian vegetation in San Juan Creek (R. Stafford, pers. comm. 2012). Riparian communities are also impacted by non–native plants, including not only the relatively ubiquitous annual grasses and forbs, but also tamarisk (*Tamarix ramosissima).* This shrub or tree, which invades riparian areas in drier regions of the Southwestern United States, occurs along the Cuyama River, where it forms dense, virtually monospecific stands (Section 3.5.1.3.3). Isolated individuals are also scattered within San Juan Creek and Barrett Creek drainages.

3.1.7.5 Disturbance Ecology

The disturbance regime of riparian areas in the CPER is dominated by flooding, which periodically removes established plant species, including shrubs and trees, scours litter and top soil, and deposits new soil. Many riparian species are adapted to establishing following flooding, through sprouting from the buds of roots and stems buried by sediment, and/or germination of seedlings on the bare sediment (Sawyer et al. 2009).

Most riparian communities are not adapted to recurring fire, which instead kills the shrubs and trees such as Fremont cottonwood (*Populus fremontii)*, though some species, such as arroyo willow (*Salix lasiolepis)* can resprout vigorously following fire (Sawyer et al. 2009). The copious leaves created by the drought-deciduous tamarisk (*Tamarix* spp.) promote fire, after which tamarisk can resprout (Busch 1995), thus facilitating conversion of native riparian communities to tamarisk.

3.1.8 Wetland Element

The wetland element includes areas within the CPER that feature permanently or seasonally saturated soils. It consists of the Soda Lake playa and three vegetation types mapped to group, macrogroup, and alliance (Section B.7).

Soda Lake, which Supports Alkali Wetland Communities, in the American Unit
(Photograph by Jodi McGraw)

3.1.8.1 Distribution

The wetland element covers 107 acres (0.3%) of the Reserve and includes the 84 acres around Soda Lake within the northeastern corner of the American Unit. Additional wetlands in the American Unit occur within an unnamed drainage to Soda Lake approximately one mile north of the American Ranch. In the Chimineas units, wetland vegetation is associated with Barrett and San Juan creeks, Gillam Pond near Gillam Spring, north of the Gifford Ranch, in Taylor Canyon, and in scattered occurrences along the Cuyama River. The Panorama and Elkhorn units lack wetlands.

Wetlands within the CPER occur on several soil types including most commonly:

- Playas ponded soils (41 acres, 38% of element total): near Soda Lake, wetlands occur primarily on playas ponded soils which are very deep, nearly level to moderately sloping, poorly drained soils formed in fine textured lacustrine sediments and alluvium on the valley floor;
- Wasioja-Polonio complex soils (19 acres, 18% of element total): well drained, fine loamy soils with moderately slow permeability formed in alluvium from mixed rock types, especially calcareous sedimentary rocks, on alluvial fans and fan remnants;
- Chicote complex soils (13 acres, 12% of element total): moderately well drained, fine textured soils with very slow permeability formed in alluvium from sedimentary rocks and lacustrine sediments on lake plains; and
- Panoza-Beam complex soils (9 acres, 9% of element total): well drained sandy, stony, and fine loam soils that formed in residuum weathered from sedimentary rocks on hills and mountains.

Wetlands are primarily associated with three main geologic formations:

- Alluvial geologic formations (66 acres, 62% of element total);
- Playa clay (16 acres, 15% of element total); and
- Vaqueros painted rock sandstone formations (15 acres, 14% of element total).

3.1.8.2 Structure

Wetlands within the CPER primarily feature herbaceous plant species, which can be short and sparse, as in the playa surrounding Soda Lake, or denser and tall, as occurs in the freshwater marsh along the Cuyama River and San Juan and Barrett creeks.

3.1.8.3 Classification

Within the CPER, the wetland element consists of the Soda Lake playa and three vegetation types mapped to group, macrogroup, and alliance. Section B.8 describes the species composition, ecology, and conservation values of each mapped wetland types. Of them, the following three are considered sensitive:

- **Playa:** the Soda Lake playa in the American Unit may present important habitat for rare invertebrates;
- **California Mixed Annual/Perennial Freshwater Vernal Pool/Swale Bottomland Group:** these vernal pools may similarly provide habitat for rare invertebrates;
- **Arid West Freshwater Emergent Marsh:** this general mapped vegetation type may feature sensitive freshwater wetland communities.

3.1.8.4 Condition

Freshwater Wetland within San Juan Creek, North Chimineas Unit (Photograph by Jodi McGraw)

The wetlands of the CPER feature occurrences of non-native species, including species adapted to greater soil moisture, such as rabbit's foot grass (*Polypogon monspeliensis*), as well as upland species such as red brome and redstem filaree.

In portions of the Chimineas units, the extent of wetland vegetation may be limited by livestock or tule elk. The Department installed exclusionary fencing around perennial streams and many ponds, to promote the growth and spread of plants that may have been limited by cattle grazing. Initial observations indicate that ongoing use by wild pigs may continue to limit growth of vegetation in these areas (R. Stafford, pers. comm. 2012).

3.1.8.5 Disturbance Ecology

The wetland communities are generally adapted to seasonal flooding and drought, and are largely fire intolerant. As noted above, they are subject to trampling by native and non-native ungulates, including tule elk, mule deer, wild pigs, and, in some cases, cattle.

3.1.9 Pond Element

Depressions that feature standing water for at least part of the year are included in the pond element. These ponds were created by prior landowners to supply cattle with water (Section 2.4.5). Some have been enhanced by the Department as part of projects with its partners, to promote use by native animals (Section 2.4.5)

3.1.9.1 Distribution

The CPER features twelve ponds that cover a total of approximately 7.4 acres. The Pridmore Pond (0.11 acres) lies 0.7 miles southeast of the American Ranch in the southeastern corner of the American Unit. The remaining 11 mapped ponds are within the Chimineas units (Figure 7). Additional smaller and seasonal ponds may also exist.

3.1.9.2 Structure

Structure of vegetation associated with the ponds varies. While some such as Broken Dam and Number 3 Pond feature emergent vegetation and wetland vegetation on the margins, other ponds such as Scale, Joe, and Corral feature only limited aquatic vegetation. While in some cases this may reflect use by cattle, in other cases, such as in Joe Pond, hydrology may limit establishment of emergent vegetation.

Number 3 Pond in the North Chimineas Unit
(Photograph by Jodi McGraw)

This variation in pond hydrology and vegetation creates a diversity of microhabitats utilized by the aquatic species, including western spadefoot toad (*Spea hammondii*), which inhabits shallow depressions which typically lack emergent vegetation, and western pond turtle, which utilizes a range of pond habitats but requires some vegetation (Section 3.3).

3.1.9.3 Condition

The ponds primarily feature native plant species, though non-native species adapted to moist conditions such as rabbit's foot grass and bull thistle (*Cirsium vulgare*) occur around the margins of many ponds, which also feature scattered tamarisk. Vegetative cover may be reduced due to herbivory from cattle as well as native ungulates. Except for Joe Pond, the Department has fenced all ponds in areas featuring livestock, to facilitate the use of cattle to manage vegetation. The Department monitors ponds to evaluate response to excluding cattle grazing.

3.1.9.4 Disturbance Ecology

The ponds within the CPER were primarily created through modifications to the drainages and areas around the outflow of springs, to provide water for cattle (Section 2.4.5.2.4). Their disturbance regime is therefore tied to that of the modified drainages, and includes primarily flooding but also historic grazing by ungulates including cattle as well as use by wild pig. Fire is infrequent around the ponds.

3.1.9.5 Species Composition

The ponds were not included as part of the vegetation classification conducted by VegCAMP (CDFW 2010c; Appendix B). However, the ponds were floristically evaluated. Pond vegetation varies depending on hydroperiod, depth, soil conditions, and use by cattle. Native plant species common on the pond margins include arroyo willow, mulefat (*Baccharis salicifolia*), heliotrope (*Heliotropium curassavicum*), saltgrass (*Distichlis spicata*), rough cocklebur (*Xanthium strumarium*), and alkali heath (*Frankenia salina*). Emergent and floating vegetation include watercress (*Nasturtium officinale*), southern cattail (*Typha domingensis*), and common spikerush (*Eleocharis macrostachya*; CDFW 2010c).

3.1.10 Cliffs and Rock Outcrop Element

Cliffs and rock outcroppings have been mapped in four locations totaling 10 acres (0.03%) of the Reserve (Figure 16). The largest mapped occurrence covers just over nine acres and straddles the American and North Chimineas units. The other three are in the Chimineas units on the eastern border of the Garcia Management Unit, the central-southern border of the Saltos Management Unit, and just east of Carrizo Canyon in the Feed Lot Management Unit (Figure 16).

Cliffs within the South Chimineas Unit (Photograph by Jodi McGraw)

Owing to the vertical nature and patchiness of these features, they are difficult to detect in examination of aerial imagery. Additional habitat occurs throughout the steeper sections of the Reserve, primarily within canyons in the Chimineas units. Steep banks above roads may create similar habitat for many species.

Native plants occurring on cliffs and rock outcroppings include shrubs such as rock gooseberry (*Ribes quercetorum*), and California fuchsia (*Epilobium canum ssp. canum)* as well as herbaceous plants adapted to thin soils such as Lemmon's jewel flower (*Caulanthus lemmonii*), woodland threadstem (*Pterostegia drymarioides*), gold back fern (*Pentagramma triangularis* ssp. *triangularis*), and lance-leaf dudleya (*Dudleya lanceolata*). The inimical soil conditions restrict the richness and abundance of exotic species within this element, which is generally in good condition.

3.2 Animal Species and Habitats

The Carrizo Plains Ecological Reserve supports a diverse assemblage of native animal species, which reflects the Reserve's biogeography as well as the diverse mosaic of relatively intact habitat. The Reserve is known to support at least 287 species of vertebrates, including 7 fish, 6 amphibians, 25 reptiles, 194 birds, and 55 mammals (Stafford 2016; Appendix D). Though little information is available about invertebrate species, their richness likely reflects the diversity of biogeographic influences and plant species and communities within the Reserve (Section 3.1).

To facilitate the design and implementation of management in this large landscape-level reserve, the Department's wildlife biologists ranked the abundance of vertebrate species within each of the ten vegetation elements (Section 3.1). For each element, characteristic animal species were identified by multiplying the species relative abundance within that element (the score within the element divided by the total score for all elements) by the score within the element (Appendix D). This approach identified species that are both common within a community and for which the community represents an important habitat type for them (Table 21). These species can serve as indicators for monitoring conditions of the elements to evaluate management effectiveness (Section 4.3.2).

3.2.1 Grassland Animals

San Joaquin Kit Fox
(Photograph by Bob Stafford)

The grassland element supports 159 species of vertebrates (Appendix D). These include 17 species that occur at higher frequency and abundance within the grasslands. Not surprisingly given the widespread conversion of grassland habitat in the region and California more broadly, most of these grassland specialists are special-status species (Table 22).

Other common species observed within the Reserve grasslands include savanna sparrow (*Passerculus sandwichensis*), western meadowlark (*Sturnella neglecta*), red-tailed hawk (*Buteo jamaicensis*), California ground squirrel, and Brewer's blackbird (*Euphagus cyanocephalus*).

Variability in grassland habitat condition can greatly influence use by vertebrate and invertebrate species that inhabit the grasslands. Three general habitat factors related to management that influence species' use include height, composition, and structure.

3.2.1.1 Grassland Height

Some species preferentially utilize or even require grasslands that feature tall herbaceous plants. For example, northern harrier and short-eared owl require tall grasslands, which harbor greater abundance of their preferred prey: the California vole. Similarly, tule elk and pronghorn preferentially occur in taller

Table 20: Animal species characteristic of the Vegetation Elements within the CPER

Element	Common Name	Scientific Name	Status Federal[1]	Status State[2]
Grassland (short)	long-billed curlew	*Numenius americanus*		WL
	mountain plover	*Charadrius montanus*		CSSC
	burrowing owl	*Athene cunicularia*		CSSC
	horned lark	*Eremophila alpestris*		WL
	California ground squirrel	*Spermophilus beechyi*		
	giant kangaroo rat	*Dipodomys ingens*	FE	SE
	San Joaquin kit fox	*Vulpes macrotis mutica*	FE	ST
	pallid bat	*Anrtozous pallidus*		
Grassland (tall)	short-eared owl	*Asio flammeus*		CSSC
	grasshopper sparrow	*Ammodramus savannarum*		CSSC
	northern harrier	*Circus cyaneus*		CSSC
	California vole	*Microtis californicus*		
	pronghorn	*Antilocapra americana*		
	tule elk	*Cervus elaphus nannodes*		CSSC
Grassland (general)	San Joaquin coachwhip	*Masticophis flagellum*		CSSC
	western meadowlark	*Sturnella neglecta*		
	golden eagle	*Aquila chrysaetos*		FP
	American badger	*Taxidea taxus*		CSSC
Coastal Scrub	desert night lizard	*Xantusia vigilis*		
	Blainville's horned lizard	*Phrynosoma blainvillii*		CSSC
	rufous-crowned sparrow	*Aimophila ruficeps*		
	sage sparrow	*Amphispiza belli*		
	Costa's hummingbird	*Calypte costae*		
	black-chinned sparrow	*Spizella atrogularis*		CSSC
	greater roadrunner	*Geococcyx californianus*		
	San Diego desert woodrat	*Neotoma lepida intermedia*		CSSC
Chaparral	striped racer	*Masticophis lateralis*		
	wrentit	*Chamaea fasciata*		
	mountain quail	*Oreortyx pictus*		
	desert cottontail	*Sylvilagus audubonii*		
	California thrasher	*Toxostoma redivivum*		
	big-eared woodrat	*Neotoma macrotis*		CSSC
	Merriam's chipmunk	*Tamias merriami*		
Desert Scrub	blunt-nosed leopard lizard	*Gambelia sila*	FE	SE
	California quail	*Callipepla californica*		
	Le Conte's thrasher	*Toxostoma lecontei*		CSSC
	lesser nighthawk	*Chordeiles acutipennis*		
	northern mockingbird	*Mimus polyglottos*		
	San Joaquin antelope squirrel	*Ammospermophilus nelsoni*		ST
	short-nosed kangaroo rat	*Dipodomys nitratoides*		CSSC
	Tulare grasshopper mouse	*Onychomys torridus tularensis*		CSSC
Juniper Woodland	red-breasted sapsucker	*Sphyrapicus ruber*		
	phainopepla	*Phainopepla nitens*		
	ash-throated flycatcher	*Myiarchus cinerascens*		
	Bewick's wren	*Thryomanes bewickii*		

Table 20: Animal species characteristic of the Vegetation Elements within the CPER

Element	Common Name	Scientific Name	Status	
			Federal[1]	State[2]
Oak Woodland	Lawrence's goldfinch	*Carduelis lawrencei*		
	long-eared owl	*Asio otus*		CSSC
	acorn woodpecker	*Melanerpes formicivorus*		
	oak titmouse	*Baeolophus inornatus*		
	house wren	*Thryomanes aedoni*		
	western bluebird	*Sialia mexicana*		
	yellow-billed magpie	*Pica nuttalli*		
	white-breasted nuthatch	*Sitta carolinensis*		
	mule deer	*Odocoileus hemionus*		
	big brown bat	*Eptesicus fuscus*		
Riparian	arroyo chub	*Gila orcutti*		CSSC
	California roach	*Lavinia symmetricus*		CSSC
	California red-legged frog	*Rana draytonii*	FT	CSSC
	killdeer	*Charadrius vociferous*		
	Nuttall's woodpecker	*Picoides nuttallii*		
	yellow warbler	*Setophaga petechia*		CSSC
	raccoon	*Procyon lotor*		
	western red bat	*Lasiurus blossevillii*		CSSC
Ponds and Wetlands	western spadefoot	*Spea hammondii*		CSSC
	western toad	*Anaxyrus boreas*		
	western pond turtle	*Emys marmorata*		CSSC
	tricolored blackbird	*Agelaius tricolor*		CSSC, CE
	common yellowthroat	*Geothylpis trichas*		
	Yuma myotis	*Myotis yumanensis*		
	western mastiff bat	*Eumops perotis californicus*		CSSC
Cliffs and Rock Outcroppings	golden eagle	*Aquila chrysaetos*		FP
	Prairie falcon	*Falco mexicanus*		WL
	western mastiff bat	*Eumops perotis*		CSSC
	canyon bat	*Pipistrellus hesperus*		

[1]Federal Status Designations:
FE= Federally Endangered. Species in danger of extinction throughout all or significant portion of its range.
FT = Federally Threatened. Species likely to become endangered within foreseeable future throughout all or a significant portion of its range.

[2]State Status Designations:
SE = State endangered. Species whose continued existence in California is jeopardized.
ST = State threatened. Species, although not presently threatened with extinction, may become endangered in the foreseeable future.
CSSC = California species of special concern. Animal species with California breeding populations that may face extinction in the near future.
FP = Fully protected by the State of California under Sections 3511 and 4700 of the Fish and Game Code.
WL = California Department of Fish and Wildlife Watch List
CE= Candidate for State listing as an Endangered Species

grasslands, which afford greater structure to hide from predators, which can be essential during fawning (Section 3.4). Conversely, some species such as mountain plover, burrowing owl, pallid bat, and San Joaquin kit fox require short-structure grasslands. Such grasslands afford greater visibility and promote ease of movement.

Within the CPER, grassland height varies depending upon several factors including species composition and precipitation, though soil conditions may also influence grassland height. Grassland height is also managed by the Department using cattle grazing.

In addition, some animals within the CPER grasslands modify the height of their habitat. Most notably, the giant kangaroo rat is a keystone species, which maintains short structure within the grasslands of the Carrizo Plain by actively clipping vegetation, as well as through its burrowing activities (USFWS 1998, Prugh and Brashares 2012). California ground squirrels similarly create short-stature grassland conditions that aid detection of aboveground predators such as coyote.

3.2.2.1 Grassland Composition and Structure

Some animal species within the CPER grasslands preferentially occur in areas that feature subshrubs, shrubs, trees, or other structure. For example, grasshopper sparrow use subshrubs, shrubs, or other tall vegetation elements such as summer mustard *(Hirschfeldia incana)* as perches for establishing their breeding territories. Various woody species including silverbush lupine, linear-leaved goldenbush, and California juniper have colonized grasslands within the North Chimineas Unit, where grazing and cultivation have been discontinued. Preventing frequent fire may be necessary to maintain structure within a portion of the grassland habitat.

Other aspects of specific grassland habitat requirements are identified for the special-status species in Section 3.3.

3.2.3 Coastal Scrub Animals

Communities within the CPER coastal scrub habitat element support 202 species of vertebrates (Appendix D). These include eight species that are characteristic of the coastal scrub, in that they occur at higher frequency and abundance within this community type (Table 21). Additional species that are common within the coastal scrub include side‑blotched lizard (*Uta stansburiana*), ruby-crowned kinglet (*Regula calendula*), western scrub jay (*Aphelocoma californica*), loggerhead shrike (*Lanius ludovicianus*) and Heermann's kangaroo rat (*Dipodomys heermannii*; Appendix D).

Black Chinned Sparrow
(Photograph by Al Schmierer)

3.2.4 Chaparral Animals

Black-Tailed Jackrabbit
(Photograph by Morgan Ball)

Chaparral vegetation is utilized by at least 196 species of vertebrates within the CPER (Appendix D). These include seven species that are characteristic of the chaparral, in that they occur at higher frequency and abundance within this community type (Table 21).

Examples of animals common in the chaparral include western rattlesnake (*Crotalus oreganus*), cliff swallow (*Petrochelidon pyrrhonota*), black-tailed jackrabbit, California myotis (*Myotis californicus*), and Mexican free-tailed bat (*Tadarida brasiliensis*). Many patches of chaparral occur as part of a relatively fine-scale mosaic featuring blue oak woodland and coastal scrub communities. Many animal species inhabiting these communities will also utilize chaparral, and vice versa (Appendix D). Owing to the variability in plant species composition and abundance, chaparral stands of varying associations and time since fire likely support different animal species.

3.2.5 Desert Scrub Animals

Desert scrub is utilized by at least 166 species of vertebrates in the CPER (Appendix D). These include eight species that are characteristic of the desert scrub, in that they occur at higher frequency and abundance within this community type. Several animal species within the element are recognized as rare, threatened, or endangered (Table 21, Appendix D).

Other desert scrub animals include tiger whiptail lizard (*Aspidoscelis tigris*), white-crowned sparrow (*Zonotrichia albicollis*), Lawrence's goldfinch (*Carduelis lawrencei*), deer mouse (*Peromyscus maniculatus*), and black-tailed jackrabbit. Desert scrub occurs as a mosaic with communities of the grassland, juniper woodland, and coastal scrub elements, such that many desert scrub species within the Reserve also utilize vegetation within these other elements (Appendix D).

Lawrence's Goldfinch in the CPER
(Photograph by Al Schmierer)

Blainville's Horned Lizard
(Photograph by Bill Bouton)

3.2.6 Juniper Woodland Animals

Communities within the CPER juniper woodland habitat element are utilized by at least 207 species of vertebrates (Appendix D). These include six bird species that preferentially occur within the juniper woodland (Table 21).

Additional inhabitants of the juniper woodland include Blainville's horned lizard (*Phrynosoma blainvilli*), California towhee (*Pipilo crissalis*), Anna's hummingbird (*Calypte anna*), and gray fox (*Urocyon cinereoargenteus*l Appendix D).

3.2.7 Oak Woodland Animals

Oak woodlands are utilized by at least 205 species of vertebrates within the CPER (Appendix D). These include seven species that are characteristic of the oak woodland, in that they occur at higher frequency and abundance within this community type (Table 21).

Ringneck Snake
(Photograph by Bob Stafford)

Other common abundant species in oak woodland include black-bellied slender salamander (*Batrachoseps nigriventris*), California legless lizard (*Anniella pulchra pulchra*), ringneck snake (*Diadophis punctatus*), tree swallow (*Tachycineta bicolor*), lark sparrow (*Chondestes grammacus*), western screech owl (*Otus kennicottii*), coyote, and big brown bat (*Eptesicus fuscus*). Many patches of oak woodland occur as a mosaic which also features chaparral coastal scrub, and grassland communities; animal species inhabiting these elements will also utilize the oak woodland (Appendix D).

Western Pond Turtle
(Photograph by Bob Stafford)

3.2.8 Riparian Animals

Riparian communities within the CPER are utilized by at least 222 species of vertebrates (Appendix D). These include eight species that are characteristic of the community, in that they occur at higher frequency and abundance within this community type (Table 21).

Other common species in riparian areas include common kingsnake (*Lampropeltis getula*), Wilson's warbler (*Cardellina pusilla*), yellow-rumped warbler (*Setophaga coronata*), black-headed grosbeak (*Pheucticus melanocephalus*), and ornate shrew (*Sorex ornatus*). In addition, many species that inhabit adjacent communities utilize streams and riparian areas for water and as occasional habitat (Appendix D).

3.2.9 Pond and Wetland Animals

The CPER ponds are utilized by at least 216 species of vertebrates (Appendix D). Of these, eight species occur at higher frequency and abundance within this community type (Table 21).

Western Spadefoot Toad
(Photograph by Bob Stafford)

Other common animals inhabiting the pond and adjacent wetlands include Pacific chorus frog (*Pseudacris regilla*), western pond turtle, and red-winged blackbird (*Agelaius phoeniceus;* Appendix D). Additionally, the ponds within the Reserve are occasionally utilized by ducks including mallard (*Anas platyrhyncos*), ring-necked duck (*Aythya collaris*), cinnamon teal (*Anas cyanoptera*), and northern pintail (*Anas acuta*); shorebirds such as white-faced ibis (*Plegadis chihi*), great blue heron (*Ardea herodias*), and sora (*Porzana carolina*); and other water birds including double-crested cormorant (*Phalacrocorax auritus*) and pied-billed grebe (*Podilymbus podiceps*).

As with riparian areas, ponds provide water as well as food (e.g., for bat s) for many species inhabiting the adjacent upland communities.

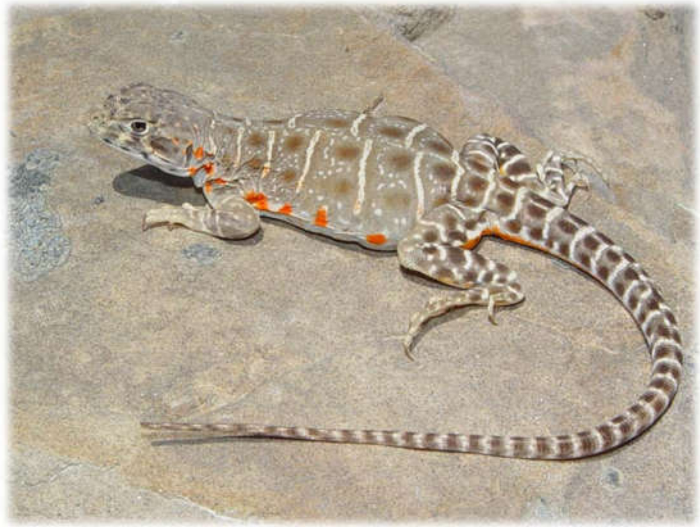
Pallid Bats Roosting in the CPER
(Photograph by Morgan Ball)

3.2.10 Cliffs and Rock Outcrop Animals

Amidst the mosaic of vegetation, cliffs and rock outcrops provide important habitat elements for numerous animals. They provide roosting and nesting habitat, which are particularly important for bats including western mastiff bat (*Eumops perotis*), pallid bat, Townsend's big-eared bat (*Corynorhinus townsendii*), and canyon bat (*Pipistrellus hesperus*). Additionally, cliffs and rocks provide habitat for rock wren (*Salpinctes obsoletus*), canyon wren (*Catherpes mexicanus*), and rufous-crowned sparrows (*Aimophila ruficeps*) as well as afford nesting sites for prairie falcon (*Falco mexicanus*), golden eagle, and barn owl (*Tyto alba*). Rocks provide important cavities and can also be critical for reptile thermoregulation.

3.3 Special-Status Species

The CPER supports occurrences of numerous rare plant and animals. Many of these species that have been listed as threatened, endangered, or have other special status under one or more of the following:



Blunt-Nosed Leopard Lizard (Photograph by Marty Felner)

- **Federal Endangered Species Act**: listed or proposed for listing as threatened or endangered;
- **California Endangered Species Act**: listed or a candidate for listing;
- **Fully Protected Species**: listed under the California Fish and Game Code (Sections 3511, 4700, 5050 and 5515);
- **Species of Special Concern**: species of special concern on the special animals list (CDFW 2016b);
- **California Rare Plant Rank (CRPR)**: plants that are rare, threatened, or endangered in California (CRPR Ranks 1B and 2; CNPS 2012);
- **Western Bat Working Group**: species ranked as 'high' or 'medium' on the regional priority matrix; and
- **CEQA**: other species that meet the definition of rare or endangered under CEQA, including those are not listed but known to be very rare or declining.

Pale Yellow Layia (Photograph by Ken Hickman)

Table 22 lists the special-status species known or likely to occur within the Reserve. For each, it characterizes their expected relative abundance within the CPER Units, and highlights their management needs; the anticipated, relative abundance of special-status species within each of habitat element is provided in Tables C-1 and D-1. Figures 20 - 23 illustrate recorded observations of special-status species within the CPER Units and nearby areas. Appendix E provides species profiles that describe known or likely aspects of each species' distribution, life history, and threats, with an emphasis on information that is relevant for management of the CPER.

Table 21: Special-status species of the CPER

		Distribution and Relative Abundance within the CPER Units[2]							
Species	**Status[1]**	**A**	**CN**	**CS**	**E**	**P**	**Notes**	**Habitat**	**Management Needs**
Plants									
Lost Hills crownscale (*Atriplex coronata* var. *vallicola*)	CRPR 1B.2	1						Saline/alkaline playas in desert scrub and wetlands around Soda Lake	Limit activities that alter soil chemistry.
Round-leaf filaree (*California macrophylla*)	CRPR 1B.1	1		1				Grasslands and occasionally desert scrub on loam and clay soils	Reduce exotic annual plant competition.
La Panza mariposa lily (*Calochortus simulans*)	CRPR 1B.3		3	1				Coastal scrub and blue oak woodland on sandy soils	Reduce exotic annual plant competition.
Lemmon's jewelflower (*Caulanthus lemmonii*)	CRPR 1B.2			3				Steep slopes and canyon walls along drainages and road cuts in coastal scrub	Reduce exotic annual plant competition. Limit herbivory by cattle.
Umbrella larkspur (*Delphinium umbraculorum*)	CRPR 1B.3		3	3				Oak woodlands, coastal scrub, and chaparral particularly in rocky areas	Reduce exotic annual plant competition. Limit herbivory by cattle.
Valley larkspur (*Delphinium recurvatum*)	CRPR 1B.2	3						Saline/alkaline soils on valley floors including the playa around Soda Lake	Reduce exotic annual plant competition. Limit activities that alter soil chemistry. Limit herbivory by cattle.
Kern mallow (*Eremalche parryi cf.* ssp. *kernensis)*	FE, CRPR 1B.1	0	2	4	1	4		Grassland, desert scrub, and juniper woodland, particularly near *Ephedra californica,* but also amidst herbaceous plants between *Atriplex* spp.	Reduce exotic annual plant competition. Limit herbivory by cattle.
Pale-yellow layia (*Layia heterotricha*)	CRPR 1B.1			3				Desert scrub and juniper woodland	Reduce exotic annual plant competition. Limit herbivory by cattle.
Munz's layia (*Layia munzii*)	CRPR 1B.2	1						Alkali wetlands and desert scrub	Reduce exotic annual plant competition.
Showy madia (*Madia radiata*)	CRPR 1B.1	1	1	4				Grasslands and open areas in juniper woodland	Reduce exotic annual plant competition. Limit herbivory by cattle.
Diamond-petaled California Poppy	CRPR 1B.1	1						Grasslands	Reduce exotic annual plant competition. Limit herbivory by cattle.

Table 21: Special-status species of the CPER

		Distribution and Relative Abundance within the CPER Units[2]							
Species	**Status[1]**	**A**	**CN**	**CS**	**E**	**P**	**Notes**	**Habitat**	**Management Needs**
(*Eschscholzia rhombipetala*)									
San Joaquin woolly threads (*Monolopia congdonii*)	CRPR 1B.2, FE				4			Grasslands and desert scrub on sandy or silty soils	Reduce exotic annual plant competition. Limit herbivory from cattle. Avoid frequent fire due to accumulation of dense annual exotic plant species.
Invertebrates									
Vernal pool fairy shrimp (*Branchinecta lynchi*)	FT			1			Known from adjacent lands	Vernal pools and ephemeral ponds as well as artificial, ephemeral wet areas including ditches	Reduce exotic annual plants, which reduce the hydroperiod of ponds and pools.
Longhorn fairy shrimp (*Branchinecta longiantenna*)	FE	2					Near Soda Lake	Vernal pools and ephemeral ponds as well as artificial, ephemeral wet areas including ditches.	Reduce exotic annual plants, which reduce the hydroperiod of ponds and pools.
Kern primrose sphinx moth (*Euproserpinus euterpe*)	FT				U	U	Carrizo Plain; also Cuyama Valley	Sandy washes featuring the host plant, Mojave sun cup (*Camissonia campestris*)	In appropriate habitat, limit trampling and soil disturbance during the breeding season. Reduce exotic annual plant competition to promote Mojave sun cup.
Fish									
Arroyo chub (*Gila orcutti*)	CSSC			5			Cuyama River only; population introduced	Streams with gently flowing water, aquatic plants, algae, and invertebrates	Eradicate or control tamarisk. Eradicate or control exotic fish. Prevent introduction of bullfrogs.
California roach (*Lavinia symmetricus*)	CSSC			5			Cuyama River only; population potentially introduced; unknown subspecies at this location	Wide-ranging stream conditions, though most commonly smaller, warmer, intermittent streams or the margins of larger streams	Eradicate or control tamarisk. Eradicate or control exotic fish. Prevent introduction of bullfrogs. Further identify subspecies to determine roach present on site are a species of special concern.
Amphibians									

Table 21: Special-status species of the CPER									
		Distribution and Relative Abundance within the CPER Units[2]							
Species	**Status[1]**	**A**	**CN**	**CS**	**E**	**P**	**Notes**	**Habitat**	**Management Needs**
California red-legged frog (*Rana draytonii*)	FT, CSSC			3			Currently known only from Cuyama River	Ponds, streams, marshes and springs featuring deep pools with overhanging and emergent vegetation	Enhance vegetation along stream and ponds, while avoiding loss of deep water pools. Eradicate or control exotic fish. Prevent introduction of bullfrogs. Eradicate or control tamarisk. Avoid introducing chytrid fungus and other emergent diseases.
Western spadefoot toad (*Spea hammondii*)	CSSC	3	4	4				Ponds or pools, especially seasonal ones that lack predators, primarily in short statured grasslands, though occasionally woodlands.	Maintain open areas in spadefoot breeding ponds. Maintain short-statured grasslands. Prevent introduction of bullfrogs. Eradicate or control tamarisk. Create additional breeding pools where appropriate
Reptiles									
California legless lizard (*Anniella pulchra pulchra*)	CSSC	3	5	5	U	U		Porous soils covered by litter in a variety of shrublands and woodlands	Prevent frequent fire (i.e., outside the range of natural variation). Work with researchers to further identify subspecies.
Blunt-nosed leopard lizard (*Gambelia sila*)	FE, SE				4	4	Endemic to the Southern San Joaquin Valley and Carrizo Plain	Sparsely vegetated desert scrub and grasslands, including washes, especially areas featuring burrows from kangaroo rats and other small mammals, which are used as thermal refuges, and scattered subshrubs (e.g., Ephedra spp.) which provide cover	If necessary, reduce exotic annual plants during periods of blunt-nosed leopard lizard activity (April – September) to facilitate movements. Reduce exotic annual plants if/when necessary to enhance populations of native subshrubs and decrease the potential for wildfire.
San Joaquin Coachwhip (*Masticophis flagellum ruddocki*)	CSSC	3	3	3	3	3		Grassland and desert scrub, particularly with taller vegetation	Maintain areas of tall-structured grassland. Avoid unnaturally frequent fire.
Blainville's horned lizard (*Phrynosoma blainvillii*)	CSSC	3	4	5	4	4		Relatively open, often sandy areas in grassland, coastal scrub, chaparral, and woodlands, including washes, featuring native ants, on which the species is a specialist predator	Reduce exotic annual plants, which can be dense in high rainfall years and potentially increase fire frequency. Reduce mortality by vehicles by limiting traffic and speed and by increasing driver awareness
Western pond turtle	CSSC		5	5				Ponds, reservoirs, and slow-moving streams with aquatic vegetation,	Promote native vegetation within and along the margins of ponds, while maintaining deep

Table 21: Special-status species of the CPER

Species	Status[1]	Distribution and Relative Abundance within the CPER Units[2]						Habitat	Management Needs
		A	CN	CS	E	P	Notes		
(*Emys marmorata*)								invertebrates and fish for food, and logs, rocks, or vegetation for basking. Adjacent upland vegetation including shrublands and woodlands for hibernation and estivation	water. Eradicate or control exotic fish and wild pigs. Prevent introduction of bullfrogs. Eradicate or control tamarisk. Fire within the natural range of variation to maintain upland habitat. Provide for basking sites on and adjacent to ponds. Provide water to occupied ponds during extended droughts.
Coast patch-nosed snake (*Salvadora hexalepis virgultea*)	CSSC	U	3	3				Shrublands and woodlands with washes, sandy flats, and rocky areas	Reduce exotic annual plants, which can be dense in high rainfall years. Minimize chances for large and frequent wildfires in chaparral and coastal sage shrublands.
Two-striped garter snake (*Thamnophis hammondii*)	CSSC		3	3			Predicted but not yet observed at the CPER	Permanent or semi-permanent water bodies, particularly streams with rocky beds lined by willows, though also ponds; adjacent chaparral and oak woodlands in winter months	Eradicate or control tamarisk within the San Juan Creek drainage. Eradicate or control exotic fish and feral pigs.
California glossy snake (*Arizona elegans occidentalis*)	CSSC	3	3	3	3	3		Open microhabitats within grasslands, coastal scrub, desert scrub, and chaparral; may preferentially occur in sandy soils	Protect large areas of open microhabitat conditions including by controlling exotic plant species in preferred habitat elements.
Birds									
Bald eagle (*Haliaeetus leucocephalus*)	FP	1	1	1			Winter migrant	Large streams, ponds, and reservoirs with fish and open grasslands with ground squirrels.	Maintain areas of open water in larger, permanent ponds. Maintain large open expanses of grasslands to provide for potential food sources.
Burrowing owl (*Athene cunicularia*)	CSSC	4	4	4	4	4	Year-round resident; Carrizo Plain supports one of the largest grassland areas in CA.	Short-statured grasslands (<3" during spring breeding), particularly grazed grasslands with ground squirrel burrows which feature cow dung used by the species	Maintain large contiguous areas of short-statured grassland using grazing and fire Achieve grass height <3" in breeding sites during May-August.

Table 21: Special-status species of the CPER

		Distribution and Relative Abundance within the CPER Units[2]							
Species	Status[1]	A	CN	CS	E	P	Notes	Habitat	Management Needs
California condor (*Gymnogyps californianus*)	FE, SE		1	1			Year-round foraging; potential future breeding	Vast expanses of grassland, shrubland, and savanna with large trees and cliffs for roosting, and cliffs and rock ledges for nesting.	Enforce regulations requiring use of lead-free ammunition by hunters. Maintain populations of ungulates including tule elk, pronghorn, and deer, which provide food. Protect the sandstone cliffs in S. Chimineas, which provide potential nesting habitat.
Golden eagle (*Aquila chrysaetos*)	FP	4	4	4	1	3	Year-round resident; breeds on site	Foothills featuring grassland, open shrublands, and savannas featuring rabbits and rodents for foraging and cliffs and large trees for nesting	Maintain grasslands with ground squirrel populations. Enforce hunting regulations requiring use of lead-free ammunition. Protect nest sites from human disturbance.
Grasshopper sparrow (*Ammodramus savannarum*)	CSSC	5	5	3	1	1	Breeds on site	Large areas of dry grasslands featuring scattered tall forbs, shrubs, and native bunchgrasses	Maintain large areas of tall-structured grasslands by limiting fire and intense grazing by livestock in these areas.
Le Conte's thrasher (*Toxostoma lecontei*)	CSSC	1			3	3	Year-round resident; breeds on site. Carrizo Plain and So. San Joaquin populations are disjunct from others.	Sparsely vegetated desert scrub with scattered shrubs (*Ephedra* spp. and *Atriplex* spp.); often nests in shrubs over washes	Reduce exotic annual plants, which can outcompete native shrubs and promote fire, which kills *Atriplex* spp. Encourage run-off flow downslope from existing *Atriplex* stringers to expand the extent of these important habitat features for this species.
Loggerhead shrike (*Lanius ludovicianus*)	CSSC	5	5	5	5	5	Year-round resident; breeds on site.	Open habitats with scattered shrubs, trees, or structures (e.g., fence posts) for perching while foraging; breeds in dense woody vegetation	Manage fire within the natural range of variation, maintaining large contiguous areas that have not been recently burned to provide for potential nesting sites.
Long-eared owl (*Asio otus*)	CSSC	1	3	3	1	1	Year-round resident and winter migrant; breeds on site.	Nests in dense woodlands including juniper woodland and riparian woodlands; forages over open grasslands and shrublands for voles, deer mice, and kangaroo rats	Prevent fire outside of the natural range of variation in juniper and riparian woodlands. Maintain open grassland habitat within 3 km of nesting sites.

Table 21: Special-status species of the CPER									
		Distribution and Relative Abundance within the CPER Units[2]							
Species	**Status[1]**	**A**	**CN**	**CS**	**E**	**P**	**Notes**	**Habitat**	**Management Needs**
Mountain plover (*Charadrius montanus*)	CSSC		3			4	Overwinters on site	Flat (<20% slope) grasslands nearly devoid of vegetation (height <2.5", cover less than 65%); also, playas and alkali flats	Maintain areas of short herbaceous vegetation in relatively flat grassland habitat, using grazing and fire if needed to ensure wintering habitat is available.
Northern harrier (*Circus cyaneus*)	CSSC	3	3	3		3	Year-round resident; breeds on site.	Forages in open, treeless vegetation including grasslands and wetlands around ponds; nests on the ground within taller grasslands	Maintain large grassland areas, including areas with tall herb cover for nesting.
Olive-sided flycatcher (*Contopus borealis*)	CSSC		1	1			Migration	Dense woodlands, riparian, and ponds adjacent to openings	Promote riparian vegetation development and succession along streams and ponds.
Peregrine falcon (*Falco peregrinus*)	FP		1	1			Winter migrant	Preys on waterfowl and smaller birds.	Maintain open water on larger ponds to promote waterfowl use. Protect perch sites in and adjacent to ponds.
Sandhill crane (*Grus canadensis*)	CSSC	1	1				Winter migrant	Soda Lake shoreline and wetlands including playa, and grasslands	Protect night roosting sites from human disturbance.
Short-eared owl (*Asio flammeus*)	CSSC	3	3	1	1	1	Year-round resident, breeds on site; also, migrants	Tall-statured grasslands, marshes, and sparse desert scrub used for foraging for voles, their primary prey, and breeding	Maintain areas of tall-statured grasslands by limiting cattle grazing and fire.
Swainson's hawk (*Buteo swainsoni*)	CT	1	1	1	0	0	Winter migrant; not yet observed in CPER	Open vegetation including juniper, sagebrush, grasslands, and agricultural fields; roosts in riparian trees.	Maintain groves of tall trees (>40') in or near open foraging habitat, including grasslands.
Tricolored blackbird (*Agelaius tricolor*)	CSSC; CE	1	5	5			Year-round resident; breeds on site	Colonial breeder that nests in emergent freshwater vegetation and thickets along ponds and streams; forages within 3 miles of breeding site in wetlands, riparian scrub, grasslands, and oak savannas and woodlands.	Maintain emergent freshwater vegetation through management of succession along ponds and streams using fire and grazing outside of the nesting season.
Vaux's swift (*Chaetura vauxi*)	CSSC	1	3	1	1	1	Late summer/early fall migrant	Ponds used for foraging for insects during migration	Maintain open water in ponds, especially those ponds adjacent to oak woodlands.

Table 21: Special-status species of the CPER

		Distribution and Relative Abundance within the CPER Units[2]							
Species	**Status[1]**	**A**	**CN**	**CS**	**E**	**P**	**Notes**	**Habitat**	**Management Needs**
Vesper sparrow (*Pooecetes gramineus affinis*)	CSSC	4	4	4	4	4	Winter resident	Forages for seed and insects on the ground in low-growth grasslands and, less often, shrublands and woodlands.	Maintain extent of grassland habitat through fire and grazing. Manage for a diversity of grassland heights, as species preference is currently unknown.
White-tailed kite (*Elanus leucurus*)	FP	1	2	1			Migration	Occasionally uses ponds, wetlands, oak woodlands, and riparian areas during migration	Promote riparian vegetation development and succession along streams and ponds.
Willow flycatcher (*Empidonax traillii*)	SE		3	3			Migration	Willow-dominated riparian woodlands	Promote riparian vegetation development and succession along streams and ponds
Yellow warbler (*Setophaga petechia*)	CSSC	3	3	3			Migrant and summer resident; breeds on site	Riparian vegetation along streams and ponds, particularly woodlands supporting willows and Fremont cottonwood; oak and juniper woodlands occasionally used	Promote riparian vegetation development and succession along streams and ponds. Limit activities that promote brown-headed cowbird populations.
Yellow-headed blackbird (*Xanthocephalus xanthocephalus*)	CSSC	1	1	1			Migration	Ponds and grasslands	Promote freshwater marsh vegetation development and succession along streams and ponds. Maintain/construct deep water ponds with water depths >30 cm.
Mammals									
American badger (*Taxidea taxus*)	CSSC	3	3	3	3	3		Grasslands and desert scrub, also occasionally shrublands and woodlands, featuring ground squirrels, pocket gophers, kangaroo rats, and voles	Maintain open habitats through grazing and managing fire within the natural range of variation. Limit vehicle traffic and speed, particularly at night.
Big free-tailed bat (*Nyctinomops mactrotis*)	CSSC	1	1	1	1	1	Seasonal migrants: only one record for entire Carrizo area	Variety of communities including desert scrub and woodlands in arid regions; roosts on rock crevices, caves, and trees; feed on insects	Protect rock outcroppings and cliffs from human activities. Maintain open water conditions in portions of the ponds to provide water. Conduct surveys before removing or altering infrastructure (e.g., old grain silos, trailers)

Table 21: Special-status species of the CPER

		Distribution and Relative Abundance within the CPER Units[2]							
Species	**Status[1]**	**A**	**CN**	**CS**	**E**	**P**	**Notes**	**Habitat**	**Management Needs**
Fringed myotis (*Myotis thysanodes*)	WBWG-H	1	3	3				Riparian woodlands and other woodlands, also grasslands and desert scrub; roosts in old trees snags, rocks, and cliffs as well as buildings; hibernates in caves and buildings	Promote growth and succession of riparian vegetation Maintain open water conditions in portions of the ponds to provide water. Protect rock outcroppings and cliffs from human activities Conduct surveys before removing or altering infrastructure (e.g., old grain silos, trailers)
Giant kangaroo rat (*Dipodomys ingens*)	FE, SE	4		3	5	5	Endemic to the Southern San Joaquin Valley and Carrizo Plain	Generally flat or gently sloping desert scrub, grasslands, and occasionally juniper woodlands; feeds primarily on seeds, but also green plants and insects; lives in burrows often aggregated in precincts	Manage fire within the natural range of variation Prevent vehicle impacts to precincts along roads Maintain short grassland structure as needed
San Diego desert woodrat (*Neotoma lepida intermedia*)	CSSC		3	3			Classified as *Neotoma bryanti* by Patton et al. (2007)	Coastal scrub and woodlands; nests constructed of sticks	Manage fire within the natural range of variation of frequency.
San Joaquin kit fox (*Vulpes macrotis mutica*)	FE, ST	3	1	1	5	5		Relatively flat desert scrub and grasslands, especially short-statured grasslands including those dominated by red brome or grazed by cattle. Feeds on kangaroo rats, pocket mice, and other rodents; dens in burrows but also culverts.	Manage fire within desert scrub and grasslands within the natural range of variation Maintain large, contiguous areas of open, short-statured grasslands
Hoary bat (*Lasiurus cinereus*)	WBWG-M	0	4	4	0	0		Grasslands, coastal scrub, blue oak woodland, and riparian areas around ponds and streams	Protect and manage areas of preferred habitat.
Long-eared myotis (*Myotis evotis*)	WBWG-M	0	2	2	0	0	Breeding	Grasslands and riparian areas around ponds	Protect and manage areas of preferred habitat.
Pallid bat (*Anrtozous pallidus*)	CSSC	1	3	3	1	1		Grasslands, oak woodlands, and riparian areas, and occasionally shrublands, juniper woodlands, and	Manage portions of the grasslands for shorter/more open structure

Table 21: Special-status species of the CPER

Species	Status[1]	Distribution and Relative Abundance within the CPER Units[2] A	CN	CS	E	P	Notes	Habitat	Management Needs
								ponds; feeds on terrestrial insects; roosts within cliffs, caves, mines, and trees as well as buildings	Promote growth and succession of riparian vegetation Maintain open water conditions in portions of the ponds to provide water. Protect rock outcroppings and cliffs from human activities Conduct surveys before removing or altering infrastructure (e.g., old grain silos, trailers)
Ringtail (*Bassariscus astutus*)	FP	1	3	3			Not yet observed on site	Oak and juniper woodlands and also shrublands; uses rock crevices, logs, snags, woodrat nests, and other cavities for cover	Manage fire within the natural range of variation
San Joaquin antelope squirrel (*Ammospermophilus nelsoni*)	ST	3			5	5	Endemic to the So. San Joaquin Valley and Carrizo Plain	Desert scrub and adjacent sparse, short-structured, often forb-dominated grasslands; feeds on insects and vegetation including *Ephedra* seeds	Manage fire in desert scrub within the natural range of variation Reduce abundance of exotic annual plants within desert scrub and grasslands
Short-nosed kangaroo rat (*Dipodomys nitratoides*)	CSSC	1	1	1	3	3		Generally flat or gently sloping desert scrub and arid grasslands on friable, often sandy soils	Manage fire in desert scrub within the natural range of variation. Reduce abundance of exotic annual species within desert scrub and grasslands to enhance native plant diversity.
Spotted bat (*Euderma maculatum*)	CSSC		1	1				High cliff faces in a variety of habitats. Forages over water; moth specialist	Maintain open water conditions in portions of the ponds to provide water. Protect rock outcroppings and cliffs from human activities.
Tulare grasshopper mouse (*Onychomys torridus tularensis*)	CSSC	3	3	3	3	3		Arid grasslands, juniper woodlands, coastal scrub, and desert scrub; feeds on insects	Manage fire within the natural range of variation. Reduce abundance of exotic annual plants.
Townsend's big-eared bat (*Plecotus towsendii*)	CSSC; CE	1	3	3				Oak and riparian woodlands, also grasslands and coastal scrub; roosts in caves and mines, though also tree cavities and buildings; moth specialists	Promote growth and succession of riparian vegetation. Maintain open water conditions in portions of the ponds to provide water. Protect rock outcroppings and cliffs from human activities. Conduct surveys before

Table 21: Special-status species of the CPER

		Distribution and Relative Abundance within the CPER Units[2]							
Species	**Status[1]**	**A**	**CN**	**CS**	**E**	**P**	**Notes**	**Habitat**	**Management Needs**
									removing or altering infrastructure (e.g., old grain silos, trailers).
Western mastiff bat (*Eumops perotis californicus*)	CSSC	1	3	3	1	1		Various habitats including oak woodlands, chaparral, and desert scrub, especially areas with cliffs and significant rock features; primarily feeds on moths	Maintain open water conditions (≥ 100 feet) in ponds to provide water. Protect rock outcroppings and cliffs from human activities.
Western red bat (*Lasiurus blossevillii*)	CSSC	1	3	3				Riparian areas and ponds, forages broadly; roosts in caves and woody plants	Promote growth and succession of riparian vegetation. Maintain open water conditions in portions of the ponds to provide water. Protect rock outcroppings and cliffs from human activities.

[1] California Rare Plant Rank Designations:

List 1A = Plants presumed extinct in California

List 1B = Most plants in this category are endemic to California and have experienced significant declines over several decades; these plants are rare, threatened, or endangered throughout California and elsewhere.

List 2 = Species that are common outside of California, but rare, threatened, or endangered within California

List 3 = A review list of species for which necessary information is not available to either categorize in one of the other rankings or to reject outright.

List 4 = "Watch List" plants with limited distribution or infrequent presence throughout California. Populations of these species may exist along the perimeter of the species' range, may have declined significantly in specific locations within its range, may exhibit unique morphology, or occur on uncommon substrates.

Decimals after any of the "Status" categories represent a "Threat Rank" (e.g., "List 1B.1"):

0.1 = Seriously threatened populations in California, where over 80% of occurrences are threatened
0.2 = Marginally threatened populations in California, where between 20% and 80% of occurrences are threatened
0.3 = Populations with limited threats, where fewer than 20% of occurrences are threatened or with no known current threats

Federal Status Designations:

FE = Federally Endangered. Species in danger of extinction throughout all or significant portions of its range.
FT = Federally Threatened. Species likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

State Status Designations:

CSSC = California Species of Special Concern. Animal species with California breeding populations that may face extinction in the near future.
FP = Fully protected by the State of California under Sections 3511 and 4700 of the Fish and Game Code.
SE = State Endangered. Species whose continued existence in California is jeopardized.

ST = State Threatened. Species, although not presently threatened with extinction, may become endangered in the foreseeable future.
CE = Species is a candidate for listing under the California Endangered Species Act
WBWG = Western Bat Working Group
LM = Low-Medium Priority
M = Medium Priority
MH = Medium-High Priority
H = High Priority

[2] CPER Units
A=American Unit
CN=North Chimineas Unit
CS= South Chimineas Unit
E= Elkhorn Unit
P= Panorama Unit

Relative abundance:
5 = Nearly always occurs in appropriate habitats in moderate to large numbers
4 = Usually occurs in appropriate habitats in small numbers
3 = Expected in appropriate habitats, but in very small numbers
2 = Occasional and/or patchy presence
1 = Rare, often with one or two occurrences
0 = Not present (or not expected to be present)
U = Unknown or insufficient data
N/A = Not applicable

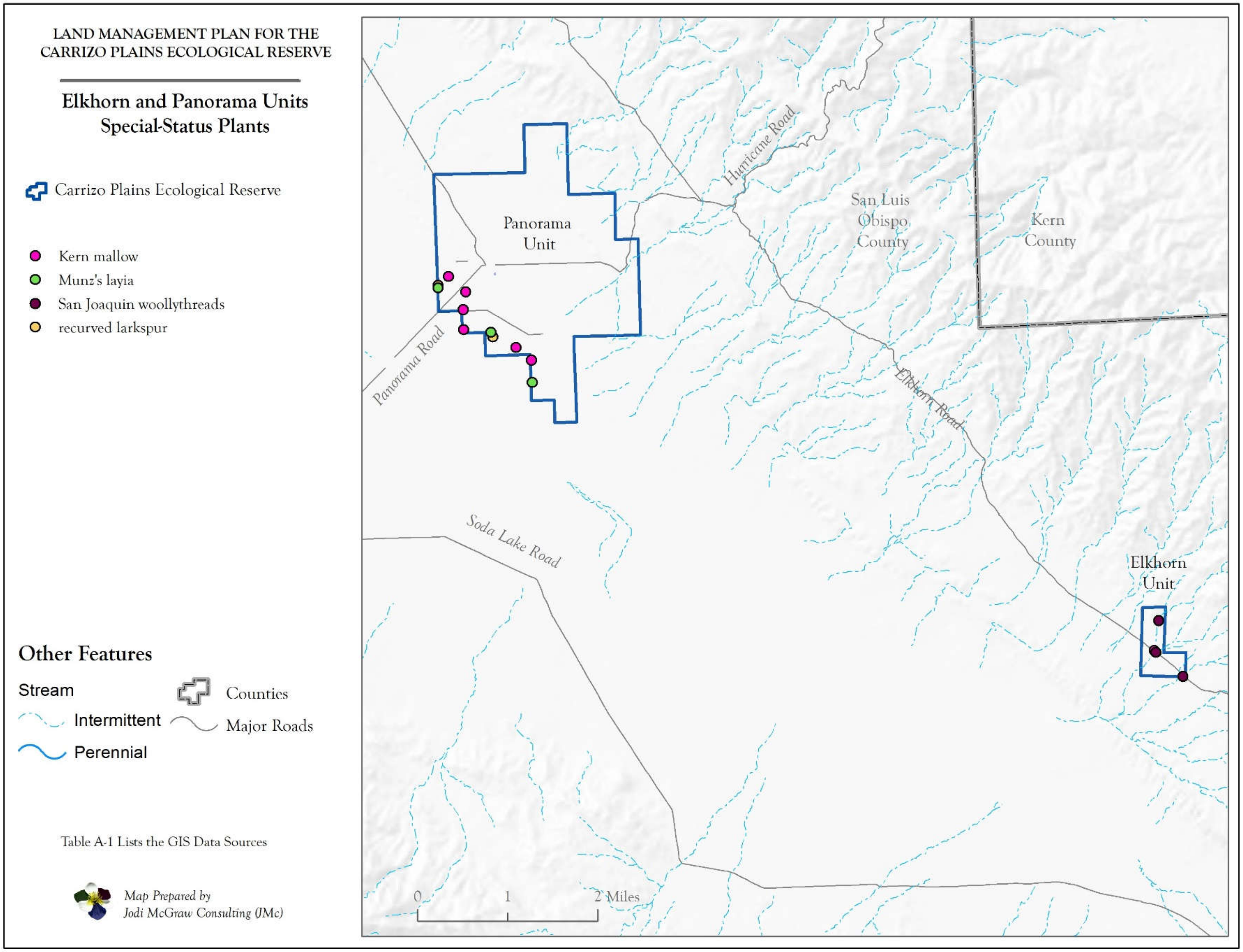


Figure 20: Special-status plant observations within the Elkhorn and Panorama units

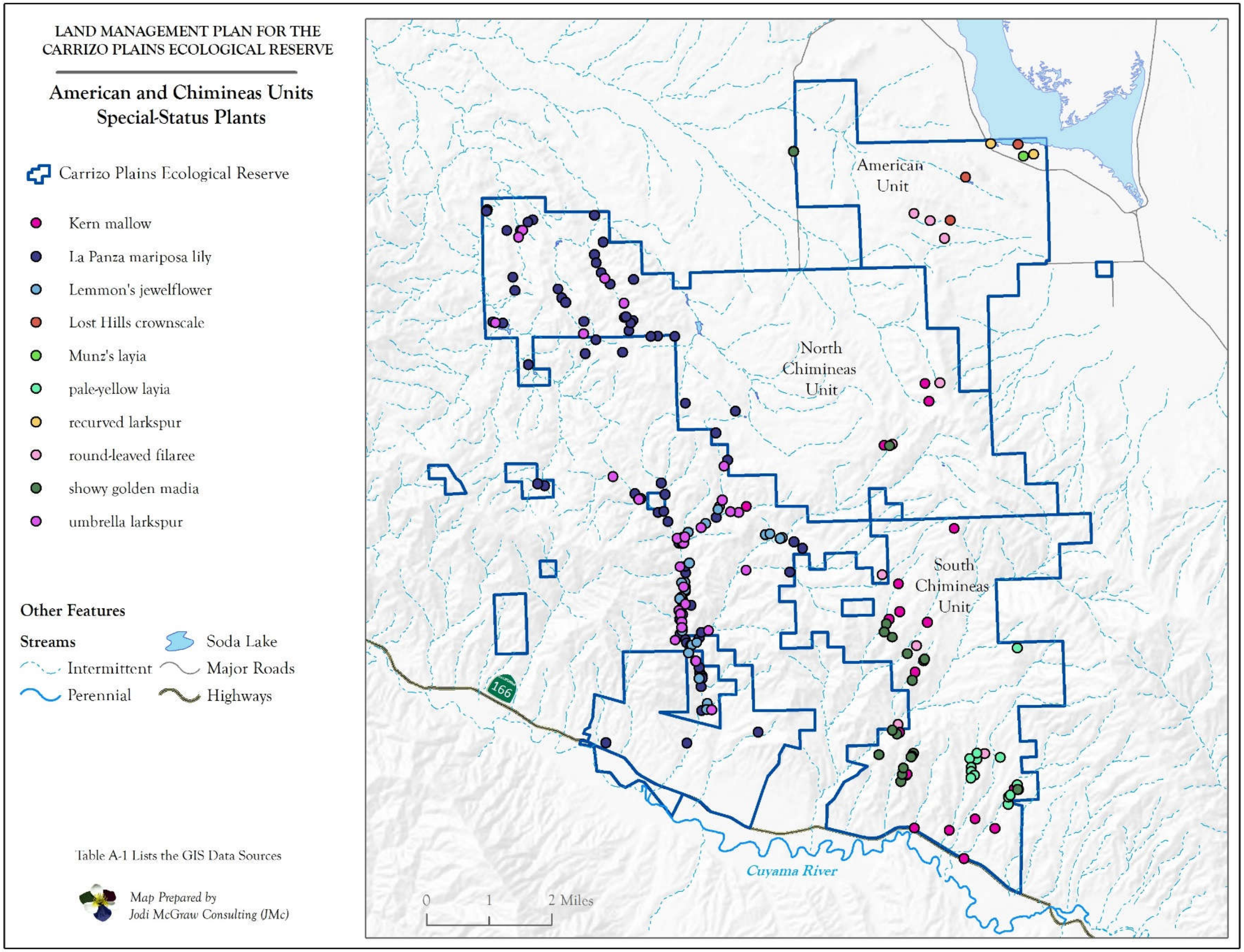


Figure 21: Special-status plant observations within the American and Chimineas units

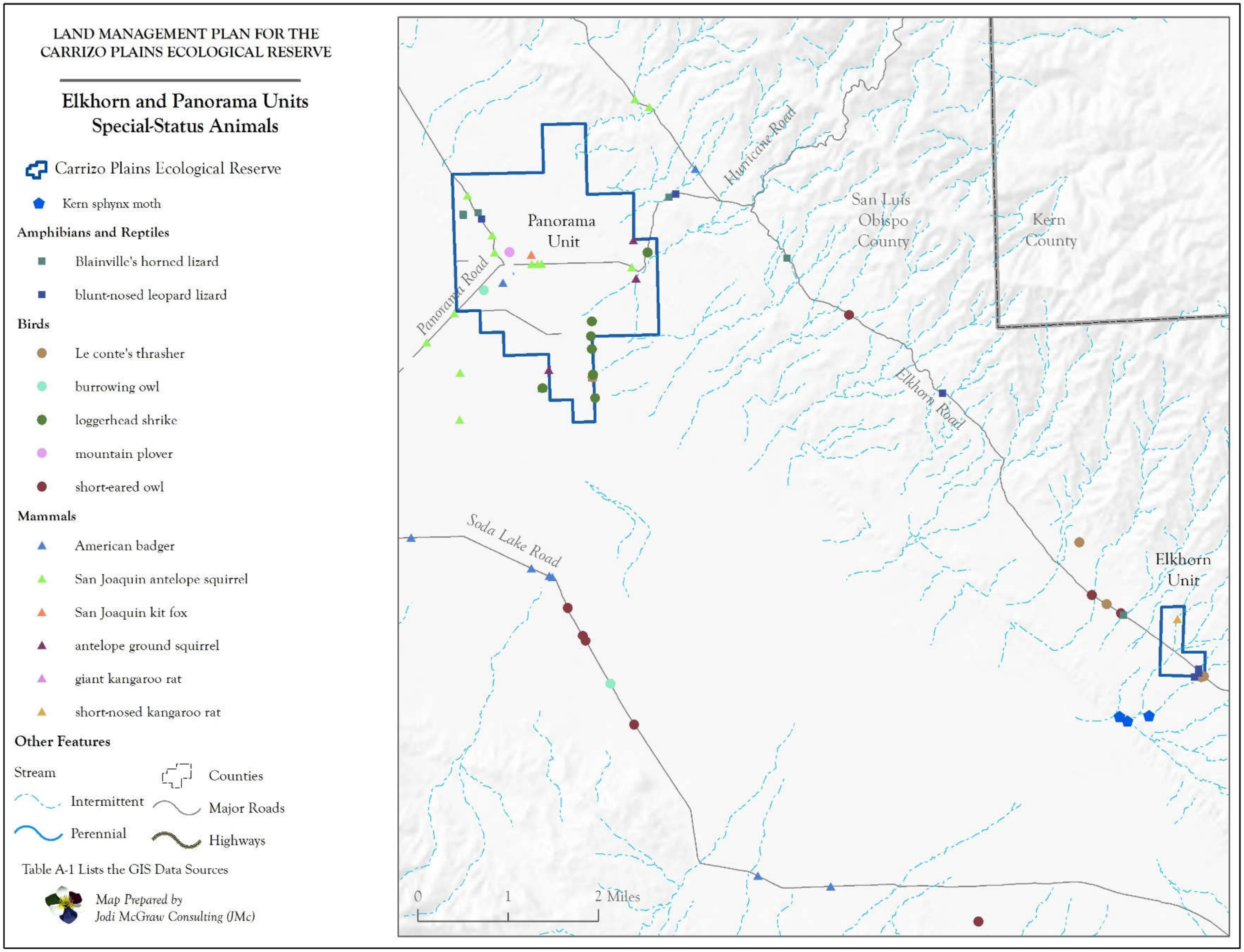


Figure 22: Special-status animal observations within the Elkhorn and Panorama units

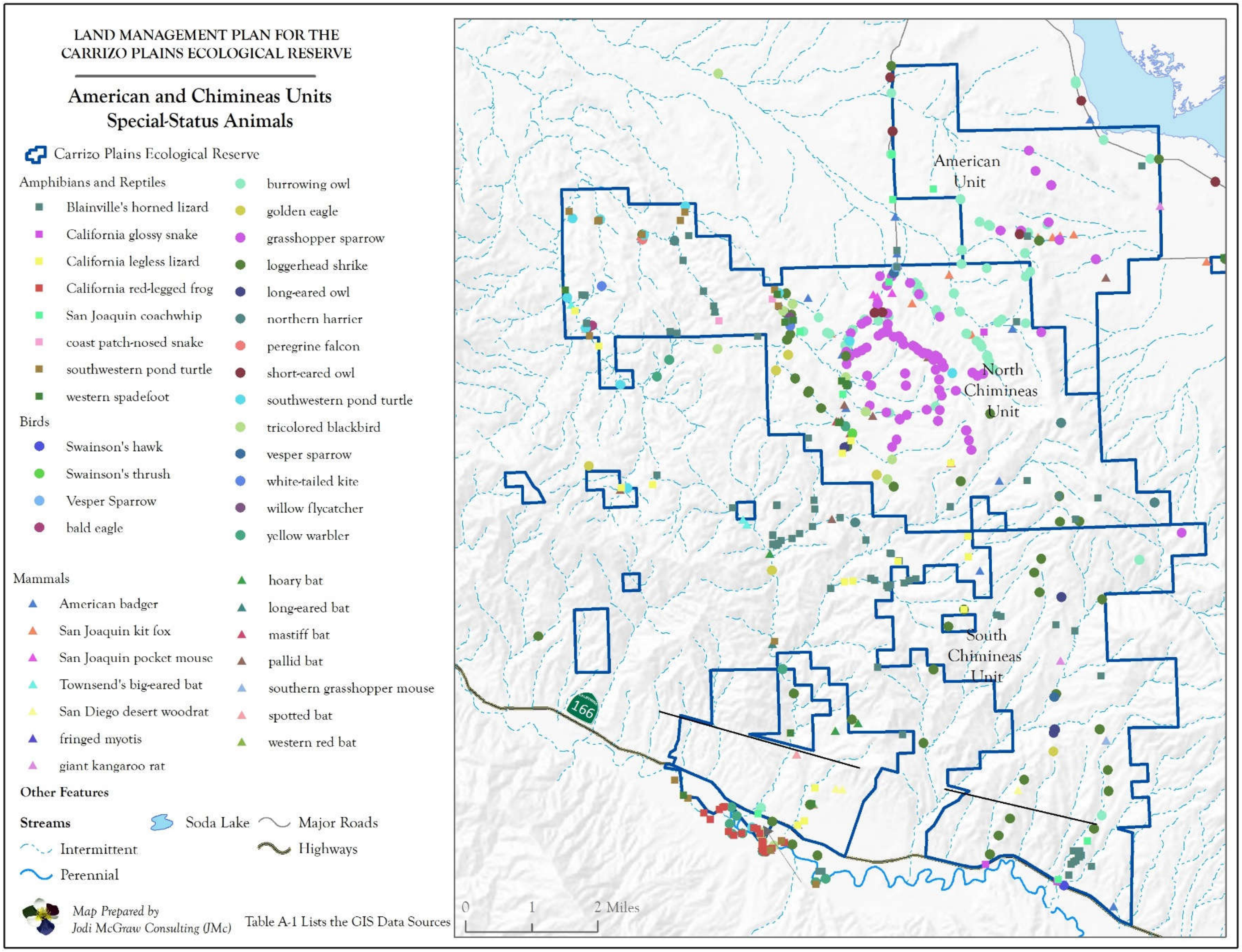


Figure 23: Special-status animal observations within the American and Chimineas units

3.4 Native Ungulates

The CPER supports three native big game species that are actively managed by the Department: tule elk, pronghorn, and mule deer. The Department works collaboratively with various organizations including the California Deer Association and Rocky Mountain Elk Foundation, to develop habitat management and enhancement projects for these species. The following sections describe their ecology and management within the CPER as part of the Department's broader programs.

3.4.1 Tule Elk

The tule elk (*Cervus elaphus nannodes*) is a large ungulate in the Cervidae that is endemic to California, where it historically occupied central California, including the Central Valley and San Francisco Bay Area (McCullough 1969). It is a genetically distinct subspecies that was geographically isolated from its conspecifics: the Rocky Mountain elk (*C. e. nelsoni*), which primarily occupies the intermountain west and occurs in northeastern California, and the Roosevelt elk (*C. e. roosevelti*), which inhabits the Coast Range Mountains north of the San Francisco Bay Area.

Originally thought to number half a million individuals throughout Central California, tule elk were hunted to near extinction in the late 1800s, with fewer than five individuals remaining in the 1870s. An active conservation and recovery program has increased tule elk numbers in California to over 4,000 individuals in 22 populations scattered throughout its original range, as well as areas outside its original distribution, such as Owens Lake (J. Hobbs pers. comm. 2016). Many tule elk herds are small and isolated, and managed for levels below their carrying capacity to limit their negative impacts on private land, particularly agricultural lands (J. Hobbs, pers. comm. 2016.

Approximately 300 tule elk currently utilize habitat within the Chimineas and American units of the CPER (R. Stafford, unpublished data; Figure 24). Aerial surveys and global positioning system (GPS) collars used to track tule elk in the region since 1999 suggest that the Carrizo population occurs as two subherds: one in the South Chimineas Unit and the other in the North Chimineas Unit, American Unit, and adjacent ranch to the north and west. Though separated by woodlands and dense shrublands on the northwest tip of the Caliente Mountains, the two subherds are not isolated; radio telemetry data reveals that males occasionally move between the two subherds (Stafford and Hobbs 2013).

Tule Elk Utilizing a Department-Created Water Source (Photograph by Craig Fiehler)

Tule elk within the CPER preferentially occupy the Reserve's grasslands, though they occasionally also utilize the adjacent desert scrub, coastal scrub, and oak woodland and juniper woodland, particularly in the South Chimineas Unit where the vegetation occurs as a mosaic. Within the North Chimineas Unit, tule elk exhibit a strong preference for the taller structured grasslands located within the management units that were placed into Conservation Reserve Program (CRP) by the prior landowner in the late 1980s and have remained largely ungrazed by cattle since that time (Section 2.5.3.4). Tule elk utilize much of the grassland habitat within the American Unit, which has not been grazed since being incorporated into the Reserve (Section 2.5.3.3).

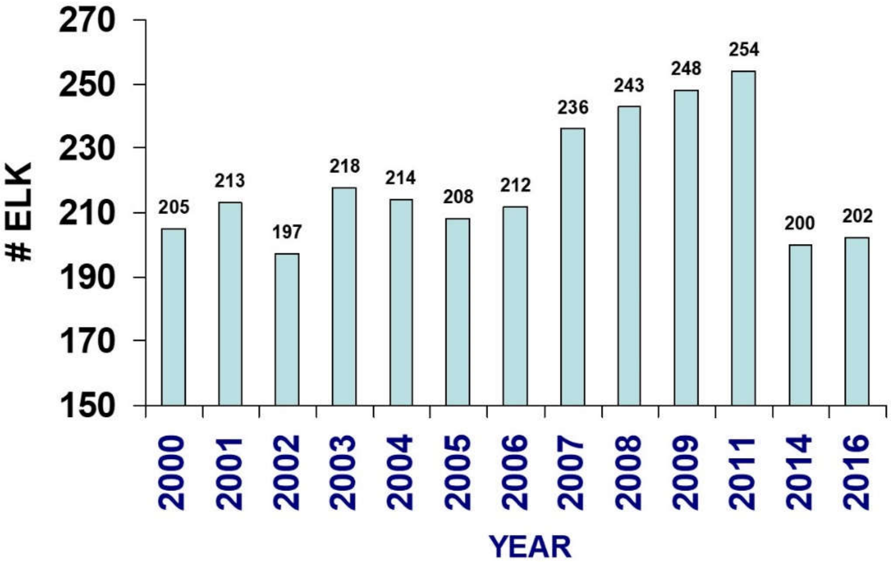


Figure 24: Tule elk population over time

In general, tule elk are grazers, feeding on grasses and forbs, but they will also eat soft twigs and leaves. Tule elk require open water within an estimated two miles (Ahlborn 2005a). In the CPER, they use ponds and troughs, as well as springs.

Tule elk are primarily crepuscular and nocturnal, though some diurnal activity is observed. In the CPER, tule elk are non-migratory, but may exhibit seasonal movement. The average home range for 11 females tracked using telemetry was 20,858 acres (Std. Dev=8,876). The average home range for the four males tracked was 51,682 acres (Std. Dev.=25,348), with the two-spike elk having much larger ranges (mean=71,839 acres; Std. Dev.=8,374) than adult males (mean=31,524 acres; Std. Dev.-15,238; Stafford and Hobbs 2013).

Tule elk breed between August and November, when bulls bugle to call in females, and form harems of five to 20 females each. Tule elk gestation is estimated to require 255 days, such that calving occurs in May and June when usually a single calf is born, though occasionally twins and even triplets occur. Calving occurs in secluded areas with good cover that are near water. A study in the Cache Creek area of Northern California found that maximum grass/forb height distinguished calving areas from other areas tule elk used in spring; calving occurring in areas of 1 m height on average (O'Connor 1988).

Tule elk predators include humans, mountain lions (*Puma concolor*), and coyotes. Mountain lion predation is thought to be infrequent due to the open nature of elk habitat, while coyote likely only take immature elk.

Tule elk can leap or duck fences, and may go straight through them when alarmed (McCullough 1969). Telemetry data from the Carrizo Plain region suggest tule elk movement is constrained by paved roads, with tule elk only infrequently crossing Soda Lake Road and Highway 166 (Stafford and Hobbs 2013). As a game species, tule elk are hunted within the CPER. In 2010, the Department permitted take of six tule elk within the Chimineas units by hunters (Section 2.8.3.1.3).

Perhaps due in part to the genetic bottleneck experienced during its near extinction (McCullough et al. 1996), tule elk populations are known to host several diseases that affect individual health and may influence population growth, including: anthrax, bluetongue, paratuberculosis, necrobacillosis, and cyclophyllidean tapeworms (Ahlborn 2005a). Tule elk that are part of the telemetry study are routinely screened for these and other diseases, none of which are currently known to occur within the CPER (R. Stafford pers. comm. 2010). To enhance genetic diversity, the Department occasionally moves tule elk from other subherds in the state into the Chimineas subherds.

Due to their relatively large size and occurrence within an expansive area of public land, the Chimineas subherds will play an important role in conservation of the species, as will be outlined in an upcoming elk management plan being developed by the California Department of Fish and Wildlife (R. Stafford, pers. comm. 2018). Research using radio-collared elk is currently being conducted to understand aspects of the species ecology, including habitat use and carrying capacity. At present, the Department believes that the tule elk herds in the Carrizo region can be increased to 500 individuals. Between 2001 and 2011, the Carrizo heard increased by 25%. Herd numbers remained stable during the drought of 2012-2015.

3.4.2 Pronghorn

Pronghorn in the CPER
(Photograph by Bob Stafford)

The only member of the Antilocapridae, a family of artiodactyls endemic to North America, pronghorn (*Antilocapra americana*) are a small (70-130 lb.) ruminant mammal that is widely distributed in southern Canada, northern Mexico, and the western United States. Their resemblance to Old World antelope results in them commonly being referred to as “pronghorn antelope”.

Pronghorn historically occupied the grasslands within the valleys and plains throughout California, though they were extirpated throughout much of this range due to over-hunting and grassland conversion to agriculture and urban development (Yoakum 2004a). Their current California distribution is restricted to the northeast portion of the state except for several isolated populations in central and southern California, all of which have been re-established by the Department.
The Carrizo Plain population of pronghorn was re-established through translocation of a total of 240 individuals from northeastern California between 1987 and 1990 (Koch and Yoakum 2002, Sommer 2012). The population declined to an average of 150 individuals by 1995 and by 2001, only 68 individuals were observed in and around the CPER. In 2016, only 25 pronghorn were detected (R. Stafford, unpublished data).

Pronghorn occur primarily in grasslands and open shrublands where good horizontal visibility, gentle slopes, and few movement obstacles allow them to detect and escape predators. Typical habitat includes sparse shrubs and/or rolling terrain used to escape weather and conceal fawns. In general, preferred habitat features vegetation 15 inches in height on slopes of less than 20% (Yoakum 2004b).

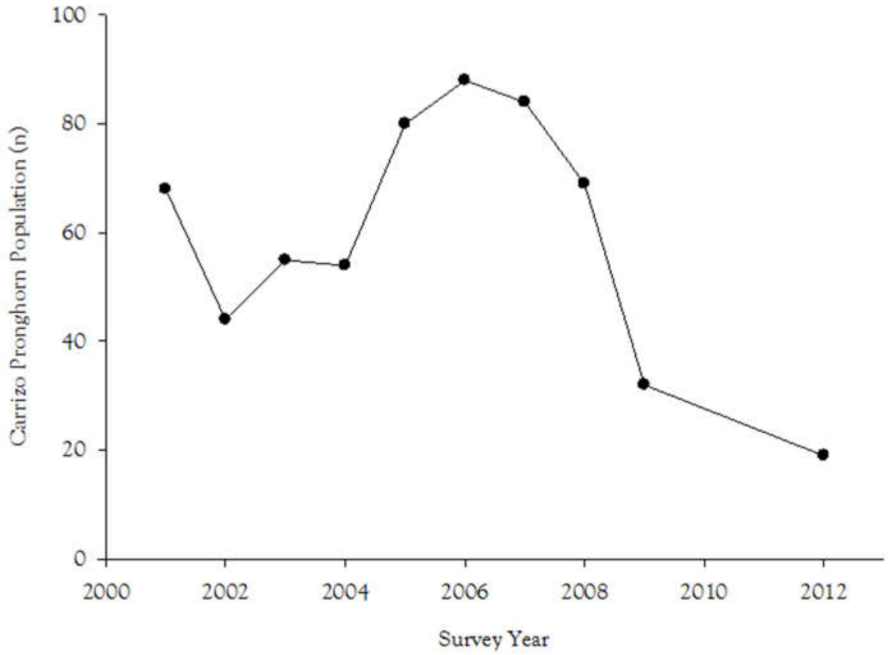


Figure 25: Carrizo Plain pronghorn population

Pronghorn feed primarily on forbs and shrubs and to a lesser extent grass; high concentrations of grass in the diet is thought to reflect poor habitat due to scarcity of forbs (Mitchell 1980). Free water (e.g., ponds and creeks) are likely required within their home ranges, which varies greatly depending on habitat quality and may be up to 50 square miles (Yoakum 2004b).

Born in spring (April-May), pronghorn fawns are subject to high rates of predation by coyote, bobcat, golden eagle, and perhaps other predators. The Carrizo Plain population is thought to be limited by recruitment, which may reflect both high rates of fawn predation as well as low quantity and quality of forage and poor cover at fawn bed sites (Johnson et al. 2015).

Fences can impede movement by pronghorn, which will rarely jump them and instead crawl underneath or find openings (Byers 1997). As a result, fences trap pronghorn during flight from predators, and thus increase rates of predation.

Small numbers of pronghorn were hunted within the Carrizo Plain region until 2002, when the population density was determined insufficient to support ongoing harvest. Studies are being conducted to understand the factors that limit the population within the region, including the role of recruitment (Johnson et al. 2015). The Department’s goal for pronghorn within the approximately 30,000-acre area currently occupied within the Carrizo Plain region is 150 individuals (R. Stafford, unpublished data).

To promote the population, fences were removed or retrofitted within both the CPNM and CPER to facilitate pronghorn movement. As of 2013, over 200 miles of fences had been removed or modified throughout the northern portions of the Carrizo including all of the highest quality pronghorn habitat (Longshore and Lowrey 2008).

Vegetation management has also been used within the CPNM to promote pronghorn. To provide for fawning cover in pronghorn fawning and high use areas, livestock grazing has been restricted to years when annual vegetation was greater than 25 inches in height; vegetation has not reached this height since 2003 and therefore these areas have not been grazed by livestock since that time. Planting native shrubs to restore desert scrub where shrubs have been removed can similarly provide cover (Johnson et al. 2015).

Water also appears to be a limiting factor for pronghorn fawning and survival. In arid ranges like the Carrizo region, availability and dispersion of open water sources can directly affect adult health and reproduction, as well as fawn productivity and survival (Johnson et al. 2015). Increasing water availability could promote pronghorn populations.

Pronghorn populations initially responded to these measures and the population increased to a total of 88 animals by 2006. However, numbers began declining precipitously in 2008 and have not recovered (Figure 25). The exact causes for the decline are not known but the severe droughts between 2007 and 2015 have led to very little fawn production. Current hypotheses on the causes of the declines include: small population sizes leading to reduced individual fitness (Allee effect), the lack of high quality habitat in the Carrizo Plain region, the lack of nutritious fall forage, and the lack of a predator swamping as a result of few fawns being born each year (Johnson et al. 2015).

Within the Carrizo Plain region, pronghorn occur within grasslands of the plain and adjacent foothills. They have been observed primarily within the American Unit, though are occasionally observed in the Chimineas and Panorama units. They may also infrequently utilize the Elkhorn Unit (R. Stafford unpublished data, Johnson et al. 2015).

3.4.3 Mule Deer

Mule deer (*Odocoileus hemionus*) are commonly found in a diversity of habitats throughout California, including woodlands and grasslands. Within the CPER region, two subspecies of mule deer, the black-tailed deer (*O. h. columbianus*) and California mule deer (*O. h. californicus*), occur and may intergrade (Ingles 1965).

Mule deer prefer a mosaic of vegetation conditions, including woodlands, riparian areas, and open, herb-dominated areas, with dense shrubs essential for escape cover and appropriate bedding habitat. Both browsers and grazers, mule deer preferentially feed on the new shoots of shrubs and trees, especially during winter and summer, and graze herbaceous plants, particularly during the spring. In chaparral, where shrub canopies can reduce the cover of preferred herbaceous forage, canopy cover of less than 40% is recommended (Sommer et al. 2007). In oak savannas and woodlands, mule deer feed heavily on acorns during the autumn.

Mule Deer in the North Chimineas Unit
(Photograph by Jodi McGraw)

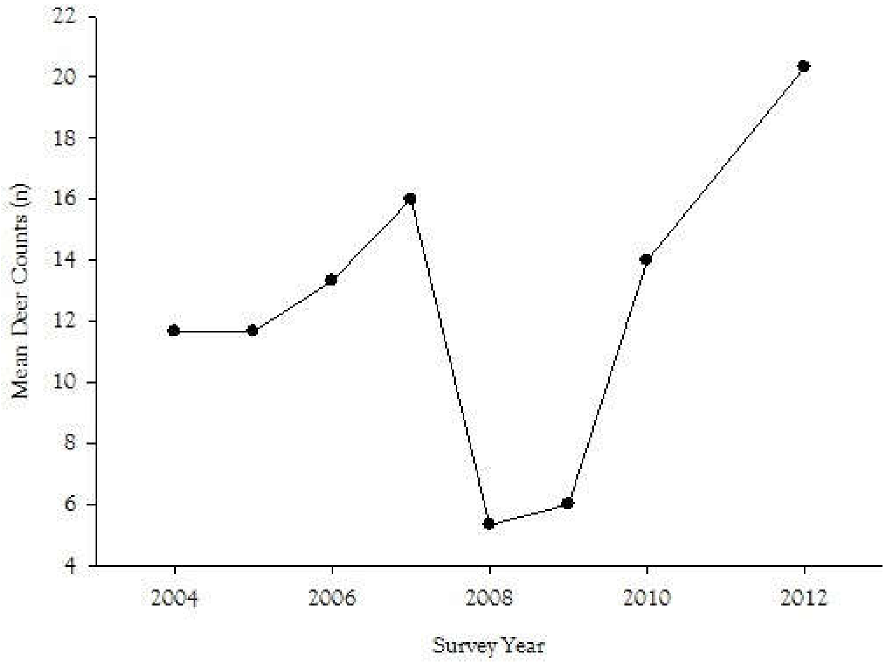


Figure 26: Mule deer survey counts

Mule deer drink free water, and require an estimated three quarts per day for every 100 lbs. of body weight. Water sources spaced at one-mile distance within suitable habitat have been recommended for supporting populations (Sommer et al 2007.)

Mule deer fawn between April and July in areas with abundant forage and available water. Fawns as well as adults are predated by mountain lions, bobcats, and coyotes (Ahlborn 2005b).

Within the CPER, mule deer occur within the Chimineas and American units, though are most abundant within the northwestern portion of the North Chimineas Unit, which features extensive oak woodland habitat. Mule deer also utilize the grasslands, oak savannas, and woodlands in the South Chimineas Unit, and occur within the grasslands of the American Unit, albeit at lower abundance (Appendix D).

A game species, mule deer are hunted within the CPER and the broader region (Section 2.8.3.1.2). Department biologists monitor their populations to inform mule deer management in the region (Section D.2.3, Figure 26).

3.5 Exotic Species

The CPER supports populations of plants and animals that are not native to California and instead have been introduced from other regions of the world. Some introductions have been deliberate, as in the case of wild turkey (*Maleagris gallopavo*) and chukar (*Alectoris chukar*), which are game species, or purple vetch (*Vicia benghalensis*), which was seeded to enhance forage for cattle and mule deer. However, in most cases, exotic species were introduced accidentally as part of other human activities, with many arriving with the European settlers in the 17th century.

Through a variety of direct and indirect mechanisms, non-native species can greatly impact the species and communities. Species impacts are determined by complex interactions between aspects of their ecology as well as that of the invaded community. Exotic plants reduce the ability of habitat to support populations of native plants directly, through competition (Carlsen et al. 2000, McGraw 2004), and indirectly, by altering habitat conditions so that they are no longer suitable (D'Antonio and Vitousek 1992, Levine et al. 2003). Exotic plants can also degrade habitat for native animals. Exotic animal species may compete with, and predate upon, rare native animals, and can consume and degrade habitat for native plants.

Exotic species that spread rapidly and exert strong effects on native species, communities, and ecosystems are often referred to as 'invasive species'. These species are a major threat to the persistence of endangered species (Wilcove et al. 1998), including many of those in the CPER (USFWS 1998, USFWS 2002).

The following sections describe the invasive plant species and exotic animals of the CPER, and describe their known or predicted effects on the native species and communities within the Reserve. Appendix C lists all known exotic plants species within the CPER, while Appendix D lists the non-native animals. Section 4.4.3 provides information about exotic plant and animal species control techniques.

3.5.1 Exotic Plants

Of the Reserve's 526 known plant species, 77 species (15%) are not native to California (Appendix C). Woody species are limited to just six trees: elm (*Ulmus* sp.), olive (*Olea europaea*), tree of heaven (*Ailanthus altissima*), tree tobacco (*Nicotiana glauca*), and two species of *Tamarisk (*Table 23). The vast majority of the exotic plants (73 or 95%) are herbaceous species, many of which originated in other regions of the world that also feature a Mediterranean climate, and thus were 'pre-adapted' to California (Jackson 1985). Moreover, their predominantly annual life history allows them to persist during the seasonal drought and high summer temperatures that might otherwise preclude invasion of the Carrizo Plain region.

Yellow Star Thistle and Bull Thistle near Quarry Pond in the North Chimineas Unit (Photograph by Jodi McGraw)

3.5.1.1 Invasive Plant Species

Thirty-two (42%) of the non-native plants within the Reserve are included within California Invasive Plant Council (CalIPC) list of invasive, non-native plants that threaten wildlands (CalIPC 2010; Table 23). These species have been documented to negatively impact natural systems by displacing native species, hybridizing with native species, altering biological communities, or altering ecosystem processes (CalIPC 2010).

Grasses are the dominant form of invasive plant, both in terms of species richness (11 species or 34% of the invasive species) and also absolute cover. The most widespread and abundant invasive grass by far is red brome, though other invasive grasses are also abundant including wild oats (*Avena fatua* and *A. barbata*), soft chess, ripgut brome, and rattail fescue (Table 23).

The CPER also supports numerous invasive broad-leaved herbs (forbs), the most widespread and abundant of which are redstem filaree, summer mustard, tocalote (*Centaurea melitensis*) and tumbleweed (*Salsola tragus).*

3.5.1.2 Invasive Species Distributions

Grasslands are the most invaded vegetation type within the CPER; they feature the highest number of invasive species (21 or 66% of total) and the highest total species relative abundance (i.e., the sum of all species' relative abundance scores; Table 23). This pattern likely reflects the impacts of historic farming, as well as perhaps livestock grazing, which may have promoted the invasion and spread of non-native species (Section 2.5). Even uncultivated grasslands are dominated by exotic plants, however, as they feature high-light conditions that are required by many of the most successful and abundant invaders, including the grasses and many ruderal species adapted to colonizing disturbed areas.

In the shrublands and woodlands, non-native species are most abundant within areas featuring open canopy conditions, which afford greater light availability. In some areas, abiotic conditions, such as thin soils or south-facing slopes, limit woody plant density and maintain open conditions. This is observed in the oak savannas, juniper woodlands, and coastal scrub, where the scattered shrubs and trees occur within a matrix of non-native herbs.

Fires, landslides, and other disturbances, can also promote exotic plants by removing the woody plant canopy and temporarily creating open conditions required by many invasive species. This is observed within the recently burned areas located in the coastal scrub, desert scrub, and juniper woodland within the South Chimineas Unit, which has burned most frequently (Section 2.4.6). Small-scale disturbances including those caused by giant kangaroo rats and perhaps other mammals can similarly promote the establishment and growth of exotic plants (Hobbs and Huenneke 1992, Schiffman 2007, Prugh and Brasheres 2012), though in highly invaded areas, such disturbances can also create opportunities for disturbance-adapted native plants to establish (McGraw 2004).

Dense Exotic Annual Grasses within the Desert Scrub Along Highway 166 in the South Chimineas Unit (Photograph by Jodi McGraw)

Owing to the increased availability of water, which restricts the distribution of many exotic plants, riparian areas within the Reserve also support high concentrations of non-native plants. Though they cover just 0.7 percent of the Reserve's total area, riparian areas support 63% of the invasive plants known from the Reserve (Table 23). Several species, including tamarisk (*Tamarix* spp.), curly doc (*Rumex crispus*), and bull thistle are restricted to riparian areas and/or the ponds (Table 23).

Invasive species also occur in higher concentrations within areas of historic or current anthropogenic activity or disturbance. These include roadsides, where recurring soil disturbance maintains opportunities for disturbance-adapted ruderal species such as tocalote.

Table 22: Relative abundance of invasive species within the habitats and units of the CPER

				Relative Abundance Rating[2]												
				Vegetation Types								CPER Units				
Scientific Name	**Common Name**	**Life Form**	**CalIPC Rank[1]**	**Grassland**	**Oak woodland**	**Juniper woodland**	**Coastal Scrub**	**Chaparral**	**Desert Scrub**	**Riparian**	**Pond**	**American**	**N. Chimineas**	**S. Chimineas**	**Elkhorn**	**Panorama**
Ailanthus altissima	tree of heaven	tree	Moderate	0	0	0	0	0	0	0	0	0	1	0	0	0
Avena barbata	slender wild oat	annual grass	Moderate	5	0	1	5	1	1	1	0	5	5	5	0	0
Avena fatua	wild oat	annual grass	Moderate	5	1	0	5	0	1	1	0	5	5	5	0	0
Bromus diandrus	ripgut brome	annual grass	Moderate	5	5	2	2	0	0	4	0	4	5	5	1	0
Bromus hordeaceus	soft chess	annual grass	Limited	5	5	5	5	5	2	5	0	5	5	5	0	0
Bromus madritensis ssp. rubens	red brome	annual grass	High	5	5	5	5	5	5	5	0	5	5	5	2	5
Bromus tectorum	cheatgrass	annual grass	High	2	4	0	0	0	0	0	0	2	4	2	0	0
Centaurea melitensis	tocalote	annual forb	Moderate	5	4	5	5	4	4	4	0	5	5	5	1	0
Centaurea solstitialis	yellow star-thistle	annual forb	High	2	0	0	0	0	0	0	0	1	2	2	0	0
Cirsium vulgare	bull thistle	perennial forb	Moderate	0	0	0	0	0	0	2	2	0	2	1	0	0
Cotula coronopifolia	brass buttons	perennial forb	Limited	0	0	0	0	0	0	1	0	0	0	1	0	0
Descurainia sophia	flixweed	annual forb	Limited	1	0	1	1	0	0	0	0	4	0	2	0	0
Erodium cicutarium	redstem filaree	annual forb	Limited	5	5	5	5	5	5	5	0	5	5	5	4	5
Hirschfeldia incana	winter mustard	perennial forb	Moderate	5	4	4	4	0	0	1	0	5	5	5	0	0
Hordeum murinum	foxtail	annual grass	Moderate	5	5	0	2	0	5	4	0	2	5	5	2	4
Marrubium vulgare	horehound	perennial forb	Limited	2	2	2	2	2	2	2	0	2	2	4	0	0
Medicago polymorpha	burclover	annual forb	Limited	5	0	0	2	0	0	4	0	2	5	5	0	0
Nicotiana glauca	tree tobacco	tree	Moderate	0	0	0	0	0	0	0	0	0	0	1	0	0
Olea europaea	olive	tree	Limited	0	0	0	0	0	0	0	0	1	0	0	0	0
Plantago lanceolata	narrow leaf plantain	perennial forb	Limited	0	0	0	0	0	0	0	0	0	0	1	0	0
Polypogon monspeliensis	annual beard grass	annual grass	Limited	0	0	0	0	0	0	5	5	2	5	5	0	0
Robinia pseudoacacia	black locust	tree	Limited	0	0	0	0	0	0	0	0	1	1	0	0	0
Rumex crispus	curly dock	perennial forb	Limited	0	0	0	0	0	0	4	0	0	4	0	0	0

Table 22: Relative abundance of invasive species within the habitats and units of the CPER

				Relative Abundance Rating[2]												
				Vegetation Types								CPER Units				
Scientific Name	Common Name	Life Form	CalIPC Rank[1]	Grassland	Oak woodland	Juniper woodland	Coastal Scrub	Chaparral	Desert Scrub	Riparian	Pond	American	N. Chimineas	S. Chimineas	Elkhorn	Panorama
Salsola tragus	tumbleweed	annual forb	Limited	5	2	2	2	0	2	0	0	4	5	5	0	5
Schismus arabicus	Arabian schismus	annual grass	Limited	5	0	2	4	0	2	1	0	0	2	5	2	5
Schismus barbatus	Mediterranean grass	annual grass	Limited	2	0	0	1	1	1	0	0	2	1	2	0	4
Sinapis arvensis	charlock mustard	annual forb	Limited	5	0	0	0	0	0	1	0	5	5	1	0	0
Sisymbrium irio	London rocket	annual forb	Moderate	0	0	0	0	0	0	1	0	1	0	1	0	1
Tamarix aphylla	athel	tree	Limited	1	0	0	0	0	0	0	0	1	0	0	0	0
Tamarix ramosissima	tamarisk or salt cedar	shrub/tree	High	0	0	0	0	0	0	5	2	0	1	5	0	0
Trifolium hirtum	rose clover	annual forb	Moderate	2	0	0	0	0	0	0	0	0	2	0	0	0
Festuca myuros	rattail fescue	annual grass	Moderate	5	5	5	5	2	0	5	0	5	5	5	0	0
		Total Species Richness		21	12	12	16	8	11	20	3	23	25	26	6	7
		Total Relative Abundance		82	47	39	55	25	30	61	9	74	92	93	12	29

[1] **California Invasive Plant Council Invasive Plant Inventory Categories (CalIPC 2010):**

High= Species have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure.

Moderate= Species have substantial and apparent—but generally not severe—ecological impacts.

Limited= Species are invasive but their ecological impacts are minor on a statewide level.

[2] **Relative Abundance Ratings (Butterworth 2012)**

5 = Widespread and abundant

4 = Frequent and/or moderately abundant

3 = Moderately Frequent and/or not abundant

2 = Patchily distributed and/or not abundant

1 = Uncommon

0 = Not present (or expected to be present)

U = Unknown (not enough information

3.5.2 General Impacts

Exotic plants can negatively impact native plants and animals and alter natural systems through a variety of direct and indirect mechanisms, which can have important consequences for management (Table 24). The following sections describe guilds of invasive species that are of management concern in the CPER.

Table 23: Selected impacts of invasive plant species within the CPER

Impact	Description	Examples within the CPER
Outcompete Native Plants	Invasive plants can deplete soil moisture and nutrients, shade-out native species, compete for limited space, and/or create conditions that deter native plant establishment, such as dense thatch.	Invasive grasses and forbs in the grasslands compete with native herbs and likely contribute to reduced native plant species richness.
Alter Community Structure	Invasive plants alter the structure of native communities, oftentimes degrading habitat for native animals.	Dense exotic grasses in desert scrub can impede movement by blunt-nosed leopard lizards.
Alter Hydrology	Invasive plants can evapotranspire excessive amounts of water, thus reducing water flow or depth.	Tamarisk in the Cuyama River may be reducing water flow and depth required by native species including California red-legged frog.
Promote Fire in Non-Fire Adapted Systems	Invasive plants can create fuel conditions that promote fire, which can kill native woody species that are not adapted to fire. Fires that kill woody species can result in type-conversion of shrublands to grasslands as part of a grass-fire cycle (D'Antonio and Vitousek 1992).	Invasive grasses create fine fuels that promote fire in shrublands where widely spaced native shrubs and sparse herbs typically will not sustain fire. In non-fire adapted systems such as desert scrub and juniper woodland, a grass-fire cycle can convert shrublands and woodlands to grasslands.

It is important to note that many animal species have adapted to the occurrence of invasive species. For example, grasshopper sparrows have been observed utilizing summer mustard as perches for singing during the breeding season (R. Stafford, pers. comm. 2010). Many migratory birds nest in tamarisk, where it has displaced native riparian vegetation (Sogge et al. 2008). Native rodents may consume the seeds produced by non-native herbs, such as has been observed with giant kangaroo rat, which consume the non-native annuals redstem filaree and red brome (Prugh and Brashares 2012).

3.5.2.1 Invasive Plant Species of Management Concern

3.5.2.1.1 Invasive Annual Grasses

A suite of non-native annual grasses, most of which have their origins in the Mediterranean Region, are the dominant invasive plant within the Reserve, in terms of species richness (11 species or 34% of invasive species) and absolute cover, as well as distribution. Invasive annual grasses attain their greatest abundance within the grasslands and oak savannas, but are also abundant in the understory of the oak woodlands and in open canopy conditions within the coastal scrub and desert scrub, where fire may play an important role in facilitating their invasion and spread (Section 3.2).

Invasive annual grasses are widespread within the American and Chimineas units. They are patchily abundant within the Panorama Unit and less frequent in the Elkhorn Unit. Their abundance and productivity (e.g., height) tracks annual rainfall and they can be very dense and tall in wet years, particularly in successive years of above-average rainfall.

Invasive annual grasses have a suite of deleterious impacts on the native communities within the Reserve, including outcompeting native plants and degrading habitat for native animals. They may also facilitate type conversion of the shrublands and juniper woodlands to grassland through the grass-fire cycle (D'Antonio and Vitousek 1992; Table 24). The fine fuel created by the dense grasses can carry fires that might otherwise not be able to spread. In the desert scrub and juniper woodlands, fires kill the dominant species including saltbush species and California juniper; unlike shrubs and trees in fire-adapted systems, these species do not feature adaptations to re-establishing following fire, such as stump-sprouting or seedling establishment that is promoted by fire. Red brome and cheat grass (*Bromus tectorum*) have been found to degrade shrub-dominated communities in the Mojave Desert (Brooks et al. 1999) and the Great Basin (Brooks et al. 2004).

Control of invasive annual grasses is very difficult, as many of the species are prolific produces of seed that can be widely dispersed. The primary methods of control in wildlands include mowing, application of grass-specific herbicides, livestock grazing, and seasonally-timed fire. Mowing and herbicide application are impractical except for treating small areas, while repeated burning can present public health and safety concerns as well negatively impact shrub and tree-dominated systems. For this reason, cattle grazing is the most widespread and commonly used tool to manage exotic annual grasses and forbs in California grasslands and oak woodlands (DiTomaso et al. 2007, Huntsinger et al. 2007).

3.5.2.1.2 Yellow Star-Thistle

Native to southern Europe and western Eurasia, yellow star-thistle (*Centaurea solstitialis*) is a late-season annual forb in the sunflower family (Asteraceae) that has invaded grasslands, wetlands, and open shrublands throughout central and southern California. Within the CPER, it is presently known only from isolated patches within the grasslands of the American and Chimineas units, and at Number 3 Pond and Quarry Pond in the North Chimineas Unit. The species is also known to occur along Soda Lake Road and within the Saucito Ranch area of the Carrizo Plain National Monument (BLM 2010b), from where it may spread into the Reserve. It is spread primarily by human activities, including transport of hay from infested fields, and on the undercarriage of vehicle including road maintenance equipment (DiTomaso and Gerlach 2000).

Dense infestations of yellow star-thistle displace native plants and can impede habitat use by some animals (DiTomaso and Gerlach 2000). They can also interfere with grazing management, as cattle will avoid yellow star-thistle due to the long spines on its inflorescences.

Because widespread infestations of yellow star-thistle are difficult to treat, early detection and rapid response (EDRR) is the most effective means to control the species. Application of post-emergent herbicides to seedlings during late winter or early spring is effective at controlling new occurrences.

Since 2007, the Department has eliminated or greatly reduced populations of yellow star-thistle within an approximate 100-acre area of the Reserve through application of herbicide and manual removal.

3.5.2.1.3 Tamarisk

Tamarisk (*Tamarix ramosissima,* also known as salt cedar) is a large shrub or tree from central Asia, which invades riparian areas and has become especially invasive in drier regions of the Southwestern United States. Within the CPER, it occurs along the Cuyama River, where it forms dense, virtually monospecific stands (Section 3.1.7.5.7). Isolated individuals are also scattered within San Juan, Barrett, Saltos Canyon, and Taylor Canyon drainages.

Tamarisk is highly invasive and has a broad range of negative impact on native systems. Mature individuals can produce 500,000 seeds, which are easily dispersed by wind and water (Sudbrock 1993). It grows up to one foot per month during the spring (Sudbrock 1993), and owing to its high rate of evapotranspiration, it can lower water tables and even dry-up streams (Sala et al. 1996). Tamarisk increases soil salinity, which inhibits the germination and growth of native riparian plants. Tamarisk degrades habitat for many animals by reducing surface water, and altering plant community structure and composition, including the availability of forage plants and appropriate nesting conditions (Lovich 2000).

Tamarisk invasion also poses environmental hazards. The dense stems trap alluvium and narrow stream channels, thus increasing the frequency of flood (Graf 1978). In addition, the copious leaves created by the drought-deciduous trees can promote fire, following which tamarisk can resprout while many native riparian species are killed (Busch 1995).

Tamarisk is very difficult to control once established so early detection and rapid response are the most effective ways to prevent it from degrading natural lands. The species resprouts vigorously following cutting or burning, necessitating cut-stump herbicide application to kill tamarisk (Lovich 2000).

The leaf beetle (*Diorhabda elongata*) has been proposed for use as a biological control agent for tamarisk. However, the US Department of Agriculture research program was discontinued in 2009 following concerns that control of tamarisk would remove breeding habitat for the critically-endangered southwestern willow flycatcher (*Empidonax traillii extimus*), which nests within tamarisk stands that have replaced native willow stands (Sogge et al. 2008). Introducing non-native species to control invasive plants also presents a concern for management of the Reserve.

3.5.3 Non-Native Animals

The CPER supports populations of 12 non-native animal species: five species of fish, six species of birds, and one mammal (Table 25). Species that are notably absent include American bullfrog (*Lithobates catesbeianus*): a large frog, which negatively impacts many native special-status species including California red-legged frog and western pond turtle. American bullfrog has not been detected within the ponds or streams of the Chimineas units during the various inventorying and research studies conducted since the Department acquired the property in 2004 (Section D.1).

3.5.3.1 Non-Native Fish

Five non-native fish species were known to occur within Broken Dam Pond, a large pond on the western boundary of the North Chimineas Unit (Table 25). Several of these species also occur intermittently within

Table 24: Relative abundance of non-native animals within the habitats and units of the CPER

			Relative Abundance Rating[1]												
			Vegetation Types								CPER Units				
Scientific Name	**Common Name**	**Type**	**Grassland**	**Oak woodland**	**Juniper woodland**	**Coastal Scrub**	**Chaparral**	**Desert Scrub**	**Riparian**	**Pond**	**American**	**N. Chimineas**	**S. Chimineas**	**Elkhorn**	**Panorama**
Ameiurus nebulosus	brown bullhead	fish	0	0	0	0	0	0	U	5	0	5	U	0	0
Gambusia affinis	western mosquitofish	fish	0	0	0	0	0	0	U	5	0	U	U	0	0
Lepomis macrochirus	bluegill	fish	0	0	0	0	0	0	U	5	0	5	U	0	0
Lepomis microlophus	redear sunfish	fish	0	0	0	0	0	0	U	5	0	5	U	0	0
Micropterus salmoides	largemouth bass	fish	0	0	0	0	0	0	U	5	0	5	U	0	0
Alectoris chukar	Chukar	bird	3	0	3	0	0	3	0	0	0	3	3	1	0
Columba livia	Rock dove	bird	3	3	3	3	3	3	3	3	3	3	3	0	3
Maleagris gallopavo	Wild turkey	bird	0	3	1	0	3	0	3	0	0	3	1	0	0
Passer domesticus	House sparrow	bird	1	3	1	1	1	0	1	1	3	3	3	1	3
Streptopelia chinensis	Eurasian collared-dove	bird	0	1	0	0	0	0	1	1	0	0	3	0	0
Sturnus vulgaris	European starling	bird	4	5	3	3	3	3	5	3	5	5	5	1	1
Sus scrofa	wild pig	mammal	4	4	3	3	4	1	4	4	3	4	3	0	0
		Species Richness	**5**	**6**	**6**	**4**	**5**	**4**	**6**	**10**	4	10	7	3	3
		Total Relative Abundance	**15**	**19**	**14**	**10**	**14**	**10**	**17**	**37**	14	41	19	3	7

[1] **Relative Abundance Ratings (Stafford 2018)**

5 = Nearly always occurs in appropriate habitats in moderate to large numbers
4 = Usually occurs in appropriate habitats but typically in small numbers
3 = Expected in appropriate habitats but in very small numbers
2 = Patchy distribution: populations not always present in appropriate habitat
1 = Occasional (may be temporarily present)
0 = Not Present (or not expected to be present)
U = Unknown (not enough information)

reaches of San Juan Creek downstream of the pond. The fish were introduced into Broken Dam and/or the Tajea Flat Reservoir on the adjacent private lands, to create opportunities for fishing and, in the case of mosquito fish (*Gambusia affinis*), to control mosquito populations. The drought between 2011 and 2015 caused these ponds to dry up, likely eliminating non-native fish from the San Juan Creek Drainage. Non-native fish may also occur within the Cuyama River.

Non-native fish have a variety of negative impacts on natural systems. Most notably, they compete with and predate upon native aquatic species, including macroinvertebrates, fish, amphibians, and reptiles. Within the CPER, their occurrences present a management concern for the native species including four sensitive species: arroyo chub (*Gila orcutti*), California roach (*Lavinia symmetricus*), California red-legged frog and western pond turtle.

Non-native fish can be difficult to control within individual reserves and instead, success is best achieved when control efforts are applied throughout the invaded hydrologic system. In the CPER, eradicating non-native fish from the San Juan drainage would require either their removal from upstream areas or the installation of barriers upstream from Broken Dam. The Department is evaluating installation of barriers above and below Broken Dam to prevent the fish from reinvading following their eradication in San Juan Creek. Similarly, successful management of non-native fish in the Cuyama River would require system-wide control efforts.

3.5.3.2 Non-Native Birds

The CPER supports populations of six non-native bird species, most of which are widespread throughout California (Table 25). Chukar and wild turkey were deliberately introduced to California to provide hunting opportunities; in the Carrizo Plain region, the Department historically bred and released wild turkey (CDFW 2004) and installed numerous gallinaceous guzzlers for supplying water to chukar as well as native upland game birds (BLM 2010b).

Rock dove and Eurasian collared dove escaped from pet breeders, with the latter only observed in the region beginning this century. European starling (*Sturnus vulgaris*) and house sparrow (*Passer domesticus*) were deliberately introduced by European settlers wanting familiar animals in their new county. Within the CPER, European starlings and rock doves are the most widespread and abundant non-native bird species (Table 25). The Department has been tracking Eurasian collared dove abundance through monitoring of the upland game hunting within the South Chimineas Unit (Section 2.8.3), and based on the increased hunter take, the species appears to be increasing in distribution and abundance (R. Stafford, unpublished data).

Chukar in the CPER
(Photograph by Chris Wemmer and Craig Fiehler)

Non-native birds can impact native species primarily through competition and direct predation. Wild turkey, which are observed on the CPER very infrequently, are large, opportunistic feeders, and while they primarily eat seed and insects, they also take small vertebrates including lizards and snakes. Through their digging, they also create soil disturbances, which can promote establishment of invasive plants.

European starlings are aggressive and can outcompete native cavity-nesting birds (Purcell and Verner 1999), such as acorn woodpecker (*Melanerpes formicivorus*), for nests and may affect their populations (Koenig 2003). Owing to their low abundance, house sparrow, chukar, and wild turkey likely have very limited impacts within the CPER.

3.5.3.3 Wild Pigs

The CPER supports wild pig (*Sus scrofa*): a non-native species found throughout much of California's Coast Range Mountains. Within the CPER, wild pigs occur primarily in the Chimineas and American units, where evidence of their rooting or grubbing is observed in grasslands, shrublands, oak woodlands, riparian areas, ponds, and wetlands. Wild pigs are hunted within the CPER as part of the Department's hunting program (Section 2.8.3.1.1).

Wild Pig in the CPER
(Photograph by Bob Stafford)

Wild pigs are opportunistic omnivores that feed on bulbs and roots, acorns, grasses and forbs, fungi, invertebrates, and small vertebrates as well as carrion (Barrett 1978). In doing so, they negatively impact native plants and compete with native animals for limited food supply, particularly acorns, which are important for many wildlife species. Wild pigs can also negatively impact herpetofauna through direct predation as well as degrading aquatic habitats through wallowing and other activities (Jolley et al. 2010).

Wild pig rooting disturbs soil, and can promote establishment of exotic plants (Kotanen 1997, Cushman et al. 2004). Wild pigs can degrade aquatic systems through sedimentation as well as contaminating water sources with disease that can affect native wildlife.

3.6 Wildlife Diseases

Several diseases may affect native species within the CPER (Table 26). Like invasive species, some of these diseases, known as emerging infectious diseases, are spreading rapidly. The following outline aspects of diseases with the greatest potential to cause impacts to sensitive species within the CPER.

3.6.1 Amphibian Diseases

Declines in amphibian populations world-wide have been linked, in part, to emerging infectious diseases (Daszak et al. 1999). In California, two diseases of conservation concern are chytridiomycosis and ranavirus.

Chytridiomycosis is caused by the chytrid fungal parasite *Batrachochytrium dendrobatidis*, or Bd (Kilpatrick et al. 2009). Known from six continents and actively spreading in North America, the disease can infect most amphibians worldwide and has been linked to population declines and species extinctions (Fisher et al. 2009). The infection causes thickening of the skin, which prevents water and electrolyte uptake. Zoospores

Table 25: Diseases of management concern for the CPER

Disease	Cause	Species Affected	Effects on Individuals	Effects on Populations and Communities	Occurrence within the CPER
Sudden Oak Death	*Phytophthora ramorum*, a water mold pathogen	trees including oaks such as *Quercus agrifolia* (but not *Q. douglasii).*	Causes tree mortality	Mortality across often mono-specific stands can limit food availability (e.g., acorns), degrade animal habitat, and promote non-native species invasion and spread	Not known from San Luis Obispo County; nearest occurrences in coastal Monterey County; primarily occurs in cool, moist, and foggy locations
chytrid fungus (Bd)	*Batrachochytrium dendrobatidis,* a fungal parasite that causes chytridiomycosis	amphibians including California red-legged frog	Thickening of skin prevents absorption of water and electrolytes, causing individual morbidity and mortality	Linked as a potential cause of amphibian population declines, extirpations, and extinctions world-wide	Detected at low levels within the Cuyama River (USGS unpublished data)
Ranavirus	*Ranavirus* spp. in the Iridoviridae family.	Amphibians worldwide including American bullfrog as well as fish and reptiles	Systemic infections, often with secondary bacterial infections, that can cause mortality	Causes dramatic population declines particularly in pond-breeding amphibians, and have been linked to extirpations and extinctions	No known occurrences within the region
West Nile virus	flavivirus	Vertebrates, especially mammals and birds, particularly corvids	High mortality of affected individuals	Can result in sharp population declines as observed in corvids including yellow-billed magpie (*Pica nuttalli*)	Isolated cases documented in San Luis Obispo County (CDPH 2016)
Avian Influenza	avian influenza (H5N1), a virus	Primarily water birds and shore birds	High mortality of affected individuals	Can result in sharp population declines	Not in wild populations in North American, though concern about spread by migrating birds on the Pacific Flyway

Table 25: Diseases of management concern for the CPER

Disease	Cause	Species Affected	Effects on Individuals	Effects on Populations and Communities	Occurrence within the CPER
Johne's Disease (paratuberculosis)	*Mycobacterium avium* ssp. *paratuberculosi*, a bacterium	Ruminants, including elk and deer, and rabbits	Diarrhea and failure to absorb nutrients causes morbidity and mortality	Can cause dramatic population declines primarily in dense herds including livestock operations	Not known from the La Panza tule elk herd or mule deer within the CPER, but present in the Point Reyes tule elk herd in Marin County
Chronic Wasting Disease	Likely prions (infectious proteins without associated nucleic acids) in the central nervous system	Deer, elk, moose	Small brain lesions, loss of body condition, and behavioral abnormalities, which often cause death.	Linked to declines in deer and elk populations in Wyoming and Montana	Not present in California, though occurs in other western states
Zika virus	Virus transmitted by mosquitos *Aedes aegypti* and *A. albopictus*	Humans; animals not currently thought to be affected	Cold or flu-like symptoms in adults; birth defects in pregnant women	No known effects on animal populations	Not known from San Luis Obispo County; risk for spread in California is limited.

spread readily in water or on moist or wet materials including on equipment used in infected areas (e.g., people's shoes) as well as the skin of amphibians.

California red-legged frogs are susceptible to infection by Bd; however, the consequences for populations are unknown (Padgett-Flohr 2008). Researchers from the USGS studying the species within the Cuyama River tested 25 California red-legged frogs in 2010 for the presence of the disease, and Bd was detected at low levels in all of these samples (Richmond et al. 2011, USGS unpublished data).

Ranavirus is highly virulent and causes systemic infections of amphibians, fish, and reptiles, including the larva of California red-legged frog (Daszak et al. 1999). Infected individuals often suffer secondary bacterial infections, with mortality greatest for tadpoles (Daszak et al. 1999). The virus may be able to survive for long periods of time at the bottom of ponds, and can be dispersed by aquatic insects, migrating waterfowl, or human activities including moving equipment, and artificial stocking of water with fish. The occurrence of ranavirus within the CPER is unknown.

3.6.2 Bird Diseases

Natural outbreaks of avian botulism, avian cholera, mycoplasmosis, salmonellosis, trichomoniasis and other diseases can cause die-offs of wild birds. Two relatively new or emerging diseases with the potential to affect bird populations include West Nile virus and avian influenza. These diseases have emerged as threats to native bird populations during the past 15 years and are being actively monitored by a variety of local, state, and federal agencies and organizations, including the Department of Fish and Wildlife, which are concerned with their potential impacts to wildlife as well as spread to humans.

West Nile virus is a mosquito-borne disease originating from Africa that was detected in the eastern United States in 1999 and has since spread throughout the United States, arriving in California in 2003. West Nile virus can infect many animals, including humans, but in wild populations has had the greatest impacts on birds, which serve as the primary host. Though more than 225 bird species have been found to be infected (CDPH 2016), the highest incidence of mortality has been observed in corvids, including western scrub jay and yellow-billed magpie (Boyce et al. 2004). Concern about impacts on populations of yellow-billed magpie is heightened, owing to their colonial behavior which can enhance opportunity to for transmission.

Breeding bird survey data show a 22% decline in yellow-billed magpie populations as of 2005, with Christmas bird count data suggesting a 42% decline as of 2006 (Crosbie et al. 2008) and no evidence of recovery of the population through 2011 (Pandolfino 2013). West Nile virus has recently been recorded in San Luis Obispo County but the virus is generally more prevalent in California's Central Valley, where irrigated agricultural lands and remaining wetlands support larger mosquito populations.

Avian flu (or influenza) is an illness caused by influenza virus adapted to bird hosts. Most avian influenza has been observed in water birds, specifically Anseriformes (ducks, geese, swans) and Charadriiformes (gulls, terns, and shorebirds). The highly pathogenic avian influenza (H5N1) has resulted in high bird mortality in Asia, Africa, India, and Europe. It is spread through contact with birds, their feces, feathers, and other contaminated material including water. Because many susceptible species are migratory, there is a concern that it will spread to wild bird populations in North America. The Department and the USGS conduct surveillance of wild migratory birds in the lower Pacific flyway including by sampling black brandt (*Branta bernicla nigricans*) in San Luis Obispo County (Brand 2009). Within California, the Department also monitors live birds, hunter harvest birds, and sick and dead birds for avian flu (CDFW 2007a).

3.6.3 Johne's Disease

Johne's disease (paratuberculosis) is an infectious, incurable, and typically fatal disease of ruminants that spread from Europe to the United States by infected dairy cattle in the 19th century; it has since infected wild ruminants including deer and elk. The disease is caused by a bacterium, *Mycobacterium avium* ssp. *paratuberculosis*, which is readily transmitted from older to younger individuals through manure, milk, and other contaminated material. Bacterium can survive at low density in the soil, water, and on plants as well, and can cause animals visiting areas that historically supported the disease to become infected (Collins and Manning 2010).

Within the Point Reyes tule elk herd in Marin County, individuals infected with Johne's disease develop diarrhea and eventually succumb due to an inability to absorb nutrients. The disease has not been observed to impact herd density, however (NPS 2010). Due to the presence of the disease, which can be spread to livestock, tule elk are carefully screened before they are translocated as part of the Department's statewide program to manage tule elk populations and enhance genetic diversity.

Evidence of Johne's disease has not been observed within the Reserve's mule deer or tule elk, the latter of which have been screened by the Department during captures conducted as part of population monitoring and management activities. (Section D.1)

3.6.4 Zika Virus

Zika is a virus that affects humans causing flu like symptoms in adults, and birth defects in pregnant women. It is spread through sexual intercourse and through bits by two mosquitos, *Aedes aegypti* and *A. albopictus* (CDC 2016). These mosquitos have not been observed in San Luis Obispo County, though they have been detected in 12 other California Counties including adjacent Kern County. There has been no local mosquito bite transmission of Zika virus in California to date, where the risk is said to be low (County of San Luis Obispo 2016). The Department will continue to work with public health agencies which conduct surveillance for these diseases.

3.7 Habitat Connectivity

Long-term effectiveness of the Reserve relies on maintaining conditions necessary for individuals, populations, and ecological processes to move through the landscape. Habitat connectivity is essential for sustaining populations of a variety of animals, including those that migrate seasonally, disperse from where they are born, have large home ranges, or exhibit metapopulation dynamics. Example of animal species within the CPER for which habitat connectivity is critical to population persistence include San Joaquin kit fox, American badger, tule elk, pronghorn, black bear (*Ursus americanus*), and mountain lion.

Habitat connectivity is also critical to plant dispersal as well as the maintenance of ecological processes that structure many communities and maintain habitat conditions, such as fire. It will also be essential to promoting the persistence of rare species and the maintenance of native biodiversity in the face of a changing climate. In response to the 4.1° F to 7.6° F increase in mean annual temperature predicted to occur by 2085 (Section 2.4.4.1), many plant species will need to disperse to remain within their climatic tolerances. Animals will similarly need to migrate to respond directly to climate, as well as the consequential changes in habitat structure.

Because these processes occur at various spatial and temporal scales in ways that are difficult to predict, long-term persistence of the species and communities that the Reserve was designated to protect will require the maintenance of habitat connectivity within the Reserve (i.e., habitat permeability), and between the Reserve and other habitat areas (habitat linkages). The following sections evaluate existing connectivity at the regional, local, and site-level.

3.7.1 Regional Connectivity

The CPER is part of a large block of intact natural habitat that has been identified as essential for maintaining habitat connectivity within California (Spencer et al. 2010). The Reserve occurs within two natural landscape blocks, the 483,280-acre La Panza Range block, and the 163,850-acre Carrizo Plain/Temblor Range block, which are separated only by Soda Lake Road. Together, the more than 650,000-acre landscape block, which features limited land conversion and roads, is part of a more than five-million-acre landscape extending from the Southern Diablo Range Mountains in the north to the Sierra Madre Mountains to the south (Spencer et al. 2010).

Mountain Lion, One of Several Species with a Large Home Range in the CPER, for which Habitat Connectivity is Essential (Photograph by Chris Wemmer and Craig Fiehler)

Due to the generally intact nature of the habitat, habitat within the Carrizo Plain region functions as an essential linkage connecting intact habitat within the Outer Coast Range Mountains, including the Santa Lucia Mountains, to the Inner Coast Range Mountains, as well as remaining intact habitat within the San Joaquin Valley. Moreover, owing to its location at the southern end of the Coast Range Mountains, the Carrizo Plain including lands within the Reserve provides essential connectivity with the Transverse Mountains to the south.

3.7.2 Local Connectivity

At the local scale, land within the CPER connects other lands managed at least in part for biodiversity conservation purposes. The Elkhorn and Panorama units are adjacent to portions of the 207,000 acres of BLM-managed land within the Carrizo Plain National Monument. These BLM holdings are contiguous with additional BLM lands east of the monument (Figure 1). To the southeast, the CPNM lands are nearly contiguous with the approximately 14,691-acre Bitter Creek National Wildlife Refuge (USFWS) and the approximately 95,000- acre Wind Wolves Preserve (The Wildlands Conservancy). These reserves, in turn, adjoin the southern portion of the 1.75-million-acre Los Padres National Forest (USFS).

The Chimineas and American units of the CPER similarly connect BLM-managed land within the CPNM with the Los Padres National Forest. These units together also provide connectivity between the Cuyama River and the protected lands to the north, which include the 27,380-acre Carrizo Ranch, which is protected by a conservation easement, and the 12,380 acres protected by the Department in California Valley as mitigation for recent solar development (Figure 1). Because many wildlife species move through riparian areas, such stream linkages to upland terrestrial areas can promote connectivity (Hilty and Merenlender 2004).

Much of the other land surrounding the CPER is managed as part of large ranches used primarily to graze cattle (Section 2.3). These private lands primarily support intact natural habitats that contribute greatly to the local and regional connectivity.

3.7.3 Site-Level Connectivity

Owing to its historic low-intensity land use, habitat in the CPER is largely permeable: it features few impediments to dispersal of plants, and the movement of animals and ecological processes (e.g., fire). The primary factors that fragment habitat within the Reserves include:

1. **Roads:** The Reserve is traversed by approximately 122 miles of roads including a major highway (State Route 166), a paved County road (Soda Lake Road), a series of unpaved county roads (e.g., Elkhorn Road), and a network of natural surface roads for which access is controlled (Section 2.6). Except for the highway and County roads, most roads are narrow (approximately 10 to 14 feet wide) and infrequently travelled, and thus may not limit movement by most species. However, roads can deter movement by some species and cause mortality to animals crossing roads or using the open conditions for movement, basking, or foraging. Slow species, such as western pond turtles, and species with poor vision, such as American badger, may be especially vulnerable to mortality due to vehicle strikes. Reducing vehicle speed on roads can reduce the frequency of collisions with animals.
2. **Fences:** The perimeter of the American, Panorama, and Elkhorn units is fenced using four-strand barbed-wire to exclude cattle and demarcate the Reserve boundaries. Many portions of the perimeter of the Chimineas units are similarly fenced, and the interior features cross fencing that creates a series of management units designed to facilitate grazing management. While many wildlife species can readily move through such fences, other species, such as pronghorn, will not jump fences, which instead must have the lower strand at least 18" off the ground or else will inhibit their movement and can increase rates of predation (O'Gara and Yoakum 2004).
3. **Dams**: Within the North Chimineas Unit, earthen dams or berms historically constructed within San Juan and Barrett creeks to create stock ponds disrupt the natural connectivity of the stream systems for some species. The impacts of this hydrologic modification may be limited, however, given the intermittent nature of most stream reaches. On the Cuyama River, Twitchell Dam inhibits upstream migration of steelhead runs and may have played a role in the extirpation of arroyo toad (*Anaxyrus californicus*) from the drainage.
4. **Facilities:** Though the Reserve is largely undeveloped, the existing facilities and intermittent human activities at the Chimineas Unit and Painted Rock headquarters may impede movement by some species.

In addition, the natural mosaic of habitat conditions including vegetation in various successional stages, can affect habitat connectivity for some species. For example, species requiring short-statured grasslands, including the San Joaquin kit fox, might be impeded by tall grasslands, shrublands, or woodlands. Conversely, species such as tule elk that preferentially occur in taller grasslands, might similarly be inhibited by short-statured grasslands, dense shrublands or woodlands. Management of the Reserve for long-term maintenance of biodiversity must address issues of habitat connectivity at all scales. To be effective, management of the CPER should take into consideration habitat conditions within adjacent lands, which can change over time in response to disturbance (e.g., fire) or changes in management (e.g., cattle grazing).

Tule Elk Herd on the Carrizo Plain
(Photograph by Bob Stafford)

4 Management Goals and Tasks

This chapter identifies the goals and tasks for management of the CPER, which are broadly designed to protect biological resources while protecting cultural resources and providing for wildlife-dependent public use. The goals were developed based upon the detailed synthesis and critical evaluation of the following:

- the purpose of the land protection projects or acquisitions that created the CPER (Section 1.1);
- the existing conditions of the CPER, including the physical setting, biological resources, and existing public uses and management (Chapters 2 and 3);
- State laws and mandates including the California Code of Regulations for Ecological Reserves (Title 14, Sections 550 et seq. and 630), the Fish and Game Code, and the policies of the California Fish and Game Commission; and
- the public comments received during the visioning process for the LMP (Appendix H), and the scoping process for the Environmental Impact Report (Appendix I).

Management is outlined in three hierarchical levels: elements, goals, and tasks. The elements are the management categories or considerations; the goals identify the conditions management is designed to achieve; and tasks are the steps that will be taken to attain the goals. Together these elements, goals, and tasks will guide the management of the CPER.

As the purpose of the LMP is to guide long-term management of the Reserve, certain tasks call for more detailed planning prior to management implementation. These 'step down' measures will promote achievement of the goals over time as part of implementation of the LMP through an adaptive management framework. In this process, management will be adjusted, over time, to promote long-term effectiveness at achieving the goals. Adaptations will be identified based on new information such as the results of monitoring and scientific studies, as well as changed conditions, such as fire, unusual weather, exotic species invasions, or other changes that influence management and its effectiveness.

The LMP goals and tasks have been evaluated for their potential impacts on the environment in accordance with the provisions of the California Environmental Quality Act (CEQA). An initial study prepared in accordance with CEQA guidelines concluded that the LMP, as proposed, had the potential to significantly impact aspects of the environment. Accordingly, an Environmental Impact Report was prepared (Appendix I). It includes a series of best management practices that, when implemented, will reduce the impacts of the LMP activities to a less-than-significant level.

Implementation of many of the plan tasks will depend on availability of the necessary staff and funding, including an adequate operations and management budget (Section 5). Appendix G identifies the staff resources anticipated to be necessary to implement each action.

4.1 Definitions of Terms Used in this Plan

The CPER LMP was developed following the Department's *Guide and Annotated Outline for Writing Land Management Plans* (CDFW 2007b), which calls for outlining management using three levels: elements, goals, and tasks, which are defined and described in the following sections.

4.1.1 Elements

An element refers to any biological unit, public use activity, or facility maintenance program as defined below for which goals have been prepared and presented within this plan.

- **Biological Elements:** These elements consist of species, habitats, or landscapes for which specific management goals have been developed within the plan.
- **Scientific Research, Monitoring, and Adaptive Management Elements:** These elements describe how scientific research and monitoring can be used as part of an adaptive management framework to promote long-term effectiveness of management at attaining the goals of the other elements.
- **Vegetation Management Elements:** These elements identify how fire, grazing, and exotic plants can be managed to maintain or enhance the condition of the vegetation to attain the biological goals of the plan.
- **Public Use Elements:** Public use elements are recreational and other public use activities appropriate to and compatible with the purposes for which the property was acquired.
- **Cultural Resources Elements:** Cultural resource elements pertain to preservation of cultural resources.
- **Facility Maintenance Elements:** This is a general-purpose element describing the maintenance and administrative program, which helps maintain orderly and beneficial management of the area.
- **Management and Monitoring Coordination Elements:** These elements include activities related to the coordination of management and monitoring in adjacent and regional protected lands.

4.1.2 Goals

A goal is the statement of the overall condition or result that this LMP is intended to achieve through management.

- **Biological Goal:** A biological goal is a statement of intended long-range results of management based upon the feasibility of maintaining, enhancing, or restoring species populations and/or habitat.
- **Scientific Research, Monitoring, and Adaptive Management Goal:** A scientific research, monitoring, and adaptive management goal is a statement describing how scientific research and biological monitoring are utilized in an adaptive management framework to support the biological goals.
- **Vegetation Management Goal:** A vegetation management goal is a statement describing a desired component of vegetation management planning and coordination of activities to maintain or modify the vegetation to attain the plan's goals.
- **Public Use Goal:** A public use goal is the statement of the desired type and level of public use compatible with the biological element goals previously specified within the plan.
- **Cultural Resources Goal:** A cultural resources goal is a statement describing management and its intended results for cultural resources.
- **Facility Maintenance Goal:** A facility maintenance goal is a statement describing management and the resulting type and level of facility maintenance, which is intended to support attainment of the goals for the biological and public use elements.

- **Management Coordination Goal:** A management coordination goal is a statement describing the desired types of management coordination activities in support of biological elements and associated goals.

4.1.3 Tasks

Tasks are the individual work elements including projects and more detailed planning that are designed to achieve one or more goals. They are also identified to facilitate development of operation and maintenance budgets. Tasks are numbered according to the goal to facilitate tracking as part of the detailed work plan for the LMP (Appendix G). In some cases, tasks can address multiple goals within the same element and are listed below all goals for which the tasks are relevant. Implementation of many of the tasks identified in this plan is dependent upon the availability of the necessary staff and an adequate operations and maintenance budget.

4.1.4 Adaptive Management

The CPER will be managed through an adaptive management framework, in which monitoring is used to evaluate the effectiveness of management, which is then adjusted, as necessary, to enhance the ability to achieve the goals of the plan. Through adaptive management, monitoring is used to increase understanding of the systems, which is needed to inform effective management but is inevitably incomplete at the outset. By applying habitat management as an explicit experiment, in which hypotheses about the system are tested by comparing (replicate) treated areas to untreated areas, active adaptive management can be used to learn by doing management (Walters and Holling 1990). In an adaptive management framework, scientific research and other new information are used to update management actions. In addition, management is adjusted based on changes in conditions over time, including in response to a fire or climate change. Details of the adaptive management framework are provided in Section 4.3.

4.2 Biological Elements

The overall goal of management within the CPER is to maintain or enhance the biodiversity of the site and protect and recover populations of rare, endangered, threatened, or other special-status species. The specific biological goals and actions are organized within elements that address three levels at which management is designed to achieve the overall goal:

1. **Landscape:** maintain or promote diversity at the landscape level, by addressing the varying communities or habitats, and their context within the landscape, including their connectivity;
2. **Habitats:** maintain or enhance the structure and species composition of the various communities (i.e., vegetation types or communities); and
3. **Species:** address specific management needs of species including rare and managed populations for which landscape and community-level management alone may not be sufficient.

Since the Department's current management objectives are ecosystem or multi-species oriented (CDFW 2007b), the goals emphasize a habitat approach to management.

4.2.1 Landscape Element

A variety of ecological processes, including floods and fire, affect the distribution and functions of ecosystems within the Reserve. These in turn, influence important ecological processes such as species movements. Maintaining biodiversity within the CPER and promoting the long-term viability of its plant and animal populations requires continuance of the processes that structure and maintain the spatial configuration of the communities within the Reserve. This element addresses two aspects of the landscape ecology that are most critical: disturbance regimes that maintain the mosaic of ecosystems, and habitat connectivity.

4.2.1.1 Disturbance Regimes

The diverse mosaic of communities within the CPER results from not only the variability in topography, geology, soils, hydrology, and climate, but also the Reserve's fire history. This is particularly true in the western portion of the Reserve where the mosaic of grassland, shrublands, and woodlands reflects, in part, the time since last fire (Section 3.1). Fire promotes establishment of many plants and creates and maintains habitat required by many animals. Fire can also have deleterious effects, particularly in systems where frequent fire is not a part of the disturbance regime, including juniper woodland, desert scrub, and riparian communities (Section 3.1); in these communities, vegetation management is required to reduce the risk of fire (Section 4.4). This element promotes effective management of fire within the landscape to maintain the heterogeneity of communities that sustains the Reserve's diversity while protecting fire-sensitive systems and species.

Goal B1: Maintain or enhance the mosaic of communities of varying structure and successional stages by facilitating the occurrence of fires in the natural range of variation of the fire regimes for the different communities within the CPER.

B.1.1: Support research examining the fire ecology of the CPER to inform fire management. Research should focus on understanding:

- Aspects of the fire regime of the region and communities of the CPER, including fire frequency, seasonality, intensity, and severity.
- How fire acts independently and interacts with other landscape factors including abiotic conditions (e.g., soils, topography etc.) to influence the spatial configuration of communities.
- The role that fire plays directly in influencing plant and animal populations, and the indirect effects of fire on native species that are mediated by fire effects on the distribution and abundance of exotic plants.

B.1.2: Develop a fire management plan that identifies proactive fire management strategies and wildfire management responses based upon the disturbance ecology of the communities and landscape within the CPER (Section 4.4.1).

B1.3: Implement fire management through an adaptive management framework, to maintain or enhance the mosaic of natural communities, and increase understanding about the ecology and management needs of the communities and species.

4.2.1.2 Landscape Permeability and Connectivity

The ability of plant and animal species to move through the landscape can be critical to their long-term persistence (Section 3.7). A permeable landscape, one without significant barriers to movement, can support wide-ranging species such as those with large home ranges, species that migrate seasonally or annually, and animals that must disperse away from their natal areas. Landscape permeability will also promote species' adaptations to a changing climate by allowing plants, animals, and other organisms to disperse to new areas within their suitable climate envelope. Landscape permeability is also essential to the continuance of ecological processes, such as fire, that are critical to maintaining the mosaic of communities and thus biodiversity.

The CPER consists of land within three disjunct areas, each of which is embedded in a region characterized primarily by intact natural systems (open space) and rural land use (e.g., cattle ranching). This low-intensity land use adjacent to the Reserve units is critical to the maintenance of biodiversity within the CPER, particularly within the two smaller units, Elkhorn and Panorama.

The Reserve itself features limited development and low intensity land uses conducive to permeability, though roads and fences can impede movement of some species (Section 3.7.1.3). The mosaic of habitats within the Reserve that contribute to its diversity may present challenges to movement for species that require large areas of a specific habitat type, such as short-statured grasslands. Managing for contiguous habitat areas can promote populations, particularly in riparian areas and grasslands.

The following goals and tasks can help maintain or enhance habitat connectivity and landscape permeability.

Goal B2: Maintain or enhance habitat connectivity and landscape permeability to promote movement of plants, animals, and ecological processes that sustain the populations and communities within the CPER.

B2.1: Coordinate management with adjacent landowners, including the BLM, USFS, and private landowners, and other agencies and organizations including San Luis Obispo County, where doing so can promote habitat connectivity (Section 4.8). Opportunities to coordinate can include:

a. Participate in interagency working groups in the region to coordinate management and identify ways to maintain connectivity;
b. Utilize the Department's Private Land Management program, which offers landowners incentives to manage private lands for the benefits of wildlife, to maintain or enhance habitat connectivity between the CPER and other protected lands;
c. Work with nonprofit organizations and the Wildlife Conservation Board to protect private lands through acquisition of fee title or conservation easements in the area that can promote attainment of regional conservation goals, including inholdings within, and lands adjacent, to the CPER; and
d. Participate in environmental review processes for development and other intensive land use projects proposed within the region to ensure that such projects are sited and developed to minimize impacts on habitat connectivity.

B2.2: Evaluate and address road barriers.

a. Collect and evaluate road kill data and other information from the Reserve and adjacent areas, to identify areas along roads where mortality is high.

b. Work with the California Department of Transportation and County of San Luis Obispo to design and implement projects to address barriers along roads and other impediments to animal movement, which may also reduce public safety from accidents involving animals (e.g., Highway 166).

B2.3: Remove or retrofit fences.

a. Remove any fences that are not necessary for management, such as cross-fencing used to create pastures in areas that are no longer grazed (Section 4.7).

b. Retrofit all fences in pronghorn habitat so that the bottom wire is at least 18" above the ground (Section 3.4.2).

c. When installing or repairing fences required for management, use wildlife-friendly designs, including by increasing the height of the lowest wire and using smooth wire on the top and bottom, where feasible.

d. Install elk crossings in appropriate areas to reduce injury to elk and damage caused by existing fences.

B2.4: Promote growth of native shrubs and trees along drainages to enhance connectivity of riparian habitats and facilitate its use as a corridor for wildlife movement (Section 4.2.2.7)

a. In areas managed using cattle grazing, fence drainages to exclude cattle where doing so is necessary to prevent cattle use that would deter growth of riparian vegetation.

b. Restore hydrologic function in riparian areas to increase the cover and diversity of woody vegetation along suitable drainages.

B2.5: Create and maintain connectivity between grassland habitat of similar structure (e.g., height) within and adjacent to the CPER, to facilitate movement by wide-ranging wildlife species.

a. Use vegetation management (fire and grazing) to create and maintain contiguous areas of short grassland within the CPER that are adjacent to short grasslands on adjacent properties, to facilitate habitat use by San Joaquin kit fox (Sections 4.2.2.1 and 4.4).

b. Manage for contiguous areas of tall grasslands within the CPER that are adjacent to tall grasslands adjacent to the Reserve, to provide important habitat for tule elk and pronghorn (Section 4.2.2.1).

4.2.2 Habitat Elements

To facilitate management at the ecosystem level (CDFW 2007b), the various communities (vegetation types) were classified into 10 habitats that feature similar ecologies and management needs (Section 3.1). The habitat-based biological elements identify the management goals and actions for each habitat. Where multiple goals can be achieved through the same action(s), the goals have been numbered using a number and letter (e.g., Goal 1a, 1b, and 1c) so that the actions can be nested below.

4.2.2.1 Grassland Habitat Element

Goal B3a: Maintain sufficient areal extent of grasslands, an important habitat within the CPER, to support grassland plants and animals.

The CPER features 21,306 acres (55% of the Reserve) of grasslands. These upland, herb-dominated communities support at least 159 vertebrate species, including 17 species that occur exclusively or preferentially within the grasslands (Section 3.2.1, Appendix D). Little is known about the natural disturbance regime, structure, and species composition of the grasslands, and the role that prior land use including cultivation and cattle grazing have played in altering these. However, the grassland within the CPER is of statewide importance for many animals, such as burrowing owl and San Joaquin kit fox, due to the widespread conversion of grassland habitat throughout much of the rest of California. Therefore, it is important to maintain grassland habitat within the CPER.

Goal B3b: Maintain or increase the total diversity of native plants and animals supported by the grasslands, including the many special-status species, by creating and maintaining a diversity of grassland habitat structure, which promote the total richness of native plant and animal species.

The diversity of the CPER grasslands is due in part to the spatial variability in plant species structure and composition (Section 3.1.1), and thus the habitat conditions they create for native animals (Section 3.2.1). While some of the variability reflects the topography, soil, geology, and microclimate, the disturbance history (e.g., fire), land use history (cultivation and grazing) also greatly influence structure and species composition (Section 3.1.1.4). They can be critical determinants of habitat availability for special-status species inhabiting the grasslands, including San Joaquin kit fox and burrowing owl (Sections 3.2.1 and 3.3). Given this, a key approach to management of the grasslands is to create a range of habitat conditions by using grazing and fire management in portions of the Reserve, while other areas may remain untreated. These vegetation management techniques can similarly promote the diversity and abundance of native plants by reducing competition with invasive plants species (Section 3.5.1.1)

B3.1: Implement fire management, in coordination with grazing, where needed, to create and maintain the varying structure in the grasslands, which promotes plant and animal diversity and populations of special-status species. This includes herb-dominated areas as well as those with scattered shrubs including linear-leaved goldenbush and silver bush lupine which are utilized by grasshopper sparrow and other native species.

B3.2: Use grazing as a management tool within the grasslands, in coordination with fire, as well as no vegetation management, where appropriate, to:

a. maintain areas of short-statured grasslands (<6" tall in spring) to provide suitable habitat for burrowing owl, mountain plover, San Joaquin kit fox, and other native species (Table 21);

b. maintain areas of tall-statured grasslands utilized by grasshopper sparrows, northern harrier, short-eared owl, tule elk, pronghorn, and other native species (Table 21);

c. promote the richness and abundance of native plants within the grasslands by creating low-thatch conditions that promote establishment of many native plants, and by reducing competition with exotic annual grasses and forbs, which can limit diversity and abundance of native plants; and

d. limit the abundance and competitive effects of non-native plants, including summer mustard, slender wild oat, ripgut brome, soft chess, red brome, and redstem filaree, among others (Table 23).

Goal B4: Restore grassland plant species diversity and composition in areas affected by cultivation.

Tillage and seeding associated with historic cultivation of the grasslands may have reduced the abundance of, or even extirpated, native plant species within the CPER. In these areas, cattle grazing, fire, and other vegetation management might not be sufficient to increase native plant cover and richness due to a lack of sufficient native plant propagule supply. In such areas, active revegetation techniques will be needed.

B4.1: Implement a revegetation program to increase the richness and cover of native grasses and forbs by increasing their propagule supply through outplanting (seeding, adding bulbs, planting etc.) in grassland areas of low species richness, such as areas that were previously cultivated. The program should incorporate the following elements:

a. Identify target species composition and structure success criteria based on quantitative examination of reference sites featuring similar abiotic conditions (soils, climate, etc.).

b. Utilize site-specific or regional propagules that will feature the locally-adapted genetic complexes and will not erode the genetic diversity of the Reserve or broader Carrizo Plain bioregion.

c. Incorporate site preparation and post- planting management techniques including vegetation management to increase success of plantings.

d. Monitor to evaluate success criteria based on important indicators of effectiveness (e.g., native plant density and richness), and to identify remedial management techniques designed to enhance success.

e. Conduct small-scale trials to compare alternative techniques prior to widespread application.

Goal B5: Increase understanding of the ecology of the grassland communities of the CPER to inform their effective long-term management.

B5.1: Support research to understand the factors affecting the distribution and species composition of grasslands within the CPER and broader Carrizo Plain region, to inform their effective management. Research should increase understanding of:

a. The successional relationships between grasslands and other communities, particularly coastal scrub and desert scrub, and the effects of fire and grazing as management tools to maintain and enhance grasslands.

b. The role of soil, microclimate, land-use history, and other factors in maintaining stable grasslands (i.e., that are not successional to shrublands or woodlands) and influencing the occurrence of grasslands of varying species composition (e.g., alliances and associations; Section B.1) within the Reserve.

c. The effects of fire and grazing on native plant richness and abundance, including:

    i. aspects of their seasonality and intensity;

ii. the role of interannual variability in precipitation in influencing their effects; and

iii. their direct and indirect effects, via exotic plants.

d. The effects of climate change on the structure and composition of grassland communities and the populations of native animal species that they support.

4.2.2.2 Coastal Scrub Habitat Element

Coastal scrub covers 4,625 acres of the reserve, 98% of which occurs in the Chimineas units where it is primarily found in the La Panza Range and near the Cuyama River. Communities of the coastal scrub element support at least 202 species of vertebrates (Appendix D), including eight species that occur at higher frequency and abundance within this community type (Table 21), including Blainville's horned lizard (*Phrynosoma blainvillii*), black-chinned sparrow (*Spizella atrogularis*) and San Diego desert woodrat. Within the CPER, coastal scrub is at the inland extreme of its range, and the plant and animal assemblages are different from those found along the coast. Coastal scrub communities are impacted by non-native species, particularly annual grasses and forbs, including red brome and redstem filaree, which outcompete native shrubs and herbs, and can promote conversion of coastal scrub to exotic- dominated grassland through the grass-fire cycle (Section 3.1.2.4).

Goal B6a: Maintain or increase the areal extent of coastal scrub within the CPER.

Goal B6b: Maintain or increase the total diversity of native plants and animals supported by the coastal scrub, including the many sensitive species, by maintaining a mosaic of habitat structure and reducing the cover of exotic plants.

B6.1: Implement fire management in coordination with managed grazing to:

a. maintain the areal extent of coastal scrub, by preventing too-frequent fire that can convert coastal scrub to grassland;

b. promote regeneration of native plants in long-unburned areas, and reduce establishment by non-native plants including annual grasses that might inhibit regeneration; and

c. create a mosaic of stands of various times since fire and thus a variety of habitat conditions for animals that inhabit coastal scrub.

B6.2: Utilize seasonally timed cattle grazing, as needed, in coordination with fire management to reduce the cover of exotic annual grasses and forbs in order to:

a. increase the richness and abundance of native coastal scrub herbs and shrubs; and

b. prevent the spread and increased frequency of fire through development of dense fine fuels, particularly during years of high productivity (e.g., above average precipitation), that can convert coastal scrub to grassland.

Goal B7: Increase understanding of the ecology of coastal scrub communities to inform their effective long-term management.

B7.1: Support research to increase understanding of the factors that affect the distribution and species composition of coastal scrub. Research topics that can inform management include:

a. The roles of abiotic factors (soils, microclimate, topography etc.), disturbance (fire), and prior land use (cultivation and grazing), in influencing the complex mosaic of coastal scrub communities with grassland and chaparral communities;

b. The effects of fire and grazing management on community structure and species composition; specifically, the relative abundance of exotic plants, the diversity and abundance of native plants, and the assemblages and abundance of native animals;

c. The distribution and abundance of native animals, particularly the sensitive species, and their responses to management within coastal scrub; and

d. The effects of climate change on the structure and composition of coastal scrub communities and the populations of native animal species that they support.

4.2.2.3 Chaparral Habitat Element

Chaparral occurs on approximately 1,251 acres in the west portion of the Chimineas units, where it forms a mosaic with coastal scrub and oak woodland. Some of the variation in chaparral associations reflects time since fire. Chaparral supports a diversity of native herbs for one to three years following a fire, after which shrub canopy increases for 20-60 years before shrubs senesce. Where conditions are appropriate, chaparral might convert to blue oak woodland in the absence of fire. Though non-native annual grasses are outcompeted by shrubs during succession following fire, grasses can produce fine fuels that can increase fire frequency, relative to that of the chaparral, thus creating a grass-fire cycle (D'Antonio and Vitousek 1992). Increased frequency of fire is thought to be an important factor contributing to the observed pattern of patchy grasslands amidst chaparral in the California Coast Range Mountains (Keeley 2002).

Chaparral is utilized by at least 196 species of vertebrates (Appendix D) including seven species that occur at higher frequency and abundance within this community type, including striped racer (*Masticophis lateralis*), wrentit (*Chamaea fasciata*), mountain quail (*Oreortyx pictus*), and Merriam's chipmunk (*Tamias merriami*; Table 21). Owing to their variability in plant species composition and abundance, chaparral stands of varying associations and time since fire likely support different animal species (Section 3.2.3).

Goal B8a: Maintain or increase the areal extent of chaparral within the CPER.

Goal B8b: Maintain or increase the total diversity of native plants and animals supported by chaparral, by maintaining a mosaic of chaparral associations reflecting time since fire, and reducing the cover of exotic plants.

B8.1: Implement fire management in coordination with managed grazing., where needed, to:

a. maintain the areal extent of chaparral, by preventing too-frequent fire that can convert it to grassland, or unnatural succession in the absence of fire;

b. create a mosaic of chaparral stands of various times since fire, promoting assemblages dominated by stump-sprouting species and obligate seeding species, maintaining populations of fire-following herbs, and maintaining a diversity of chaparral habitat conditions that support different animal assemblages;

c. Create open chaparral conditions adjacent to oak woodlands, to promote use by mule deer.

B8.2: Utilize seasonally timed cattle grazing, as needed, in coordination with managed fire to reduce the cover of exotic annual grasses and forbs to:

a. increase the richness and abundance of native chaparral herbs and shrubs; and
b. prevent the spread of fires through development of dense fine fuels, particularly during years of high productivity (e.g., above average precipitation), that can convert chaparral to grassland.

Goal B9: Increase understanding of the ecology of the chaparral communities of the CPER to inform their effective long-term management.

B9.1: Support research to increase understanding of the factors that affect the distribution and species composition of chaparral. Research topics that can inform management include:

a. The roles of abiotic factors (soils, microclimate, topography etc.) and disturbance (fire) in influencing the complex mosaic of chaparral associations with coastal scrub and oak woodlands; particularly, understanding the successional relationship between chaparral associations and oak woodland;
b. The effects of fire and/or grazing on community structure and species composition; specifically, the relative abundance of exotic plants, the diversity and abundance of native plants, and the assemblages and abundance of native animals;
c. The distribution and abundance of native animals, particularly the special-status species, within chaparral; and
d. The effects of climate change on the structure and composition of chaparral communities and the populations of native animal species that they support.

4.2.2.4 Desert Scrub Habitat Element

Desert scrub covers 4,770 acres (12% of the Reserve). It is highly variable, consisting of 13 different vegetation types, three of which are considered sensitive: spiny saltbush, California ephedra, and winterfat (Section 3.1.4.5).

Desert scrub habitat is utilized by at least 166 species of vertebrates (Appendix D), including five special-status species that primarily or exclusively occur in the desert scrub: blunt-nosed leopard lizard, LeConte's thrasher (*Toxostoma lecontei*), San Joaquin antelope squirrel, short-nosed kangaroo rat (*Dipodomys nitratoides*), and Tulare grasshopper mouse (*Onychomys torridus tularensis*; Table 21). Within the CPER, the condition of the desert scrub varies from highly intact to degraded by exotic annual grasses and forbs. Historic cultivation in the Panorama and American units converted desert scrub to grasslands. Fires ignited along Highway 166 in the South Chimineas Unit have killed the fire-sensitive allscale saltbush, facilitated the invasion and spread of exotic plants, and may have initiated a grass-fire cycle that threatens to convert desert scrub to non-native grassland.

Goal B10a: Maintain or increase the areal extent of desert scrub within the CPER.

Goal B10b: Maintain or increase the total diversity of native plants and animals supported by the desert scrub, by maintaining the rich mosaic of desert scrub communities.

B10.1: Implement fire and other vegetation management to:

a. Prevent fires in desert scrub by reducing the likelihood that anthropogenic fires ignited along highways (e.g., Highway 166), other frequently traveled roads, or in other areas of human activity, will spread into intact desert scrub habitat. Techniques to prevent fire spread can include reducing the cover of fine fuels by creating and maintaining fuel breaks along areas of fire ignition (e.g., Highway 166).

b. Suppress fires that can convert desert scrub to grassland using the most non-destructive methods.

B10.2: Restore native shrubs following wildfires in desert scrub, where/when natural shrub recruitment is limited.

Goal B11: Increase understanding of the ecology of the desert scrub communities of the CPER to inform their effective long-term management.

B11.1: Support research to increase understanding of the factors that affect the distribution and composition of desert scrub. Research topics that can inform management include:

a. The roles of abiotic factors (soils, microclimate, topography, hydrology etc.), land use history (cultivation and grazing) and disturbance (fire) in influencing the species composition and structure of the desert scrub communities within the CPER;

b. Understand the factors that influence the establishment of the dominant shrubs, including flooding (e.g., for certain *Atriplex* species);

c. The distribution of animal species within the various desert scrub communities; and

d. The effects of climate change on the structure and composition of desert scrub communities and the populations of native animal species that they support.

4.2.2.5 Oak Woodland Habitat Element

The Chimineas units of the CPER support 3,547 acres of oak woodlands, which consists of 2,742 acres dominated by blue oak, 804 acres dominated by Tucker oak, and a 0.7-acre patch of coast live oak in the northwest. The oak woodlands are important for many animals of the CPER. They are utilized by at least 205 species of vertebrates (Appendix D) including seven species that preferentially inhabit this community, which include acorn woodpecker, oak titmouse (*Baeolophus inornatus*), yellow-billed magpie (*Pica nuttalli*), mule deer, and big brown bat (Table 21). Oak woodlands of the CPER are in good condition as they feature sapling oaks that suggest ongoing recruitment, which is a conservation concern throughout much of their range (Tyler et al. 2006, McLaughlin and Zavaleta 2013). Non-native annual grasses and forbs are patchily abundant in the understory, particularly of the blue oak woodland-herbaceous association; however, populations of many invasive species are limited.

Goal B12a: Maintain or increase the areal extent of oak woodlands within the CPER.

Goal B12b: Maintain or increase the total diversity of native plants and animals supported by oak woodlands, by maintaining the rich mosaic of communities of varying seral stages.

Goal B12c: Promote recruitment of oaks to maintain persisting populations over time.

B12.1: Implement fire management, where needed, to:

a. Maintain the areal extent of oak woodlands, by preventing too-frequent fire resulting from anthropogenic factors, which could prevent oak recruitment and convert oak woodland to chaparral or grassland;

b. Use fire of varying frequency and other characteristics to create and maintain the mosaic of oak woodland communities and associations (Section 3.1.5), which feature diverse understory conditions and support different animal assemblages;

c. Promote establishment and growth of seedling and sapling oaks, particularly in blue oak woodlands where recruitment and stand regeneration may be patchily limited by competition from exotic annual grasses;

d. Create areas of open chaparral adjacent to oak woodlands, which can to promote use by mule deer.

B12.2: Use grazing as a management tool, where needed, to:

a. Facilitate blue oak regeneration, by reducing competition from exotic annual grasses and forbs while limiting livestock herbivory of acorns, seedlings, and saplings using seasonally timed grazing, fencing, and/or tree protectors;

b. Promote the richness and abundance of native plants within the understory by creating low-thatch conditions that promote establishment of many native plants, and reducing competition with non-native annual grasses and forbs which can limit diversity and abundance of native plants; and

c. Limit the abundance and competitive effects of non-native plants, including ripgut brome, soft chess, and red brome (Table 23).

Goal B13: Increase understanding of the ecology of the oak woodland communities of the CPER to inform their effective long-term management.

B13.1: Support research to increase understanding of the factors that affect the distribution and composition of oak woodlands. Research topics that can inform management include:

a. The roles of abiotic factors (soils, microclimate, topography, hydrology etc.), land use history (cultivation and grazing) and disturbance (fire) in influencing the species composition and structure of the oak woodland communities within the CPER;

b. The factors that influence the establishment of oaks, including the roles of abiotic factors (e.g., soil moisture), exotic plant competition, and herbivory including from native animals as well as cattle; and

c. The effects of climate change on oak recruitment, the distribution of oak woodlands, and the populations of native animal species that they support.

4.2.2.6 Juniper Woodland Habitat Element

The CPER supports 3,037 acres (8% of the Reserve) of juniper woodland, most of which is on the eastern half of the Chimineas units. Juniper woodlands are utilized by at least 207 species of vertebrates (Appendix D) including six bird species that preferentially occur within the juniper woodland: phainopepla (*Phainopepla nitens*), ash-throated flycatcher (*Myiarchus cinerascens*), Bewick's wren (*Thryomanes bewickii*), Lawrence's goldfinch, and long-eared owl (*Asio otus*; Table 21). Common animal species include Blainville's horned lizard, whiptail lizard, California towhee, Anna's Hummingbird, and gray fox (Appendix D).

The juniper woodlands are generally in good condition, though the western area that burned in the 1922 fire and then again in 1997 (Section 2.4.6) is dominated by exotic annual herbs (Section 3.1.6.3). These species may limit California juniper recolonization particularly on south-facing slopes where competition for scarce soil moisture may be greatest. The fine fuels they create can promote subsequent fires in juniper woodland, resulting in a grass-fire cycle that could convert juniper woodlands, rendering fire management critical.

Goal B14a: Maintain or increase the areal extent of juniper woodlands within the CPER.

Goal B14b: Maintain or increase the total diversity of native plants and animals supported by juniper woodland, by maintaining the rich mosaic of communities of varying seral stages.

Goal B14c: Promote recruitment of California juniper to maintain persisting populations over time.

B14.1: Implement fire management to:

a. Reduce the likelihood that anthropogenic fires ignited along Highway 166, other frequently traveled roads, or in other areas of human activity, will spread into juniper woodlands, by reducing fine fuels, particularly by controlling exotic herbs; and

b. Suppress fires in juniper woodland using techniques that are least impactive to the native plants and animals of this community. Avoid widespread use of fire retardant and fuel breaks (i.e., dozer lines), whenever feasible.

B14.2: Use grazing as a management tool to:

a. Reduce fine fuels created by exotic herbs, to reduce the risk of a fire that would kill California juniper and other non-fire adapted species in the community;

b. Facilitate California juniper recruitment, by reducing competition from non-native annual grasses and forbs while limiting livestock herbivory of seedlings and saplings, using seasonally timed grazing, and fences;

c. Promote the richness and abundance of native plants within the understory by creating low-thatch conditions that promote establishment of many native plants, and reducing competition with exotic herbs which can limit diversity and abundance of native plants; and

d. Limit the abundance and competitive effects of non-native plants, including red brome (Table 23).

Goal B15: Increase understanding of the ecology of the juniper woodland communities of the CPER to inform their effective long-term management.

B15.1: Support research to increase understanding of the factors that affect the distribution and composition of juniper woodlands. Research topics that can inform management include:

a. The roles of abiotic factors (soils, microclimate, topography, hydrology etc.), land use history (cultivation and grazing) and disturbance (fire) in influencing the species composition and structure of the juniper woodland associations and their distribution within the CPER;

b. Understand the factors that influence the establishment of California juniper, including the roles of abiotic factors (e.g., soil moisture), competition from non-native species, and herbivory including from native animals as well as cattle;

c. The effects of climate change on the establishment, growth, and survivorship of California juniper, which are long-lived trees on the edge of their range; and

d. The distribution of juniper woodlands, and the populations of native animal species that they support.

4.2.2.7 Riparian and Riverine Habitat Element

The CPER contains more than 100 miles of streams which currently support at least 261 acres of riparian communities. The riparian and riverine systems of the CPER support 222 vertebrate species (Appendix D), including eight native species that preferentially occur in this element: arroyo chub, California roach, California red legged frog, killdeer (*Charadrius vociferous*), Nuttall's woodpecker (*Picoides nuttallii*), yellow warbler (*Setophaga petechia*), raccoon (*Procyon lotor*), and western red bat (*Lasiurus blossevillii*; Table 21). Other common species in riparian areas include western pond turtle, common kingsnake, Wilson's warbler, yellow-rumped warbler, black-headed grosbeak, San Diego desert woodrat, and ornate shrew. In addition, many species that inhabit adjacent communities utilize streams and riparian areas for water, occasional habitat, and as corridors for movement (Appendix D).

Riparian and riverine communities within the CPER have been impacted by hydrologic modifications, including installation of dams; historic land uses including farming and grazing; the invasion and spread of exotic plants such as tamarisk; and the impacts of non-native animals, including wild pigs and predatory fish such as largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), and brown bullhead (*Ameiurus nebulosus*; Table 25; Section 3.1.7.3).

Except for the Cuyama River, the Reserve's streams flow only intermittently (Section 2.4.5.2). As a result, most reaches lack insufficient soil moisture to support riparian vegetation. However, stands of this important habitat occur along the Cuyama River as well as in areas of greater soil moisture in other drainages, such as those downstream of springs (Section 3.1.7.1). Historic land uses including farming and cattle grazing may have limited riparian species.

Goal B16a: Increase the areal extent of riparian communities within the CPER.

Goal 16b: Maintain or increase the total diversity of native plants and animals supported by riparian and riverine areas, by creating and maintaining a rich mosaic of intact natural communities and the range of abiotic conditions which support them.

Goal16c: Promote recruitment of riparian shrubs and trees where feasible, to create and maintain contiguous areas of riparian vegetation along streams.

B16.1: Restore riparian areas to attain the following objectives:

a. Restore the hydrologic functions of the drainages, where practical and where doing so does not degrade other important habitats, including ponds that support native plants and animals including several special-status species (Section 3.1.7);

b. Establish native riparian plant species, including riparian shrubs and trees, through direct planting, fencing to reduce cattle herbivory and trampling, and other techniques in areas that feature the appropriate hydrologic conditions to support the native riparian species; and

c. Eradicate, where feasible, and control elsewhere the populations of non-native animals that impact native species within streams, including predatory fish (e.g., using fish screens; Section 3.5.2.1) and wild pigs (Section 3.5.2.3).

d. Control tamarisk (*Tamarix ramosissima*) along the Cuyama River and eradicate it from the other drainages in the CPER, including Barrett Creek and San Juan Creek.

B16.2: Implement fire management to:

a. Reduce the likelihood that anthropogenic fires ignited along Highway 166 other frequently traveled roads, or in other areas of human activity, will spread into riparian areas, by reducing fine fuels, particularly exotic herbs and highly flammable tamarisk, or through other appropriate techniques; and

b. Suppress anthropogenic fires using techniques that are least likely to impact the sensitive species and communities.

Goal B17: Increase understanding of the ecology of the riparian and riverine systems of the CPER to inform their effective long-term management.

B17.1: Support research to increase understanding of the factors that affect the distribution and composition of riparian shrublands and woodlands. Research topics that can inform management include:

a. The roles of abiotic factors (soils, microclimate, topography, hydrology etc.), land use history (cultivation and grazing) and disturbance (fire and floods) in influencing the species composition and structure of the riparian associations and their distribution within the CPER;

b. The factors that influence the establishment of riparian shrubs and trees, including the roles of abiotic factors including stream hydrology and soil moisture, competition from non-native species (including tamarisk), and herbivory from native animals as well as cattle;

c. The distribution and control methods for non-native fish in perennial streams within the CPER, including San Juan Creek and the Cuyama River; and

d. The impacts of climate change on riparian and riverine systems, including populations of native animals.

4.2.2.8 Wetland Habitat Element

The CPER features 107 acres (0.3% of the Reserve) of wetlands, 84 acres of which is on the shore of Soda Lake in the northeastern corner of the American Unit. Additional wetland habitat patches are associated with drainages, springs, and ponds in the American and Chimineas units. The wetlands feature non-native species adapted to greater soil moisture, such as rabbit's foot grass and bull thistle, as well as cattails (*Typha sp.*), rushes (*Juncus sp.*), and sedges (*Carex sp*).

The wetland and adjoining saline soil areas along Soda Lake support at least three sensitive plant species, Lost Hills crownscale (*Atriplex coronata* var. *vallicola*), valley larkspur (*Delphinium recurvatum),* and Munz's tidy tips (*Layia munzii*). They provide important roosting habitat for long-billed curlew (*Numenius americanus)* and other shore birds.

Goal B18: Maintain or enhance the natural structure and native species composition of wetlands by maintaining or improving the hydrologic conditions.

B18.1: Coordinate with BLM to manage the wetlands surrounding Soda Lake.

B18.2: Recreate the topographic conditions to support wetlands that were altered or destroyed through cultivation, including by creating microrelief to promote vernal pools in grasslands, where appropriate.

B18.3: Manage exotic plants within wetlands to:

a. Prevent alteration of the hydrology, including reduced hydroperiod, as a result of uptake of soil moisture by non-native plants; and

b. Reduce competition with native plants, including the three special-status plants, by controlling exotic plant management using an integrated pest management approach.

Goal B19: Increase understanding of the ecology of the wetlands of the CPER to inform their effective long-term management.

B19.1: Support research to inform wetland management, including studies that:

a. Increase understanding of the ecology and species composition of the wetlands, including Soda Lake shore environment and adjacent saline soil plant assemblages, and the vernal pools of the Reserve;

b. Examine the impacts of climate change on wetlands, including the structure and species composition of the communities and populations of native animals; and

c. Evaluate effectiveness treatments to re-create wetlands and promote establishment and colonization by native plants and animals.

4.2.2.9 Pond Habitat Element

Located in the American and Chimineas units, the CPER features twelve ponds covering an estimated 7.4 acres. Prior property owners created the ponds by damming drainages or by excavating depressions in catchment areas. Pond vegetation varies depending on hydroperiod and water depth, as well as other factors, with native plant species including arroyo willow, mulefat, heliotrope, saltgrass, rough cocklebur, and alkali heath. Emergent and floating vegetation include watercress, southern cattail, and spikerush (Section 3.1.9).

Variation in hydrology and vegetation influences pond use by aquatic animal species, including western spadefoot toad, which inhabits shallow depressions that often lack emergent vegetation, and western pond turtle, which utilizes a range of pond habitats but requires some vegetation or other substrate for basking (Section 3.3). The ponds are utilized intermittently by a variety of ducks, shorebirds, and other water birds including double-crested cormorant. Other animals inhabiting the pond areas include Pacific chorus frog, tricolored blackbird, and red-winged blackbird (Appendix D).

Ponds provide important water sources for upland species in this relatively xeric environment, particularly away from creeks on the eastern portion of the American and Chimineas units, where they support numerous species that require free water including mule deer, tule elk, and several species of bats.

The ponds primarily feature native plant species, though non-native species adapted to moist conditions such as rabbit's foot grass and bull thistle occur around the margins of ponds. Vegetative cover around some of the ponds may be reduced due to herbivory from tule elk as well as cattle, for which most of the ponds were historically created. The Department has fenced the perimeter of all ponds, except for Joe Pond, to regulate cattle grazing as a tool to manage pond vegetation and hydrology.

Goal B20: Maintain or increase the total diversity of native plants and animals supported by ponds by creating and maintaining a range of pond conditions, in terms of hydrology, vegetation, and other aspects including structure.

B20.1: Enhance pond habitat to:

a. Maintain areas of open water conditions preferred or required by many species including western spadefoot toad, vernal pool species such as fairy shrimp, and many bats, which rely on open water ponds for foraging and water, using vegetation management and sediment management (e.g., dredging), where needed;
b. Maintain appropriate upland habitat for pond-breeding species, including open conditions for western spadefoot toad and woody structure required by western pond turtle (Section 3.3);
c. Regulate cattle access to ponds, to promote establishment and growth of native vegetation within and along the margins of ponds, which can enhance habitat for native many native birds such as tricolored blackbird, common yellowthroat, and yellow warbler; and
d. Create opportunities for basking, such as exposed logs, rocks, or floating mats of vegetation for pond turtles.

B20.2: Control invasive plants and animals within the CPER ponds, including:

a. Eradicate, where feasible, and control elsewhere the populations of non-native animals that impact native species within ponds, including predatory fish (Section 3.5.2.1) and wild pigs (Section 3.5.2.3); and
b. Control invasive plant species including bull thistle, yellow star-thistle, and other species that outcompete native plants and degrade habitat for animals.

Goal B21: Increase understanding of the ecology of the ponds of the CPER to inform their effective long-term management.

B21.1: Support research to inform pond management, including studies that:

a. Increase understanding of the ecological factors and management techniques that influence use of ponds by native plants and animals, particularly pond-obligate species, vernal pool species, pond-breeding species (e.g., amphibians), and bats that rely on ponds for water, and others; and

b. Examine the impacts of climate change on ponds, including the structure and species composition of the communities and populations of native animals.

4.2.2.10 Cliff and Rock Outcrop Habitat Element

The CPER features 10.4 acres that feature cliffs and rock outcroppings which support assemblages of plants adapted to thin soils, including Lemmon's jewelflower, rock gooseberry, and California four o'clock (*Mirabilis laevis* var. *crassifolia*), woodland threadstem, and lance-leaf dudleya, as well as ferns such as coffee fern (*Pellaea andromedifolia*) and goldback fern.

Rock outcroppings feature ledges, caves, and crevices that provide important habitat for a suite of animals, many of which require them. Reptiles use rock outcroppings for thermoregulation, prey avoidance, and, in the case of western rattlesnakes, hibernation locations (hibernacula). Birds including golden eagle and prarie falcon nest and roost in rock outcrops, which also provide roosts for a variety of bats including western mastiff bat, fringed myotis (*Myotis thysanodes*), and hoary bat (*Lasiurus cinereus*).

Goal B22: Prevent anthropogenic impacts and disturbances to cliffs and rock outcrops.

B22.1: Limit public access to rock outcroppings and caves by:

a. Avoiding them when siting trails, roads, other facilities and programs;
b. Limiting seasonal access for hunting and other recreational activities, as needed, to avoid disruptions to nesting and roosting species;
c. Erecting signs and fencing to deter access; and
d. Enforcing closures to cliffs, rock outcroppings, and other highly sensitive habitat areas.

Goal B23: Increase understanding of the ecology of the rock outcrops and cliffs of the CPER to inform their effective long-term management.

B21.1: Support research to inform rock outcrop and cliff management, including studies that:

a. Increase understanding of their use by plants and animal species, including lichens and invertebrates; and
b. Examine susceptibility of native species to anthropogenic impacts and disruptions.

4.2.3 Species Elements

Biological elements at the landscape and habitat level were designed to promote the viability of populations of native species within the CPER, including the numerous special-status species (Section 3.3) and native ungulates (Section 3.4). The species elements identify additional actions designed to promote populations of individual species.

4.2.3.1 Special-Status Species

The CPER supports occurrences of numerous rare plant and animal species (Section 3.3), including several species listed as threatened or endangered under the California Endangered Species Act and federal Endangered Species Act (Section 3.3). Their special status is primarily due to habitat loss; specifically, widespread habitat conversion in the Central Valley, and statewide declines in grassland, desert scrub, riparian, wetland, and pond communities.

San Joaquin Antelope Squirrel
(Photograph by Al Schmierer)

The CPER is an essential part of a large area of protected habitat within the Carrizo Plain region, which is essential to the persistence of many of these species. Most notably, the Reserve contains important habitat for the endangered species of the San Joaquin Valley including San Joaquin kit fox, San Joaquin antelope squirrel, blunt-nosed leopard lizard, and giant kangaroo rat. Other narrowly endemic species include LeConte's thrasher and Kern primrose sphinx moth. The CPER also supports regionally important habitat for more widespread species including burrowing owl, mountain plover, western pond turtle, and western spadefoot toad, among others (Section 3.3 and Appendix E).

Landscape and habitat management of the CPER is designed to maintain or enhance habitat conditions and promote viability of the populations of the special-status species of the CPER. The following additional elements are designed to ensure persistence of the especially rare or vulnerable species and safeguard special-status species during implementation of the other management elements for the Reserve, including public use and facilities maintenance. The EIR provides additional species protection measures during implementation of the LMP (Appendix J).

Goal B24: Maintain or increase populations of special-status species and otherwise promote their long-term viability within the CPER.

B24.1 Conduct management and restoration projects to address anthropogenic factors thought to unnaturally limit special-status species populations within the CPER, including controlling and eradicating, where feasible, non-native plants and animals (Section 3.5).

B24.2 Reintroduce special-status species to suitable habitat where dispersal limitation might prevent natural recolonization; for example, aquatic species (e.g., California red-legged frog) could be reintroduced following eradication of predatory fish.

B24.3 Evaluate introducing rare species not currently within the Reserve, where doing so will promote their populations without significantly impacting other native plants and animals.

B24.4: Limit impacts of human activities on the special-status species within the Reserve, through careful implementation of the habitat management, public use, and facilities management elements. The following are specific actions that can reduce impacts to special status species.

a. Maintain a spatial database (i.e., GIS) of rare species occurrences within the Reserve to inform project planning and updates to the LMP.

b. Continue to inventory the Reserve, as resources allow, and prior to projects, and update the database based on new occurrences observed during inventories and monitoring.

c. Evaluate potential impacts of management projects on special-status species during project planning and identify steps to avoid or minimize impacts as part of CEQA analyses and consultations with the federal agencies, as needed. The EIR outlines the full suite of species protection measures, which include:

   i. Avoiding activities in areas or times of the year (e.g., breeding season) where and when impacts could occur; and

   ii. Conducting pre-project surveys to identify potential significant impacts and adjusting projects to avoid or minimize them.

d. Monitor projects to evaluate their effects and effectiveness on special-status species.

B24.5: Ensure that all actions in the CPER comply with the federal Endangered Species Act and California Endangered Species Act, Section 1602 of Fish and Game Code, and other applicable regulations to protect of special-status species or their habitats.

Goal B25: Increase understanding of the ecology of the special-status species of the CPER to inform management that promote long-term viability of their populations.

B25.1: Continue to conduct surveys to evaluate the distribution and abundance of special-status plants and animals within the CPER.

B25.2: Periodically evaluate habitat within the Reserve to assess its condition for special-status species.

B25.3: Monitor the status and trends in the distribution and abundance of special-status species and evaluate effects of management. Priority should be given to focal species from the range of taxonomic groups that have been identified as collectively representing the diversity of habitat needs of the broader suite of special-status species.

B25.4: Support research to inform management of special-status species, including studies that:

a. Provide information about the specific habitat requirements and life history of special-status species populations within the CPER;

b. Track population dynamics and evaluate factors affecting the distribution and abundance of special-status species; and

c. Evaluate the effects of management, enhancement, and restoration projects, using study designs that facilitate comparisons between treated and untreated areas, and/or areas before and after treatment.

4.2.3.2 Native Ungulates

Tule elk, pronghorn, and mule deer populations are actively managed by the Department as part of state-wide programs. Within the CPER and elsewhere, the Department conducts regular monitoring to track their population abundance and determine appropriate harvest levels. The Department also works in collaboration with the California Deer Association, Rocky Mountain Elk Foundation, and other organizations to develop and implement habitat management and enhancement projects designed to promote their populations as well as that of other species.

Goal B26.1: Maintain or increase populations of native ungulates and otherwise promote their long-term viability within the CPER.

B26.1: Design and implement habitat management and restoration projects within the CPER to address anthropogenic factors that unnaturally limit tule elk, pronghorn, and mule deer populations, including controlling and eradicating, where feasible, populations of non-native plants and animals (Section 3.5).

B26.2: Manage grazing to protect mule deer, tule elk, and pronghorn habitat, including by:

a. Maintaining areas of tall grasslands in gently sloped areas, with at least 15" tall herbaceous vegetation during the spring to provide cover for fawns;

b. Maintaining large, contiguous areas within the grasslands of the Chimineas and American units that are not managed using cattle and thus preferred by tule elk; and

c. Maintaining connectivity of habitat for pronghorn between the American and Chimineas units, and the remainder of the Carrizo Plain ecoregion.

B26.3: Design and implement enhancement projects that can improve habitat conditions and promote populations of tule elk, pronghorn, and mule deer, without negatively impacting other native species, particularly special-status species. Examples of habitat enhancement projects include:

a. Creating new water sources including ponds and troughs to complement existing water sources to provide water at approximately one-mile distance within suitable habitat, including grasslands and oak woodlands of the Chimineas and American units, and desert scrub in the Panorama and Elkhorn units;

b. Restoring native shrubs to areas of desert scrub where shrub cover has been reduced, to promote use by pronghorn for fawning.

B26.4: Manage Carrizo Plain herds of tule elk, which utilize the Reserve, to promote genetic diversity, including by:

a. Maintaining large, contiguous areas of suitable habitat that promote habitat connectivity and thus movement of animals between herds; and

b. Translocating individuals between other herds in California and that within the Carrizo Plain area, as needed, to facilitate genetic exchange.

B26.5: Coordinate management of tule elk, mule deer, and pronghorn within the CPER as part of the larger state-wide management plans.

a. Implement management activities that are appropriate for the CPER within the updated statewide management plans for tule elk, mule deer, and pronghorn.

b. Monitor tule elk, mule deer, and pronghorn populations to inform their management within the CPER as well as updates of the respective statewide management plans.

B26.6: Conduct and support research to inform management of native ungulates, including:

a. Evaluate tule elk and pronghorn habitat specificity within the grassland associations of the CPER mapped by VegCAMP, to inform grassland management for structure and species composition;

b. Increase understanding of the tule elk and pronghorn diet within the CPER; and

c. Increase understanding of the population dynamics of the Carrizo Plain tule elk and pronghorn herds, to inform estimates of the carrying capacity.

4.3 Scientific Research, Monitoring, and Adaptive Management Elements

Scientific research and monitoring are critical elements of the adaptive management process used to manage the CPER. Specifically, research and monitoring can be used to:

- fill gaps in knowledge about the habitats and species, which is needed to inform management;
- evaluate the effectiveness of management and adjust it, as needed, to enhance the ability to achieve the goals of the Plan; and
- adjust to changes in conditions or circumstances that will influence management needs and effectiveness, including new scientific information, threats, or species.

Annual work plans and periodic LMP updates can be used to address changes informed by science and monitoring to promote attainment of the goals of this plan.

4.3.1 Scientific Research Element

Though much scientific research has been conducted on the biological systems and species found within the Reserve, including some studies conducted on site or in the Carrizo Plain region (Chapters 2 and 3), many gaps remain in the understanding of their ecology needed to inform management. In addition, the inherent complexity of ecological systems renders it difficult to predict the ultimate impacts of ongoing management and specific projects on populations and communities. Scientific research helps fill critical data gaps to inform the need for management and design management strategies, and also evaluate the effects of management when it is implemented as part of an 'experiment' through adaptive management. Studies conducted by academic and other research institutions can help bridge the gap between the list of desired studies to inform management and the Department's resources for monitoring.

The CPER, in turn, represents an excellent resource for the scientific community. It features a diverse mosaic of intact habitat, rich flora and fauna, and numerous populations of special-status species. Other assets include its large size, remote nature, central location within the state, and existing facilities. For these reasons, the CPER is ideally suited for establishment of long-term ecological research programs that can advance management goals for the CPER and benefit science and society broadly.

Goal S1: Increase understanding of the ecology and management needs of the species, communities, and ecosystems and their response to management, restoration, and enhancement projects by promoting, supporting, and conducting research within the CPER.

S1.1: Create and maintain a prioritized list of research topics to provide to researchers interested in conducting studies within the CPER. Topics could include:

a. evaluating restoration, enhancement, and management actions, including vegetation management, through studies that explicitly test hypotheses about management effects;

b. identifying anthropogenic factors including public access and other threats to inform the need for restoration and management;

c. identifying and characterizing indicators of ecosystem functions; and

d. studying the ecology and conservation biology of the rare or endangered species and communities.

S1.2: Encourage researchers to conduct studies within the CPER, through outreach including:

a. posting information about the Reserve and the list of research topics information on the Department's website;

b. conducting presentations about the Reserve and opportunities for research at universities, other research institutions (e.g., USGS), and scientific meetings and conferences; and

c. circulating letters to researchers to describe the Reserve and its research opportunities.

S1.3: Manage the Reserve to maintain the ecological conditions of the communities and species, so that it can be effectively used for scientific research.

a. restrict public access to the North Chimineas Unit to special permitted uses only, to protect biological resources and reduce the potential for the public to disrupt research sites or equipment.

b. limit access to the South Chimineas Unit to primarily walk-one use. Drive on use should continue to facilitate public access, but should remain limited to reduce impacts associated with vehicle access including increased likelihood of unauthorized entry into the North Chimineas Unit.

S1.4: Evaluate proposals for research projects and provide feedback to increase the effectiveness based on several criteria including:

a. success: can be successfully implemented based on the appropriateness of the study design, availability of support including funding, and the logistical and ecological opportunities and constraints imposed by the site;

b. appropriate: uses appropriate methods including any approved study protocols developed by the Department, CNPS, USFWS, BLM, USFS, or others;

c. relevance for management: ability to answer one or more high-priority questions for management of the Reserve for the Department;

d. limited impacts: can be implemented without impacting biological, cultural, and public use goals for the Reserve or interfering with or precluding future research; and

e. importance: can contribute to science and society.

S1.5: Issue permits for approved research projects that specify the conditions under which research can be conducted, consistent with the Department's regulations for public use (https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=93480&inline) and including:

a. dates, times, locations, and methods of authorized access;

b. allowable manipulations, including habitat treatments, capturing, handling, and/or marking of individual plants or animals; and permanent marking of plots; and

c. reporting requirements, including the type and format of data, reports, and published papers that must be provided upon completion of the study, or at intervals during the research (e.g., annually).

S1.6: Establish and maintain relationships with regional academic institutions to promote ongoing research at the CPER, including long-term ecological studies that are essential to effective management including monitoring climate change impacts.

S1.7: Create and maintain resources to promote research at the Reserve and enhance the effectiveness of individual projects and the overall research program at the CPER. Resources include:

a. infrastructure and facilities to promote research, including a laboratory with basic equipment (e.g., microscopes, scales, etc.) for on-site research use, internet access, one or more weather stations;

b. an electronic database of research projects, monitoring studies, and surveys conducted on the Reserve as well as background literature on the region such its geology, soils, hydrology, and other information to inform research;

c. a geographic information system (GIS) for the Reserve, which contains base layers, regional datasets, and data collected within the Reserve by the Department and researchers;

d. species lists for the Reserve; and

e. records of all habitat management projects and the occurrences of natural disturbances (e.g., fire) or other information about the site.

4.3.2 Monitoring Element

Monitoring can serve a variety of purposes within the CPER including:

- examining potential impacts of human activities including public use and facilities management on the biological and cultural resources;
- detecting changes in the condition of communities or focal species habitat or populations that should trigger changes in management;
- evaluating the effectiveness of ongoing management programs such as vegetation management to inform changes necessary to attain long-term goals for the site;
- examining responses to specific management or restoration projects, such as an invasive plant control project, to determine its effects; and

- detecting trends in focal species populations as part of regional and statewide monitoring programs.

A variety of approaches can be used to systematically observe and record conditions in order to evaluate status and/or trends. Qualitative monitoring studies used to generally characterize the system can include direct observational assessments of habitat conditions and photomonitoring. In quantitative monitoring, some aspects of the system that indicate its condition are measured, and descriptive and/or inferential statistics are used to assess the status and trends.

San Joaquin Woolly Threads
(Photograph by Bill Bouton)

To be effective, monitoring protocols for the CPER should be designed to:

- Measure appropriate indicators to accurately represent the systems being monitored (e.g., density for populations, or native species cover and richness for communities) using techniques that are repeatable.
- Specify all elements of a successful study, including the questions, hypotheses, and all aspects of the methods, including study design, personnel, frequency, and seasonality, and how results will be analyzed, interpreted, and used to guide management.
- For quantitative monitoring, be designed based on robust principles of scientific sampling in order to accurately detect the status of the indicators and identify real and biologically meaningful trends in their values.

Given the size and complexity of the Reserve, an effective, long-term monitoring program will need to:

- focus on the highest priority systems for observation, including species, communities, or responses to management;
- maximize effective use of monitoring resources including staff time and budget; and
- be sustainable, in terms of the level of resources required, to enable the long-term analysis required to accurately assess trends and other modest changes amidst background variation.

The following goals and tasks identify key approaches to successful monitoring within the CPER.

Goal S2: Enhance long-term effectiveness of the management of the CPER by evaluating the effectiveness of management and tracking the status and trends in communities and species to detect changes that could trigger the need for new management projects.

S2.1: Evaluate the effects of public use, facilities management, and other human activities on the biological and cultural resources of the Reserve. Specific monitoring elements should include:

a. Tracking aspects of public use including type, frequency, intensity, and locations of use;

b. Recording facilities maintenance activities including road maintenance by type, frequency, and location; and

c. Identifying and periodically assessing the conditions of the types and locations of resources that could be affected by human activities.

S2.2: Periodically examine the areal extent of the communities within the CPER, in order to evaluate success toward the landscape and habitat elements related to maintaining or increasing important communities. The protocol could include:

a. Periodic updates to the Reserve-wide vegetation mapping conducted to develop the LMP (Section 3.1) as new high-resolution aerial imagery becomes available. Intervals of 8-15 years are appropriate to detect changes in the areal extent of terrestrial vegetation.

b. Periodic field mapping of ponds, wetlands, and other community types or habitat features that are small, ephemeral, or otherwise not readily detected in aerial images.

S2.3: Periodically examine the species composition and structure of the communities to evaluate success toward the habitat elements related to maintaining or increasing the cover and diversity of native species and decreasing the cover of exotic plant species. Monitoring should include the following elements.

a. Examination of plants and animals in permanent sampling units (e.g., plots for plants, trap stations for small mammals, points for birds, etc.), which are stratified among the various community types and by management regime (e.g., burned/unburned areas and/or grazed/ungrazed areas), and co-located to enable comparison of the data among taxonomic groups (e.g., effects of vegetation changes on bird populations). The current permanent points within the Chimineas units of the CPER established as part of the initial inventory of the unit could be utilized for this purpose and the monitoring protocol could be expanded to the other units.

b. Protocols for each taxonomic group that are repeatable and can be used to detect biologically meaningful changes in the richness and abundance of native and exotic plants and animals.

S2.4: Track the status and trends of the focal species populations within the CPER, by developing, implementing, and adapting, as needed, long-term monitoring protocols that address important aspects of each species' life history and population biology within the site. Table 26 includes the initial list identified based on the following criteria, which should be reviewed and updated to refine focal species for monitoring:

a. Species subject to the Department's statewide management (e.g., tule elk and mule deer);

Table 26: Monitoring for focal species and habitats

Type	Monitoring Target[1]	Primary Habitat(s)	Attribute(s) Monitored	Method	Frequency
Plants and Vegetation	pale-yellow layia	juniper woodland, desert scrub	Density and frequency of occurrence	Permanent plot sampling	Every Five Years
	showy madia	grassland, juniper woodland, desert scrub	Density and frequency of occurrence	Permanent plot sampling	Every Five Years
	Lemmon's jewelflower	coastal scrub	Density and frequency of occurrence	Permanent plot sampling	Every Five Years
	Kern mallow	Desert scrub, juniper woodland, grassland	Density and frequency of occurrence	Permanent plot sampling	Every Five Years
	San Joaquin woolly threads	grassland	Density and frequency of occurrence	Permanent plot sampling	Every Five Years
	La Panza mariposa lily	coastal scrub	Density and frequency of occurrence	Permanent plot sampling	Every Five Years
	blue oak	blue oak woodland	Size structure and recruitment	Permanent plot sampling	Every Five Years
	vegetation	All types	Vegetation changes	Remote sensing (e.g., aerial image analysis)	Every 8-15 years
Amphibians	western spadefoot toad	pond	Occupancy	Visual pond surveys	Every Five Years
Reptiles	Blainville's horned lizard	coastal scrub	Occupancy	Visual surveys	Every Five Years
	blunt-nosed leopard lizard	desert scrub	Occupancy	Visual surveys	Every Five Years
	western pond turtle	pond	Abundance and demography	Capture/recapture	Every Five Years
	San Joaquin coachwhip	grassland (general)	Occupancy	Coverboards	Every Five Years
Birds	burrowing owl	grassland (short)	Occupancy	Call surveys	Every Five Years
	Costa's hummingbird	coastal scrub	Frequency	Point counts	Every Five Years
	wrentit	chaparral	Frequency	Point counts	Every Five Years
	California thrasher	chaparral	Frequency	Point counts	Every Five Years

Table 26: Monitoring for focal species and habitats

Type	Monitoring Target[1]	Primary Habitat(s)	Attribute(s) Monitored	Method	Frequency
	grasshopper sparrow	grassland (tall)	Frequency	Point counts	Every Five Years
	lark sparrow	oak woodland	Frequency	Point counts	Every Five Years
	LeConte's thrasher	desert scrub	Occupancy	Territory Surveys	Every Five Years
	long-eared owl	juniper woodland	Occupancy	Call Surveys	Every Five Years
	Tricolored blackbird	pond/riparian	Frequency	Point counts	Every Five Years
	Yellow-billed magpie	oak woodland	Frequency	Point counts	Every Five Years
	Yellow warbler	Riparian	Frequency	Point counts	Every Five Years
Mammals	western spotted skunk	chaparral	Occupancy	Camera traps	Every Five Years
	giant kangaroo rat	grassland	Density and frequency	Small mammal trapping, Aerial surveys	Every Five Years
	mule deer	oak woodland	Density and frequency	Road surveys	Every Five Years
	San Joaquin kit fox	grassland (short)	Occupancy, density, and frequency	Camera traps and Spotlighting	Every Five Years
	tule elk	grassland (tall)	Density and frequency	Aerial surveys	Every Five Years
	Special-status bats	various	Density and frequency	Acoustic surveys (sonobat)	Every Five Years

[1] Scientific names are provided in Appendix C (plants) and Appendix D (animals).

b. Special-status species for which the CPER is particularly important for conservation (e.g., San Joaquin kit fox and western pond turtle); and

c. Species which are specialists within a community and could serve as good indicators of condition (e.g., western spadefoot toad, yellow-billed magpie, and western spotted skunk).

S2.5: Monitor occurrences of invasive plant species to detect their potential spread and inform the need for management. Invasive plant monitoring should include:

a. Tracking the abundance and distribution of widespread exotic species in permanent plots monitored as part of the community structure and species composition monitoring (S2.3); and

b. Implementing an Early Detection/Rapid Response (EDRR) program (Section 4.4.3), to identify new locations of invasive plant species so they can be eradicated before they spread.

S2.6: Evaluate the effects of specific management, restoration, and enhancement projects, such as invasive plant control projects, pond enhancement projects, or other discrete (rather than ongoing) activities. By conducting project-level monitoring before and after the treatment, and/or comparing managed areas to unmanaged (control) areas, management projects can be implemented as experiments designed to increase understanding of their effects or effectiveness and guide long-term management.

4.3.3 Adaptive Management Element

Department Staff Monitoring Tule Elk with GPS Collars (Photograph by Maya Kepner)

The CPER will be managed through an adaptive management framework, in which monitoring is used to evaluate the effectiveness of management strategies, which are then adjusted, as necessary, to enhance their ability to achieve the goals of the plan. In the adaptive management element, changes in conditions, as well as new scientific research and monitoring results, will be used to inform changes in management.

S3: Increase the long-term effectiveness of management of the CPER by updating management actions according to new scientific research and monitoring results, as well as changes in the Reserve.

S3.1: Review newly developed scientific information relevant to management of the Reserve. Methods to obtain and assimilate the information may include but are not limited to:

a. Convening a team scientists, biologists from other portions of the Department (e.g., state headquarters), staff of agencies responsible for managing the adjacent public lands (BLM, USFS, USFWS, etc.), and other knowledgeable individuals for an annual meeting to discuss scientific research and monitoring relevant to conservation in the region;

b. Attending scientific meetings and conferences hosted by other organizations (e.g., The Wildlife Society, California Invasive Pest Council Conference, etc.)

c. Reviewing the annual reports of researchers working on the CPER as well as those prepared by agencies managing other protected lands nearby; and

d. Direct outreach to knowledgeable individuals including scientists, conservation practitioners, and land managers.

S3.2: Prepare a report for the CPER every ten years that contains the following for each element of the LMP (i.e., biological, public use, cultural resources, and facilities):

a. A summary of the management activities and monitoring results;

b. A summary of new scientific information and its implications for management;

c. Recommendations for future management and monitoring designed to attain the LMP goals; and

d. Recommended adjustments to the LMP based on results to date, to facilitate periodic updates to the LMP (S3.4)

S3.3: Develop an annual work plan for the CPER. The work plan should contain the following for each element:

a. A list of the management and monitoring activities to be conducted, based on the highest priorities and the resources available (Department staff time and budget, collaborator resources, etc.);

b. A schedule or timeline for activities; and

c. An annual budget.

S3.4: Update the LMP as needed to maintain its relevance to inform management of the Reserve. The updated LMP should include current information about the following aspects of the Reserve:

a. biological and cultural resources, based on ongoing monitoring, research, and other new information at the site;

b. public uses, including the type and frequency;

c. conservation status of rare species populations; and

d. management techniques and their overall effectiveness.

4.4 Vegetation Management Elements

Various approaches to managing the vegetation of the CPER will be used to achieve goals for the biological elements (Section 4.2) and facilities elements (Section 4.7) of the LMP. The vegetation management element coordinates fire management, grazing management, and exotic plant management, to maximize effective use of the interrelated tools.

4.4.1 Fire Management Element

Within the CPER, fire plays an important role in maintaining the diverse mosaic of communities of various successional (seral) stages, and thus greatly contributes to the Reserve's native species diversity. Fire is a major component of the natural disturbance regime of many of the Reserve's communities, particularly the chaparral and oak woodlands within the Chimineas units, where fire creates and maintains habitat for many native species, including mule deer (Section 3.1). Prescribed fire can be an effective landscape-level vegetation management tool for attaining the biological goals of the Reserve.

At the same time, several of the Reserve's plant communities including juniper woodland and desert scrub, can be harmed by fire, which can kill their dominant plant species (i.e., California juniper and *Atriplex* spp.). Even in fire-adapted communities, fire can promote the invasion and spread of exotic plants, which, in turn, can increase fire frequency and convert shrublands and woodlands to exotic-dominated grassland (Section 3.1). Unnatural fire ignitions associated with human activities, particularly along Highway 166 and other roads, may be negatively impacting the biological systems, cultural resources, and facilities of the Reserve, as well as threatening public safety and property (Section 2.4.6).

Due to the proximity to human development and thus threat to lives and property, fire protection agencies are likely to suppress wildfires in the CPER soon after they are detected. These agencies may be interested in collaborating with the Department to conduct prescribed fires and other vegetation management projects to reduce the risk of catastrophic wildfire.

Given the complex nature of the landscape-scale process and the uncertainties regarding fire effects, adaptive management will be essential to the effective use of fire to attain the goals for the Reserve. Fire management in the Reserve will be designed and implemented consistent with the Fish and Game Commission's Joint Policy on Pre-, During-, and Post-Fire Activities and Wildlife Habitats (http://www.fgc.ca.gov/policy/p5joint.aspx#INTERIM). It will be based on the biological and vegetation management goals outlined in the LMP, by biologists and fire practitioners with regional experience, and implemented in coordination with fire protection agencies and with input from adjacent landowners.

Goal V1: Manage fire to protect and enhance the biological systems, cultural resources, and facilities of the CPER, and promote attainment of the goals described under the corresponding elements.

V1.1: Develop a fire management plan for the CPER to manage wildfires and use prescribed fire as a vegetation management tool to attain the biological goals related to fire, and protect cultural resources, facilities, and public safety. The fire management plan should contain the following components:

a. An assessment of the fuel conditions throughout the Reserve, to identify areas where hazardous fuels may threaten human health and safety or biological or cultural resources, or facilities.

b. Wildfire prevention methods, which will address techniques to:

   i. Reduce anthropogenic fire ignitions, through outreach to the public and neighbors including adjacent land managers; and

   ii. Vegetation management projects including shaded fuel breaks, disking, mowing, or prescribed fire, to prevent or slow the spread of fires into the Reserve from roads or adjacent lands.

c. Wildfire response strategies, to respond to wildfires in the Reserve using techniques that are least harmful to the biological and cultural resources, including appropriate fire suppression techniques that may be used to protect public safety, property, or biological resources on the site. This portion of the plan could address:

   i. Designating fire compartments, or areas delimited by existing roads, fuel breaks, or naturally low-density vegetation, within which fire can be contained;

   ii. Ponds, tanks, wells, and other water sources that can be used to fight fire;

   iii. Methods and infrastructure (e.g., water pumps) needed to protect facilities at the Chimineas Headquarters and Painted Rock Ranch;

   iv. Creating and maintaining compartments, including carefully designed and created fuel breaks that avoid or minimize impacts and which can prevent more destructive suppression techniques;

   v. Identifying areas in which wildland fires can burn to accomplish specific management objectives related to plant community structure and species composition and fire hazard abatement elsewhere;

   vi. Access and staging areas for heavy equipment, including preferred routes and areas of high biological and/or cultural resources value to avoid, where possible; and

   vii. Aerial combat guidelines, including use of fire retardant and water.

d. Wildfire mop-up and rehabilitation, which will outline steps to restore areas negatively affected by the fire and its suppression, including by:

   i. Repairing fences;

   ii. Recontouring and stabilizing fire lines to prevent erosion;

   iii. Detecting and eradicating new invasive plant occurrences, which can be vectored by heavy equipment and facilitated by fire, mechanical disturbance, and fire retardants; and

   iv. Temporary public access closures to protect public safety, prevent erosion, or protect vulnerable biological or cultural resources.

e. Prescribed fire, which will describe approaches to using fire to manage the biological resources and prevent or reduce the spread of wildfires that could threaten biological and cultural resources and threaten property and public safety. The prescribed fire component of the plan could include:

   i. General fire management prescriptions to alter plant community structure and species composition and attain the goals for each habitat element (Section 4.2.2). Prescriptions should be developed based on the fire ecology of the Reserve communities and species (Section 3.1 and Appendix E) and identify the following:

      - fire type (surface or crown), seasonality, intensity, and severity;
      - fire conditions, in terms of fuel moisture, temperature, and humidity; and

- Other general considerations pertaining to the ecological conditions of the fire that should be addressed in the development of specific burn plans.

ii. Steps to avoid and minimize impacts to sensitive biological and cultural resources, including pre-project surveys.

iii. Fire implementation approaches, permit requirements and processes for burning, potential partners, Reserve closures, noticing of neighbors, and other logistical steps to implement the fire.

iv. Monitoring protocols to evaluate fire effects and effectiveness and to evaluate the need for remedial management, such as invasive plant or erosion control.

V1.2: Implement fire management and fire protection in coordination with agency partners, which may include the California Department of Forestry and Fire Protection (CalFire), Los Padres National Forest (USFS), Carrizo Plain National Monument (BLM), County of San Luis Obispo, and adjacent landowners.

V1.3: Provide the public with information about fire management to promote public understanding of and support for the Department's fire management within the Reserve.

4.4.2 Grazing Management Element

Like fire, managed livestock grazing is an important landscape-scale vegetation management tool for attaining the biological goals for the Reserve. Ungulate grazing is an important natural process in grassland ecosystems (McNaughton et al. 1989). Well-managed grazing is recognized as an effective management tool in herbaceous-dominated communities, including grasslands and oak woodlands, to manipulate plant community structure and species composition, control exotic plant species, decrease fuels and reduce the risk of fire, and create and maintain habitat for native animals (Huntsinger et al. 2007). When managed improperly, grazing can also harm biological systems, degrade water quality, and cause soil erosion and loss (Painter and Belsky 1993, Fleischner 1994, Freilich et al. 2003).

The Department has used grazing as a vegetation management tool within the Chimineas units of the CPER to maintain habitat conditions required by, or conducive to, several focal management species, including those that require short-statured grasslands (Table 21). As outlined in the respective habitat elements (Section 4.2) and described in greater detail in the habitat descriptions (Section 3.1), grazing management within the CPER can be used to:

- create and maintain areas of short-structured grassland required by several native species;
- enhance native plant cover and richness in grasslands, blue oak woodlands, and coastal scrub; and
- control non-native herbaceous plant species to reduce their competitive effects on native plants and the potential for type conversion of shrublands to grassland via the grass-fire cycle.

As with other components of vegetation management, managed grazing will be implemented through an adaptive management framework in which monitoring will be used to evaluate the effectiveness of grazing at achieving the goals and objectives, as well as to assess its effects on grazing-sensitive biological resources, soils, water, and cultural resources. If grazing is not achieving the goals, or negative effects are outweighing its benefits, it will be adjusted or discontinued.

Cattle Grazing for Vegetation Management in the North Chimineas Unit
(Photograph by Jodi McGraw)

The elements of the adaptive management framework will be outlined in the grazing management plan, which will be developed by biologist(s) in coordination with range managers with regional experience in their respective fields. It will be developed in consideration of fire and exotic plant management elements as part of coordinated vegetation management.

The plan will reflect the use of grazing as a management tool to achieve the biological goals and objectives, while limiting impacts on cultural resources and public use. Though fees will be charged to those who receive grazing permits; the purpose of a grazing program will not be to generate revenue.

The grazing management plan will build on the prior grazing lease for the Chimineas units of the CPER (CDFW 2011b). Developed to be consistent with the LMP, which was in development at the time, the lease was subject to environmental review in accordance with the California Environmental Quality Act (CEQA, Public Resources Code Section 22000 et set). It identifies specific management prescriptions for management units which are consistent with the habitat element goals related to grazing (Section 4.2.2).

Goal V2: Maintain and enhance the biological systems that are promoted by grazing management, while protecting cultural resources, environmental resources, and Reserve facilities, allowing public uses, and promoting attainment of the goals described under the corresponding elements.

V2.1: Develop a grazing management plan for the CPER to use livestock as a landscape-level management tool to attain the biological goals related to grazing, while protecting sensitive biological and cultural resources and facilities. The plan will be prepared by a team including those with expertise in grazing management as well as the ecology of the region and rare species. The following are recommended plan components.

a. Specific goals and objectives for grazing as a management tool, which are based upon the biological goals of the LMP.

a. Grazing prescriptions, which identify how grazing management can be conducted to attain the various goals and objectives. Grazing prescriptions will include:

i. Desired grazing conditions: specific metrics identifying the conditions to be created through grazing in each treatment area. The metrics will vary depending on the goals, but will include herbaceous plant height, residual dry matter, and cover or richness of native and exotic plants;

ii. animal class: the kind of animals, in terms of species, breed, and age, which can influence the grazing management;

iii. spatial distribution: which portions of the Reserve will be grazed, including to create variable habitat conditions, and avoid impacts to grazing-sensitive resources;

iv. temporal distribution: when animals will be grazing, as the seasonality of grazing can influence its effects; and

v. intensity of use: the amount of herbaceous plant biomass that will be left on the ground as residual dry matter at the end of the year, which can be used to estimate the number of grazing animals within each area to be grazed, based on annual productivity, which varies each year due to weather.

Grazing prescriptions will be developed based on the extensive scientific literature that has examined the effects of various types of grazing, based on the seasonality, intensity, and frequency, on biological systems, and the site-specific conditions of the Reserve. These prescriptions will be updated over time, as part of the adaptive management process, to promote effectiveness of grazing at achieving the goals, and also to address changes in conditions due to weather, exotic plant invasions, or fire.

b. Grazing facilities, such as water and fencing, that are currently present or that would be needed to implement the plan, including to protect grazing-sensitive resources such as some rare plants or riparian and wetland areas.

c. Potential impacts of grazing on sensitive species, special communities, cultural resources, and public uses, and measures to avoid or minimize these effects.

d. Measures to protect soil and water quality, including by maintaining appropriate levels of residual dry matter on the soil surface.

e. Elements of an adaptive management framework, including monitoring protocols to assess effective implementation of the grazing prescriptions and evaluate effectiveness at attaining the biological goals and objectives of the grazing management plan and larger LMP.

V2.2: Implement grazing management through the adaptive management framework outlined in the plan, including by developing and administering grazing permits, conducting annual monitoring of grazing effects and effectiveness, and identifying adjustments to the grazing permits, as needed, to promote achievement of the goals.

V.2.3: Coordinate grazing management with the staff of the Los Padres National Forest (USFS) and Carrizo Plain National Monument (BLM) that administer the grazing leases on the federal land adjacent to the Reserve.

V2.4: Provide public information on grazing management within the CPER to promote public understanding of and support for the Department's efforts to manage the Reserve.

4.4.3 Exotic Plant Management Element

The CPER supports at least 77 exotic plant species, including 32 species on the California Invasive Plant Council (CalIPC) list of invasive, non-native plants that threaten wildlands (Table 23). Exotic plants negatively impact the Reserve through a variety of mechanisms including by outcompeting native plants, changing the structure of the communities and degrading habitat for native animals, altering the hydrology of ponds and streams, and promoting fire in non-fire adapted systems (Section 3.5.1.1). As elsewhere, the invasion and spread of exotic species is ongoing; new, potentially more detrimental, species are likely to become established within the Reserve during implementation of this plan.

Table 27: Treatment goals and potential methods for initial priority exotic plants species

Species or Guild	CalIPC Rank[1]	Treatment Goal	Treatment Method(s)
Non-Native Annual Grasses (*Avena* spp., *Bromus* spp., *Schismus* spp., *Festuca myuros)*	Limited to High	Control	Managed grazing, particularly during late fall to early spring, to reduce competition and seed production
			Mowing in the fall to early spring as per above
			Post-emergent, grass-specific herbicides for especially problematic patches (e.g., *Polypogon monspeliensis* near ponds or wetlands)
Yellow star-thistle	High	Eradicate	Intensive grazing before the spiny stage but after bolting (April-June)
			Post-emergence herbicide application (May-July)
tocalote	Moderate	Control	Same as for yellow star-thistle
Non-Native trees other than *Tamarix* spp. (*Ailanthus altissima*, *Olea europaea, Robinia pseudoacacia*)	Limited to High	Eradicate	Cut at base and apply topical herbicide as needed to prevent stump and root sprouting.
Tamarix spp.		Control in Cuyama River; eradicate everywhere else.	Isolated trees and small stands (e.g., Barrett and San Juan creeks): cut and apply topical herbicide to the stump to reduce sprouting; kill root sprouts with follow-up herbicide.
			Large infestations (Cuyama River): Develop site-specific treatment plan in coordination with other landowners

[1] **California Invasive Plant Council Invasive Plant Inventory Categories (CalIPC 2016):**

High= Species have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure.

Moderate= Species have substantial and apparent—but generally not severe—ecological impacts.

Limited= Species are invasive but their ecological impacts are minor on a statewide level.

Exotic plant management strategies must be developed in consideration of the ecology of the exotic species (or guilds of species, such as annual grasses) and the systems in which they occur. Given the size of the Reserve and the current extent of exotic species, their occurrence within sensitive habitat supporting special-status species, their response to disturbance including fire, and their ability to spread from adjacent properties, exotic plant management should be strategic and cautious, and conducted in coordination with other vegetation management components and, where feasible, adjacent landowners. As with other aspects of management, exotic plant management will be conducted within an adaptive management framework to enhance long-term effectiveness.

Goal V3: Control or eradicate exotic plant species and prevent their invasion and spread into the Reserve to promote attainment of the biological, public use, and facilities goals of the LMP.

V3.1: Control and eradicate priority exotic plants within the Reserve, using the most effective control techniques for the species or guild, while minimizing impacts to non-target species or other natural resources. Table 28 identifies initial priorities based upon an assessment of the impacts of each exotic plant on the species, communities, or ecosystems of the CPER, and the feasibility of successful control, based on its extent, life history, and demonstrated effective control in the literature.

Treatment locations should be prioritized based upon site factors, sensitive habitat areas, including community types (e.g., ponds and riparian areas) or population centers for sensitive species, where exotic plant control is most important; treatments should also be prioritized where they can be most effective, including upstream or upwind of the infestation, or on the edge rather than the middle.

V3.2: Monitor priority exotic plant populations to evaluate effectiveness of treatment and detect changes in their distribution and abundance to inform adjustments to management.

V3.3: Reduce the likelihood of new invasions and the spread of exotic plants, by:

a. Cleaning vehicles and heavy equipment that enter the Reserve;

b. Disposing of plant debris, including from exotic plant control projects;

c. Conducting outreach to the public to prevent movement of exotic plants;

d. Feeding livestock used in grazing management only certified weed-free feed (e.g., hay and pellets); and

e. Requiring livestock operators to use only certified weed-free forage to limit the invasion and spread of non-native plants.

V3.4: Implement an Early Detection/Rapid Response program for the Reserve, to identify new invasive species occurrences and eradicate them before they spread. Such EDRR programs are the most cost-effective way to manage exotic plants in large and diverse natural lands such as the CPER.

V3.5: Coordinate exotic plant control with fire and grazing management whenever possible, and use integrated pest management to limit negative impacts of control methods including biocides (herbicides and pesticides) on non-target species and resources, including water.

V3.6: Coordinate exotic removal efforts with adjacent landowners USFS, BLM, private landowners to coordinate regional exotic plant control, particularly where efforts within the CPER alone cannot address exotic plant impacts (e.g., tamarisk along the Cuyama River).

V3.7: Enlist the assistance of government agencies and scientific and conservation organizations with exotic plant management. The Natural Resource Conservation Service, Resource Conservation District, San Luis Obispo County Agricultural Commissioner's Office, California Department of Food and Agriculture, The Nature Conservancy, Audubon Society, California Native Plant Society, California Invasive Plant Council, California Deer Association, Chimineas Ranch Foundation, and Rocky Mountain Elk Foundation can assist with projects, provide information about effective control methods, and support research where controls methods are still costly or unknown.

V3.8: Provide public information about exotic plant management within the CPER to promote public understanding and support for the Department's efforts to manage the Reserve.

4.5 Public Use Elements

A Public Workshop on Native Plants in the Chimineas Units of the CPER (Photograph by Jodi McGraw)

The CPER provides excellent opportunities for wildlife-dependent outdoor recreation activities and public education programs. The Reserve is also part of an important cultural landscape, and access for cultural resources purposes is important to Native Americans in the region.

Public access must be consistent with CCR Title 14, Division 1, Subdivision 2, Chapter 11, Sections 550 et seq. and 630, which identify allowed uses of State ecological reserves (Section 2.8.1). Moreover, it must be designed and managed to ensure it is compatible with the biological goals for the Reserve, which are the priority for management of State ecological reserves. The EIR outlines best management practices including species protection measures to limit impacts of activities and new infrastructure on the Reserve's natural and cultural resources (Appendix I).

Where conflicts arise between public use and the conservation of the natural resources, the goals and tasks within the public use element will be modified to ensure that biological and cultural resources are protected. Public access will also be managed to ensure public health and safety and to maintain the effective use of the Reserve for scientific research.

4.5.1 Environmental Education Element

The CPER provides excellent opportunities for activities and programs that promote public education about ecological systems and values of the region, the importance of habitat protection and management, and wildlife and environmental management issues. The Department can pursue the following goals through its collaborations with organizations including various universities, Chimineas Ranch Foundation, The Wildlife Society and, the California Native Plant Society, and by forming new partnerships with schools and education organizations in the region.

Goal P1: Educate the public about the unique ecology, natural history, and conservation and management of the CPER to increase understanding of its conservation, cultural resource, and education values.

P1.1: Develop and support public education programs and activities for the CPER including:

a. educational workshops (e.g., on invasive plant ecology, wildlife tracking);
b. guided tours of parts of the Reserve that are popular destinations for day-use visitors and that highlight the Reserve's unique natural resources;
c. presentations to K-12 schools and university classes and/or at educational conferences to promote educational programs and opportunities; and
d. opportunities for volunteers to gain hands-on experience with management and monitoring activities (e.g., through participation in wildlife surveys and habitat restoration and management projects).

P1.2: Facilitate site-appropriate, wildlife-dependent programs at the Reserve by:

a. providing permits for, and staff assistance with, programs as Department time and resources permit;
b. encouraging user groups to incorporate the Department's guidelines for natural resource education in their activities, curricula, and interpretive programs, both on and off-site; and
c. collaborating with partner agencies and local organizations and user groups to develop natural resource education opportunities.

Wildflower Viewing in the Panorama Unit
(Photograph by Jodi McGraw)

P1.3: Create and maintain tools and materials for use in environmental education programs and activities including:

a. Upgrade and/or construction of facilities (i.e.-classroom) that are of sufficient size and technology to provide educational programs for large groups.
b. interpretive information that describes the ecology of the Reserve, identifies areas where visitors can observe unique natural resources, resource degradation, and management challenges, and describes how the Department is working to restore and manage habitat; and
c. curriculum materials and field equipment for use by environmental education groups and programs.

4.5.2 Wildlife Observation Element

With its abundant and varied plants and animals, the CPER provides outstanding opportunities for high-quality wildlife observation activities, including botanizing, birding, and nature photography.

Goal P2: Promote public enjoyment of, and awareness about, the native species and communities of the CPER and adjacent region, by maintaining and enhancing opportunities for self-guided hiking, wildlife observation, illustration, photography, and plant identification.

P2.1: Develop and make publicly available information about the native species and communities of the Reserve, including species lists, maps indicating areas of interest, and other brochures, to facilitate pubic wildlife observation. Information should be made available at the main access points of the Reserve as well as on the Department's website.

P2.2: Consider establishing wildlife viewing areas such as observation platforms or boardwalks in habitats and locations that provide for undisturbed wildlife viewing and where they will not have deleterious environmental impacts or result in undesirable visual effects.

4.5.3 Hunting Element

A Junior Hunt Program within the Chimineas Units of the CPER (Photograph by Ryan Smith)

The large size, remote location, and diverse mosaic of intact habitat within the CPER create excellent opportunities for hunting. The Department currently allows hunting for upland game and big game within the Reserve as part of both unsupervised public access and Department-sponsored programs (Section 2.8.3). Hunting programs include game species are managed on a statewide basis. In developing and implementing hunting programs, the Department works closely with local and state-wide hunting organizations including The California Deer Association, Rocky Mountain Elk Foundation, Quail Forever, Arroyo Grande Sportsmen, Santa Maria Valley Sportsmen, Wild Turkey Federation, and Safari Club International.

The goal of the hunting element for the CPER is to provide safe, high-quality hunting opportunities, in which lower-intensity hunting (i.e., fewer hunter days) helps maintain relatively high abundance of upland game (quail, dove, and rabbit) and big game (tule elk, mule deer, and wild pig), while limiting impacts to biological and cultural resources. Hunting of coyote and California ground squirrel is not permitted within the Chimineas units. Unsupervised target shooting is similarly prohibited (Section 2.8.3).

Goal P3: Provide high-quality hunting opportunities within the CPER.

P3.1: Develop and continue to refine the elements of high-quality hunting program, based on feedback from hunters.

P3.2: Regulate hunting including access, harvest rates, and hunting locations to maintain viable populations.

P3.3: Monitor hunting activity (hunter days and harvest) and population abundance and adjust the hunting program, as needed, to maintain high-quality hunting opportunities and viable animal populations.

Goal P4: Minimize the impacts of hunting on the biological and cultural resource goals while providing high-quality hunting opportunities.

P4.1: Post the allowed hunting opportunities (species and seasons), and the hunting restrictions, including the prohibitions on target shooting, hunting certain species, and lead ammunition on the Department website and at Reserve access locations.

P4.2: Monitor hunting activity (hunter days and harvest) and animal populations and adjust the hunting program, as needed, to maintain viable populations of game, and minimize impacts on non-game native species.

Goal P5: Maintain the safety of hunters and non-hunting visitors to the Reserve.

P5.1: Provide hunter safety instruction during apprentice hunts and other on-site workshops, as well as posted signs and websites.

P5.2: Provide visitor information through posted signs and website content to maintain the safety of non-hunting visitors during hunting season and/or in areas where hunting is ongoing.

P5.3: Where and if needed, designate separate hunting areas and non-hunting areas during hunting seasons.

P5.4: Monitor and supervise hunting as needed to promote compliance with the regulations and safety guidelines.

Goal P6: Enhance and expand hunting opportunities and the number and variety of users taking advantage of them.

P6.1: Coordinate with non-profit groups that promote hunting opportunities to plan activities and programs.

P6.2: Encourage hunting by under-represented groups such as youth, women, and mobility-impaired individuals.

P6.3: Periodically solicit and review feedback from the public for changes to the hunting program on the Reserve.

Goal P7: Increase public awareness of the hunting opportunities available on adjacent public lands, including the Los Padres National Forest and the Carrizo Plan National Monument, particularly where activities or uses are limited on the CPER.

P7.1: Use Department signage (e.g., kiosks), websites, and other public information materials to increase awareness of other hunting opportunities in the region.

P7.2: Work with federal land managers and others offering public hunting opportunities to coordinate on efforts to disseminate information about hunting regulations and opportunities in the region.

4.5.4 Native American Cultural Use Element

The Carrizo Plain region and portions of the CPER are important cultural areas for Native Americans (Section 2.5). This element is designed to support use of the Reserve by Native Americans for activities that have cultural or ceremonial significance. These activities may include collecting, which requires a permit from the Department.

Goal P7: Accommodate cultural uses of the Reserve by Native Americans.

P7.1: Collaborate with native peoples to determine the purpose and needs related to specific requests for access and collections within the Reserve.

P7.2: Maintain regular dialog with representatives of the Carrizo Native American Advisory council to promote regular exchange of information.

P7.3: Develop and implement standardized procedures to evaluate requests and grant permits for cultural use of the Reserve by native peoples. The process should include:

a. Evaluation of access requests on a case-by-case basis to ensure each is compatible with the goals of the biological and cultural resource elements of the LMP; and

b. Issuance of a permit for access, when granted, that specifies the types of activities permitted, including their location, timing, and limitations.

4.5.5 Public Access Element

Public access to the CPER should be conducted in ways that are compatible with the biological and cultural resources goals of the Reserve and that ensure that it does compromise the security of the Reserve and its facilities.

Goal P8: Maintain and improve access to the Reserve that is compatible with the biological and cultural resource management elements.

P8.1: Maintain roads and parking areas in a drivable condition (F1.3).

a. Maintain roads seasonally and as needed.

b. Clearly designate roads that are not passable or are otherwise closed using signage and notations on Reserve maps.

c. To facilitate effective management and public use, upgrade the northern access road to the Chimineas units to provide all-weather access to the Chimineas Unit Headquarters.

d. Provide an effective system of opening, closing, and locking gates to control vehicular access to the Reserve.

P8.2: Create a system of trails based in part on the Reserve's existing dirt roads.

a. Work with adjacent landowners, including the USFS and BLM, to investigate the potential for trails or access points and routes that enhance connectivity between the Reserve and adjacent properties (e.g., Caliente Peak to southern La Panza).

b. Identify trails that can be created or improved for mobility-impaired visitors in accordance with the Americans with Disabilities Act (ADA).

c. Consider allowing bicycle and/or horseback riding access on particular trails to the extent that such use is compatible with the biological and cultural resource goals and objectives or the Reserve. The location and levels of these activities would be determined by the Department. Allowing horses and/or bicycles on the Reserve would require an exemption to Section 550 et seq. of CCR Title 14, Division 1, Subdivision 2, Chapter 11.

d. Use signage, natural barriers, and other approaches to designate open routes, control access to areas closed to protect sensitive species (e.g., nesting birds and plants) and cultural resources, and for maintenance, habitat restoration, emergency repairs, flood damage, safety, and to deter trespass onto adjacent lands.

e. As funding and staffing allow, provide garbage cans and toilets in or near parking areas or trailheads or where site assessments determine they are appropriate and necessary and can be operated and maintained with a reasonable investment of time and money and will not result in adverse site impacts, including promoting populations of corvids.

P8.3: Install informational signs in the Reserve.

a. Post signs at Reserve entrance points, parking lots, and/or trailheads to: designate Reserve boundaries, identify compatible uses, list regulations, provide safety and emergency information and specific contact information for the Reserve, provide the CalTip number, and provide educational information (P1.2).

b. Select signage locations and styles that are consistent with Department signage guidelines, the rural character of the region and the aesthetics of the natural environment in the Reserve.

P8.4: Coordinate public use of the Reserve with adjacent landowners.

a. Coordinate with the adjacent public landowners (BLM and USFS) to provide seamless public use opportunities where feasible and where doing so is consistent with the resource protection objectives and regulations of the Reserve.

b. Work with adjacent public and private landowners to minimize or eliminate undesirable impacts of use(s) of their properties on the Reserve and vice versa.

4.5.6 Public Safety Element

The CPER is located within a remote, wilderness area that is subject to extreme weather and natural disasters, including fires, floods, and earthquakes. The goal of this element is to minimize risk and safeguard the public.

Goal P9: Promote safety through thoughtful design, management, and operation of the Reserve.

P9.1: Ensure that Reserve management and operation activities comply with safety codes and procedures outlined in the facilities maintenance and safety plan (F1.1).

P9.2: Encourage safe use of the Reserve and minimize conflicts by providing visitors with appropriate safety information including:

a. providing information at access points and on the Department website that clearly identify when and where hunting is permitted;

b. posted signs identifying acute safety concerns, including speed limits and fire prevention, where necessary; and

c. information at the Reserve headquarters and other facilities, which clearly communicates regulations, safety warnings, and codes of conduct.

P9.3: Restrict access to unsafe areas such as construction zones, habitat management areas, locations where hunting is ongoing, and other restricted areas. In addition, restrict access when road conditions are unsafe.

P9.4. Provide emergency contact numbers at parking areas or other areas of public congregation.

Goal P10: Promote safety and limit property loss during emergencies.

P10.1: Develop and maintain an emergency response plan for the Reserve that identifies appropriate responses to fire, flood, earthquake or other emergency (F1.1).

P10.2: Post relevant emergency information on the Department's website, on signage, and at the Chimineas Unit Headquarters to facilitate appropriate public responses.

P10.3: Review and update the emergency plan annually to ensure staff familiarity with procedures and protocols.

P10.4: Work with local, regional, and state agencies to coordinate the Reserve operations, facilities, and personnel into emergency communications and response plans.

P10.5: Collaborate with federal, state, and local fire and law enforcement personnel to improve coordination of emergency services, including through development of the fire management plan (Section 4.4.1).

4.5.7 Community Outreach and Involvement Element

Long-term effective management of the Reserve can be facilitated by effective partnerships between the Department and the diverse group of community organizations and stakeholders**.**

Goal P11: Increase support for the Reserve and its management through outreach and coordination.

P11.1: Utilize a variety of mechanisms to increase the awareness about public use opportunities, management programs, and regulations within the Reserve, including:

a. Providing talks to community organizations, schools and universities, and at scientific meetings and professional society meetings;

b. Creating and maintaining a website that provides up to date information about the Reserve and its management, including public uses, regulations, and volunteer opportunities;

c. Maintaining and utilizing an updated list of outreach contacts to notice regarding the Reserve, including public events, closures, changes in regulations and, if time and resources permit, periodic updates about the Reserve's management;

d. Coordinating press releases and other forms of media outreach with the Department's public information officers; and

e. Soliciting input from the public regarding management of the Reserve on the Department website and posted signs, which provide appropriate contact information for Reserve staff.

P11.2: Develop and expand volunteer opportunities on the Reserve including through collaboration with the Chimineas Ranch Foundation. Specific actions could include:

a. Creating a volunteer program to promote regular involvement with environmental education, wildlife observation, and/or natural resource conservation and management;

b. Recruiting new volunteers through regional media, community organizations, local colleges, professional associations, conservation organizations, and at public events;

c. Tracking volunteer hours for use as in-kind labor contribution for state and federal grant programs, and as part of a volunteer recognition system; and

d. Periodically solicit and review feedback from volunteers to enhance and expand volunteer programs and opportunities.

4.5.8 Unauthorized Public Use Element

Due to the Reserve's remote location, it experiences only infrequent unauthorized use. Unauthorized vehicle access, illegal dumping, and poaching, can impact the biological and cultural resources, and incur Department costs (e.g., for enforcement and cleanup). Management as part of this element is designed to reduce the frequency and impacts of unauthorized use of the Reserve.

Goal P12: Discourage, prevent, and reduce the frequency and impacts of unauthorized use of the Reserve, such as vehicle access, illegal dumping, vehicle use (especially off-highway vehicle), poaching, and camping.

P12.1: Post Reserve regulations on Reserve signs and the Department's websites, and provide Department staff contact information (name, phone number, and e-mail address) for questions, comments, and suggestions.

P12.2: Department enforcement personnel shall regularly and randomly patrol the Reserve and enforce regulations that prohibit unauthorized uses. Issue citations, request assistance from other law enforcement agencies, and/or pursue legal action when voluntary cooperation cannot be obtained. Adjust allocation of enforcement efforts based on the nature, frequency, magnitude, and impacts of unauthorized uses of the Reserve.

P12.3: Coordinate with Department law enforcement personnel and representatives from other law enforcement agencies, including county and federal, to facilitate enforcement and public safety within the Reserve (M2.3).

P12.4: Restore lands and ecosystems damaged by unauthorized use as necessary. When feasible, determine restoration costs so that payment for remediation from parties deemed responsible for adverse impact(s) can be pursued through legal action.

P12.5: Establish a regular monitoring and removal program to discourage, and clean up following, illegal dumping. Ensure that removed materials are taken to an appropriate and approved disposal facility.

P12.6: Install physical barriers at points used to access the Reserve for illegal vehicular use. Select barriers that are consistent with the rural character of the region and the aesthetics of the natural environment of the Reserve.

P12.7: Coordinate with local law enforcement agencies and adjacent landowners to reduce the frequency of trespass and illegal activities in and around the Reserve. Insofar as possible, place trail cameras and other detection devices in areas where chronic entry problems have been detected. Meet regularly enforcement staff to discuss entry issues as well as Reserve rules and regulations.

4.6 Cultural Resources Elements

The CPER occurs within an important cultural landscape and has a rich cultural history (Section 2.5). The purpose of the cultural resources element is to ensure that the diverse and significant prehistoric and historic sites, as well as the broader cultural landscape, will be protected during the management of the Reserve's biological systems, public uses, and facilities. This element also calls for steps to increase awareness of the cultural resources of the Reserve. The EIR provides additional measures to safeguard cultural resources during implementation of the LMP (Appendix I). Steps to implement the cultural resources element will be consistent with the Fish and Game Commission's Tribal Consultation Policy (http://www.fgc.ca.gov/policy/p4misc.aspx#tribal).

4.6.1 Cultural Resource Protection Element

Goal C1: Identify locations of cultural resources within the Reserve and use this information to facilitate their protection during management.

C1.1 Create and maintain a database of the cultural resources that have yielded or have the potential to yield information important to the prehistory or history of the Reserve or that otherwise would meet the significance criteria of the California Register of Historical Resources, including resources that may have traditional use or religious values to Native Americans. Information about cultural resources includes electronic information, maps, and reports for the inventories and investigations of cultural resources on the Reserve. This information can by synthesized through the following steps:

a. Conduct a records search at the Archaeological Information Center at California State University, Bakersfield;

b. Contact Native Americans who have historical ties to the Reserve lands and solicit information on resources that may not be previously identified or that they deem important;

c. Contact the Native American Heritage Commission for an archival search of their Sacred Lands files;

d. Research the relevant literature to obtain information about newly discovered or previously documented resources; and

e. Coordinate with the adjacent federal agencies (USFS and BLM) regarding their cultural resource investigations and information related to adjacent lands.

f. Maintain information obtained through surveys conducted on the property.

The database must be confidential, to comply with state and federal laws that restrict public access to such information to protect them from theft or vandalism, including:

- Section 304 of the National Historic Preservation Act;
- Section 9(a) of the Archaeological Resources Protection Act;
- Executive Order 13007; and
- Section 6254.10 of the California State Government Code.

This can be achieved by:

- Placing all documents in a secure, locked cabinet or room; and
- Restricting access to the above kinds of information, and to any archaeological GIS layers and digital files, to professional staff, on a need-to-know basis only.

C1.2: Support efforts to document the history of human activities at the Reserve. In particular, encourage or pursue archaeological research in coordination with prescribed fire and immediately after natural fires when herbaceous and shrubby vegetation has been removed.

C1.3: When cultural resources are found during surveys or other projects, complete and submit the necessary record documentation to the California Historical Resources Information System (i.e., DPR Form 523).

Goal C2: Pro-actively manage cultural resources on the Reserve to ensure their long-term preservation.

C2.1: Mitigate all potential adverse impacts to cultural resources through passive site preservation (avoidance) in-place, insofar as this is possible.

C2.2: Where passive preservation alone may not be adequate to ensure cultural resource protection, use active site management techniques that minimize impacts to the resources. These can include:

a. Installing carefully-placed fencing or barriers around site boundaries.

b. Capping site areas with non-cultural soils;

c. Revegetating disturbed or altered site areas;

d. Monitoring the conditions of sites periodically; and

e. Closing areas from public entry using signage indicating that an area is sensitive.

C2.3: Ensure that ongoing and routine Reserve activities, including road maintenance, public use, and vegetation management, do not adversely impact cultural resources. Methods to achieve this can include:

a. Re-routing roads through known sites to non-sensitive areas, or capping existing roads within site areas with load-bearing geotextile matting and non-cultural fill; and

b. Fencing-off archaeological sites in areas of intensive livestock use and/or moving livestock facilities to non-sensitive areas.

C2.4: Conduct intensive Phase I cultural resource surveys before ground-disturbing activities (e.g., grading, excavations) in all areas that have not been previously surveyed by archaeologists.

C2.5: Prepare an "inadvertent discovery plan" to be followed when cultural resources that have the potential to be adversely impacted by projects are encountered during ground disturbance.

Goal C3: Mitigate any unavoidable impacts to significant cultural resources.

C3.1: In cases where projects may result in adverse impacts to known archaeological resources, and site avoidance may not be feasible, conduct Phase II tests excavations and determinations of significance to establish whether the sites are eligible for listing on the California Register of Historical Resources.

C3.2: In cases where projects involving built structures that meet the 50-years-age-criteria may be altered, conduct an architectural assessment of the integrity and significance of the structure to establish whether the structures are eligible for listing on the California Register of Historical Resources.

C3.3: If a project has the potential to have an adverse impact on a cultural resource that has been recommended as eligible to the California Register of Historical Resources based on the significance evaluation, consult with the State Historic Preservation Officer to obtain concurrence on the eligibility determination.

C3.4: In cases where adverse impacts resulting from a project cannot be avoided, prepare a treatment/data recovery plan, consult with the State Historic Preservation Officer on the adequacy of the plan, and implement the approved plan.

C3.5: Follow all best management practices and provisions related to accidental discovery of human remains, as provided for in Section 7050.5(b) of the California Health and Safety Code, and CEQA Guidelines Section 15064.5, including by ceasing excavation and calling in a coroner and qualified archaeologist if human remains are discovered.

4.6.2 Cultural Resource Awareness Element

Goal C4: Increase awareness and appreciation of cultural values of the Reserve to promote their long-term persistence.

C4.1: Develop and implement a cultural resources interpretive plan that provides for education about the Reserve's cultural resources without threatening their integrity.

C4.2: Develop educational and information materials to increase public awareness and appreciation of the cultural resources of the Reserve.

C4.3: Involve the community in cultural resource stewardship activities. This could include consultation and regular collaboration with Native American groups, creating a public contact list of interested parties or stakeholders, and developing outreach programs through presentations and lectures.

4.7 Facilities Maintenance Elements

The CPER contains a variety of facilities, including two areas with buildings, one in the North Chimineas Unit and one in the Painted Rock Ranch portion of the American Unit; more than 100 miles of roads; facilities that enable grazing management, including fences, corrals, water tanks, pipelines, and troughs; and utilities, including wells and power and telecommunications lines (Section 2.6). Maintenance of the facilities is essential to effective management of the Reserve, and they facility public education, research, and wildlife-dependent recreation. Facilities maintenance is also important to protect public safety, and safeguard the Department's investment in acquiring the properties for conservation. Effective facilities management also includes removing obsolete infrastructure to address potential public safety issues and enhance habitat conditions.

Goal F1: Maintain, improve, and expand existing facilities as necessary to facilitate the management goals associated with the other elements of the plan and promote safety for staff and visitors.

F1.1: Develop and implement a facilities maintenance and safety plan that includes the following:

a. An inventory of existing facilities, that identifies the location and condition of each component, and classifies it to three management activities:
   i. Remove: infrastructure that is in poor condition, or is a detriment to biological resources and/or a public safety, and should therefore be removed to meet the management goals for the Reserve;
   ii. Repair or upgrade: facilities that require repairs or replacement to meet the management goals for the Reserve;
   iii. Maintain: equipment that is in good condition but may require periodic maintenance or repairs to remain so.
b. Annual and periodic maintenance schedules that specify the maintenance activities;
c. Facilities inspections to evaluate their status and identify repairs or improvements needed;
d. Best management practices and other steps to protect biological and cultural resources during facilities removal, maintenance, or repair projects, such as pre-project surveys and construction monitoring;
e. Department facilities safety codes and procedures to be followed to ensure safe and effective operation of the facilities; and
f. An emergency response plan, which identifies steps that should be taken in the event of fire, flood or other emergency.

F1.2: Maintain the general facilities by implementing the tasks in the facilities maintenance and safety plan, including.

a. Maintaining a database of facilities (e.g., as a GIS data) to inform management;
b. Repair, replace, or remove facilities as needed, ensuring that:
   i. Repairs are completed in accord with regulations, building and safety codes, and manufacturers' recommendations.

ii. Maintenance is conducted in a manner that avoids negative impacts to the biological and cultural resources or other aspects of the natural environment within the Reserve. Examples of procedures could include:

- Spray or steam-clean road maintenance equipment to prevent spread of weed propagules.
- Collect and dispose of waste fuels from vehicle maintenance in appropriate off-site locations. Use drip pans under stored vehicles to contain leaks.
- Store pesticides and other potentially hazardous materials safely.

F1.3: Maintain and upgrade, where feasible, roads and parking areas to facilitate their use, including by:

a. Maintaining roads and parking area surfaces, so they are smoothly graded and/or graveled;

b. Upgrading roads, as feasible, to make them passable during all weather. Priority should be given to the main access road(s) to each unit of the Reserve;

c. Periodically clearing vegetation, as needed, to maintain clearance for vehicles including fire engines; and

d. Maintaining access gates in smooth operational condition.

F1.4: Maintain and upgrade fences, kiosks, and signage.

a. Inspect and repair fences to deter unlawful entry by vehicles and facilitate grazing management.

b. Upgrade fences, where possible, to make them wildlife friendly, using smooth wire on the top and bottom strand, as feasible. In pronghorn habitat, fences should either be removed or retrofitted so that the bottom wire is at least 18" from the ground (Section 3.4.2).

c. Replace gates on interior fencing used for grazing management with cattle guards, where feasible and desirable, to facilitate access.

d. Inspect kiosks and signage and repair or replace as needed.

e. Update signage, as necessary, to display current public information.

f. Install additional kiosks at areas of new ingress as needed to deter new unauthorized activities.

F1.5: Maintain and upgrade the buildings and grounds on the North Chimineas and American units.

a. Periodically inspect the condition and functionality of buildings and other structures (e.g., paint, structural and roof integrity, plumbing, electrical, painting, fixtures).

b. Repair, replace, or remove structures that are unauthorized or have become unsafe or are otherwise in an undesirable condition.

c. Create and maintain defensible space (i.e., reduced fuels) within 100 feet around structures to protect them from fire.

d. Control exotic plants and animals (e.g., rodents) in and around structures.

e. Remove remnants of recent human activity (e.g., abandoned structures, debris piles, etc.) provided that such remnants have no historical or management value. In particular, tear down the shed and corrals in the Panorama Unit and the silo at Painted Rock Ranch.

f. When available, work with volunteers to maintain facilities and the grounds.

g. Inspect and maintain the septic systems.

h. As funds become available, construct conference/educational facility at the Chimineas headquarters.

F1.6: Maintain and upgrade water-related facilities.

a. Maintain water-related facilities associated with the headquarters and grazing infrastructure, including wells, pumps, pipelines, storage tanks, ponds, troughs, and filtration systems.

b. Retrofit and upgrade open water tanks and troughs to facilitate their use by native animals, such as tule elk and bats, and prevent impacts to native species, including by including wildlife escape devices.

c. Conduct water quality analyses of drinking water on the Reserve to insure public safety. Post warning signs when water is deemed non-potable and provide potable water or conduct treatments to make water potable, as feasible.

F1.7: Maintain the system of power generation and delivery on the Reserve.

a. Maintain and/or upgrade the Department-owned power lines that provide power to the Chimineas Ranch house. Reduce the amount of above-ground power lines, where feasible.

b. When possible, increase the proportion of Reserve power produced by on-site (e.g., solar) energy generation to reduce long-term energy use and facility maintenance costs.

F1.8: Maintain and upgrade field and office equipment.

a. Inspect the condition and functionality of field equipment (e.g., road graders, tractors, field vehicles, miscellaneous field tools including survey equipment) and office equipment (e.g., computers, printers, copy machines, and telephones).

b. Maintain the shop facility on the North Chimineas Unit so that field equipment can be safely and serviced.

Goal F2: Improve the condition of the Reserve's habitats and its visual resources while protecting public safety by removing obsolete facilities and equipment including dilapidated infrastructure.

F2:1: Remove unnecessary fences, including cross fencing.

F2.2: Remove dilapidated infrastructure associated with land use of prior owners. Items that might be removed include:

a. grain storage tanks (American and Panorama units)

b. sheds (American and Panorama units)

c. trailers (American and Chimineas units)

As noted above, appropriate techniques must be employed to avoid impacting native animals such as bats, during infrastructure removal projects by, for example, conducting pre-project surveys and biological construction monitoring, and limiting disturbance to adjacent sensitive habitat areas.

F2.3: Abandon any unused wells using the appropriate techniques to safeguard groundwater.

Goal F3: Limit negative impacts associated with maintenance of utilities and infrastructure managed by other entities that occurs on the Reserve.

F3:1: Work with those that maintain the high-voltage electricity transmission lines and the gas transmission lines to limit impacts associated with their maintenance on the grassland habitat and species.

F3:2: Work with the County Public Works to limit negative impacts associated with road maintenance on the sections of County-maintained road that traverse the American, Panorama, and Elkhorn units of the CPER.

F3-3: Research subsurface mineral rights and work to acquire them, where needed.

F3-4: Survey portions of the Reserve's boundaries where needed to facilitate effective management.

4.8 Management and Monitoring Coordination Elements

Given the size and complexity of the Reserve, the various mandates and regulations related to the Reserve, the regional goals for which it was established, and the numerous agencies and organizations working in the region, management of the Reserve should be integrated, well-coordinated, and collaborative to be efficient and effective. These elements outline approaches to management designed to promote attainment of the goals of the various elements of the LMP.

Goal M1: Facilitate attainment of the Reserve's multiple goals through management that promotes compatibility and minimizes conflicts, and that reflects and reinforces the purposes of the acquisitions.

M1.1: Protect special status and sensitive animals and plants and their habitats with particular emphasis on the locations and times where and when impacts may be especially pronounced (e.g., during the breeding season, in nesting or calving areas).

M1.2: Identify and manage the inevitable conflicts between management goals and strategies for the various biological systems, to promote to the maximum extent possible, the attainment of each of the biological goals while prioritizing the species and communities for which the CPER is most critical to persistence.

M1.3: Assess conflicts between public uses and the condition of biological and cultural resources, and modify management of the public uses to reduce or eliminate these conflicts.

M1.4: Promote safe use and operation of the Reserve and strive to ensure compatibility of multiple public uses, prioritizing wildlife-dependent activities, particularly those for which the CPER is uniquely suited.

M1.5: Periodically review the relevant regulations and guidelines and revise management or regulations as necessary, to ensure that they are appropriate given the condition of biological and cultural resources and the frequency, nature, and demand associated with the various public uses.

Goal M2: Enhance long-term effectiveness of management by coordinating and collaborating on Reserve management with other agencies, non-profit organizations, user groups, and neighbors.

M2.1: Coordinate with federal, state, and local agencies regarding plans and projects that may affect or be affected by management of the Reserve. Table 29 lists some of the main agencies as well as organizations with which management should be coordinated.

M2.2: Coordinate with other law enforcement agencies whose jurisdictions overlap or are contiguous with those of the Departmental law enforcement staff (i.e., game wardens) to collaborate and explore opportunities for cooperative programs and joint funding requests. Specific agencies could include:

a. California Highway Patrol;

b. San Luis Obispo and Santa Barbara county sheriffs' departments;

c. Bureau of Land Management Rangers;

d. U.S. Fish and Wildlife Service; and

e. US Forest Service Rangers.

M2.3: Coordinate with local public service agencies to increase fire safety and conduct surveillance and suppression of wildlife diseases. Agencies with which these aspects of management should be coordinated include:

a. Fire protection agencies including CalFire, County of San Luis Obispo Fire Department, Los Padres National Forest (USFS), Bureau of Land Management Fire, and Santa Barbara County Fire Department; and

b. County public health department(s), primarily for the purposes of vector control and wildlife disease surveillance.

M2.4: Coordinate with non-profit organizations, neighboring and local landowners, lessees, user groups, and others interested in the management of the Reserve, to obtain assistance and support (Table 29).

Goal M3: Promote long-term effective and efficient management of the Reserve by maintaining organized, accurate, and complete records related to the management and resources of the Reserve.

M3.1: Develop protocols to standardize the collection and management of data, including records, GIS data (including metadata), survey data, and photographic data.

M3.2: Include within reports and work plans explanations of the management actions, including their rationales and effects; notations of changes in management strategies; changes in the status of sensitive species, habitats, and cultural resources; public use accidents or other safety issues; and ongoing or upcoming projects.

M3.3: Regularly update the Reserve's GIS as new or updated information becomes available.

M3.4: Maintain financial records that include expenditures and costs and hours associated with staff, maintenance, and administrative functions, including volunteer activities.

M3.5: Provide data on special-status species for inclusion within the California Natural Diversity Database.

Table 28: Agencies and organizations with which the Department may coordinate management

Entity	Topics of Coordination
Federal and Tribal	
U.S. Fish and Wildlife Service (USFWS)	Special-status species protection projects, including permitting, recovery, and funding opportunities
U.S Forest Service	Aspects of adjacent federal land management that affect the Reserve, including public access and grazing leases
Bureau of Land Management (BLM)	Aspects of adjacent federal land management that affect the Reserve, including public access, grazing leases, and mineral exploration
U.S. Department of Agriculture	Invasive plant control
Natural Resources Conservation Service (NRCS)	Watershed planning and restoration, grazing management projects, and exotic plant control projects
Tribal groups	Cultural resource protection and Native American access
State	
California Department of Water Resources (DWR)	Water rights issues, funding opportunities, assistance with watershed projects
California State Water Resources Control Board (SWRCB)	Water quality and management
California Department of Forestry and Fire Protection (CALFIRE)	Fire management including vegetation management projects, and public outreach assistance
California Department of Transportation (Caltrans)	Watershed restoration, road maintenance, facility access from state highways, and funding opportunities
California Highway Patrol	Public safety and law enforcement
California Department of Food and Agriculture	Invasive plant control
County	

Table 28: Agencies and organizations with which the Department may coordinate management

Entity	Topics of Coordination
County of San Luis Obispo	Various departments, including public works regarding roads, the sheriff's department regarding public safety and law enforcement, the Air Pollution Control District, regarding burn permits, and the agricultural commissioner's office, regarding exotic plants
County of Santa Barbara Sheriff's Department	Public safety and law enforcement
Non-Governmental Organizations	
The Nature Conservancy	Habitat protection, restoration, and management; rare species protection, and scientific research to inform conservation
Audubon Society	Habitat protection and management, and bird surveys and research
The Chimineas Ranch Foundation	Management of the Chimineas units including habitat enhancement, public recreational opportunities, and operations and maintenance of the facilities
Rocky Mountain Elk Foundation	Management of native ungulate populations including elk, habitat enhancement projects
California Deer Association	Management of native ungulate populations including deer, habitat enhancement projects

Wildflowers and Distant Cliffs within the South Chimineas Unit
(Photograph by Jodi McGraw)

5 Operations and Maintenance Summary

Attaining the goals of this plan will require coordinated implementation of the tasks identified in Chapter 4. This chapter describes the current staff and resources allocated to the Reserve, and then identifies the additional personnel time required to implement the plan.

5.1 Operations and Maintenances Tasks to Implement Plan

The tasks to achieve the goals of the LMP elements (Chapter 4) are tabulated in Appendix G, which identifies the Department personnel hours required annually or periodically to complete each task. It was developed to facilitate assessment of positions required to fully implement the plan, and assist annual work planning and budgeting during plan implementation. The table features the details for each task that are relevant to estimating the time required. Additional information about the tasks, goals, and elements is provided in Chapter 4.

5.2 Staff and Personnel

5.2.1 Existing Staff

At present, seven personnel assist with management of the Reserve. Table 30 estimates the percent of their time annually spent on CPER management.

5.2.2 Partnerships with Other Organizations

As identified in California's Wildlife Action Plan (Bunn et al. 2007), the Department lacks sufficient funding for facilities maintenance, resource monitoring, and habitat management. Consistent with the recommendations of the wildlife action plan, and the Department's initiative to develop and enhance partnerships, Department staff has worked extensively to cultivate partnerships with several non-profit agencies and organizations whose staff and volunteers have lent extensive time and invaluable expertise to enhance management of the CPER (Table 31). Many of these organizations have also provided financial support for various habitat protection and enhancement projects conducted on the Reserve. The Department continues to look for partnership opportunities with other appropriate organizations.

The Department has also leveraged the staff time available to inventory and monitor the biological resources on the site by reaching out to universities and other research organizations in the region to encourage and support research within the Reserve (Section 2.8.4). Studies conducted to date helped inform development of this plan. Ongoing collaborations within scientific institutions are recommended to develop the information needed to enhance effective management of the Reserve (Section 4.3).

Recognizing the interest in, and need for, coordinating the volunteers behind a single mission related to the Chimineas units of the CPER, the Department worked with stakeholders to form the Chimineas Ranch Foundation: a non-profit public benefit corporation (IRS 501[c]3) that was established to provide support and enhancement to the Chimineas units of the CPER. The mission of the Chimineas Ranch Foundation is to protect and enhance the ecological values of the Chimineas Unit of the Carrizo Plains Ecological Reserve and to help provide opportunities for wildlife dependent recreation, education, and research activities that are compatible with conserving the biological integrity of the reserve. The Foundation will also support the protection and enhancement of the historic and cultural heritage of the Facility when deemed appropriate (CRF 2006)

Table 29: Existing Department personnel involved in management of the CPER

Position and Time Allocated for CPER (Personnel Year)	Duties for the CPER
Senior Environmental Scientist Supervisor (0.2)	Prepare and manage budgets, plans, grant proposals, and contracts. Procure funding for future programs and activities. Supervise all staff working at CPER. Perform administrative duties including supervising other staff, approving timesheets, providing for vehicle maintenance, and purchasing minor equipment.
Environmental Scientist (0.5)	Determine resource assessment needs and develop biological monitoring and research studies. Conduct or assist with surveys, monitoring, and other biological data collection. Develop plans, including this Plan, and annual work plans and budgets. Conduct outreach to stakeholders in the region and respond to public inquiries regarding the Reserve. Implement or oversee land management, restoration, and enhancement, including grazing management. Conduct or oversee facilities maintenance activities. Implement the special hunts conducted within the Reserve. Coordinate management with agencies and organizations involved in the Carrizo Plain region, including BLM, USFS, USFWS, and TNC. Coordinate volunteers.
Scientific Aid (1.0)	Assist with facility maintenance and habitat management and enhancement projects.
Scientific Aid (RAP) (0.25)	Assist the RAP Environmental Scientist with all inventories, surveys, and other studies.
Habitat Assistant (0.8)	Implements land management, restoration, and enhancement projects. Maintain roads and fuel breaks. Maintain facilities and equipment. Assists with running special hunts.
Warden (0.25)	Patrol the Reserve to facilitate compliance with laws and Reserve rules and regulations, including public access and hunting.

Table 30: Non-governmental organizations that have facilitated management of the CPER through their volunteer time and/or financial support

Organization	Type of Assistance
Arroyo Grande Sportsmen's Association	Habitat enhancement projects and facilities maintenance projects
Audubon Society	Habitat enhancement projects
California Deer Association	Habitat enhancement projects, apprentice hunting programs, and facilities maintenance project
California Native Plant Society	Rare plant surveys and vegetation mapping and native plant garden installation and maintenance
Chimineas Ranch Foundation	Habitat enhancement projects, public education programs, and facilities maintenance projects
Quail Forever	Habitat enhancement projects
Rocky Mountain Elk Foundation	Habitat enhancement projects, apprentice hunting programs, and facilities maintenance projects
Safari Club International	Habitat enhancement projects
Santa Maria Valley Sportsman	Habitat enhancement projects and facilities maintenance projects
Sierra Club	Habitat restoration
The Nature Conservancy	Science and Planning assistance, habitat management projects
The Wildlife Society	Facilities maintenance and habitat restoration and management
Wild Turkey Federation	Habitat enhancement projects

Since its formation in 2007, the all-volunteer Chimineas Foundation has collaborated with the Department on numerous projects to enhance habitat within the unit, including:

1. Fencing riparian areas; and
2. Enhancing water availability for wildlife, including by replacing or installing new water facilities such as solar-powered pumps, tanks, cisterns, pipelines, and troughs, and ponds.

The Chimineas Ranch Foundation has also partnered with other organizations to assist the Department with maintenance of the Chimineas Unit Headquarters facilities and developing and implementing environmental education programs. This public-private partnership between the Chimineas Ranch Foundation and the Department of Fish and Wildlife can leverage the Department's available funding, staff time, and expertise to promote effective management of the Chimineas units of the CPER.

5.2.3 Additional Personnel Needs

Based on the tabulation of the personnel time required to implement the tasks identified in Chapter 4 of this plan (Appendix G), a total of approximately 3.3 additional Department staff (personnel years), or additional staff working part time at the equivalent level of effort, will be needed to fully implement the LMP (Table 32).

Work to complete each task was estimated for six positions, which reflect the current staffing for the Reserve (Table 30), with the addition of a tractor labor operatoer and an archaeologist to assist with cultural resources management.

Tasks were divided into two categories based on their general frequency:

1. Annual tasks are anticipated to be conducted, at least in part, during each year. The level of effort may vary from year to year; the annual average is included in the table.
2. Periodic tasks are those that are conducted occasionally, such as preparing or updating plans, and conducting specific restoration and enhancement projects.

Cells for tasks that are repeated in multiple elements of the LMP are shaded in grey and are blank, to avoid double-counting.

The level of effort was summed separately for the two types of tasks and the total number of personnel years required for each position was calculated, based on the annual tasks and one-third of the hours in the periodic tasks; the latter approach reflects the assumption that periodic tasks will be conducted every three years, on average. To identify the number of personnel years, the number of hours was divided by 1,760—the number of hours of a total 2,080-hour full-time equivalent position that could be spent working on tasks outlined in the plan (the remainder is spent on training and other non-task work).

Table 32 illustrates the additional staff positions that will be needed to implement the plan. This estimate is likely low, as it will not include all tasks conducted by employees to manage the Reserve.

Table 31: Additional personnel needed to implement the LMP

	Personnel Years		
Position	**Current**	**Total Needed to Implement the LMP**	**Additional Needed to Implement the LMP**
Senior Environmental Scientist Supervisor	0.2	0.3	0.1
Environmental Scientist	0.5	1.4	0.9
Environmental Scientist, Resource Assessment Program (RAP)	0.0	0.7	0.7
Habitat Assistant or Habitat Assistant 1	0.8	1.0	0.2
Tractor Labor Operator	0.0	0.8	0.8
Scientific Aid	1.25	1.6	0.35
Warden	0.25	0.4	0.15
Archaeologist	0	0.1	0.1
Total	3.0	6.3	3.3

To eliminate the need for additional Department personnel, some tasks could be conducted by contractors. In addition, the Department can continue to leverage its staff time and funding by engaging volunteers to assist with certain tasks. In addition to current volunteer groups, the Department could involve volunteers from the Department's statewide Natural Resource Volunteer Program, which is designed to provide enhanced public service to the community while offering opportunities for citizens to make a definitive contribution toward protecting California's wildlife resources.

Department-Led Volunteer Crew Removing Fence in the CPER
(Photograph by Bob Koch)

The Department can also continue and expand its successful partnerships with agencies and organizations with which it has partnered to date (Section 5.2.1). By coordinating with the other managing partners of the CPNM, the BLM and TNC, the Department can maintain current information about the latest scientific information and other current issues relevant to management. By reaching out with research institutions including universities, the Department can fill important gaps in knowledge needed to inform management. Similarly, by partnering with the Chimineas Ranch Foundation, members of which represent a larger network of organizations who are interested in promoting the welfare of the Reserve, the Department can stretch available funding and staff time to implement much needed projects on the ground. Importantly, coordinating with other agencies and research institutions and implementing projects with volunteers will also require time spent by Department staff coordinating management (Appendix G).

5.3 Funding

5.3.1 Costs and Budgeting

In addition to staff time, effective implementation of this plan will require that sufficient funds are budgeted for the following:

1. Salary and operating expenses for personnel to staff the positions;
2. Facilitates operations, including office supplies, fuel, utilities, and other basic materials;

3. Facilities maintenance, including the repair and upgrading of the Reserve's infrastructure such as roads, signs, water, and grazing infrastructure, and all of the buildings and associated development; and
4. Habitat restoration, enhancement, and management projects, which can require materials (e.g., herbicides), tools (e.g., weed wrenches), and hauling and disposal fees, among other direct costs.

The annual work plan should include a budget that identifies the ongoing maintenance costs as well as costs to implement specific projects.

5.3.2 Potential Funding

The Department and its partners may be eligible to receive funding for habitat management, restoration, and enhancement projects from a variety of sources (Table 33).

Table 32: Examples of the types of funding sources that might assist management of the CPER

State	Federal	Private Foundations
Department of Fish and Wildlife Programs (e.g., Fish and Game Preservation Fund, Big Game Fund) Wildlife Conservation Board (e.g., Habitat Restoration and Management grants) Future state grant programs authorized by new bond funds acts	Natural Resources Conservation Service Grants (e.g., for grazing management) Neotropical Migratory Bird Conservation Act Grants Program (USFWS) Endangered species recovery funds (e.g., Section 6, USFWS) State Wildlife Grant program for species of greatest conservation need (USFWS)	Audubon Society California Deer Foundation Chimineas Ranch Foundation National Fish and Wildlife Foundation Rocky Mountain Elk Foundation The Nature Conservancy

5.1 Future Planning

5.1.1 Focused Planning

As part of implementing the LMP, the Department will conduct focused planning processes for grazing and fire management, as funding and staff resources allow. These planning processes constitute 'step-down activities' for this plan: activities that are important to attain the goals and objectives of this plan in the long term but could not be completed as part of the LMP planning process, due to budget and time limitations.

Section 4.4 identifies the critical aspects of these planning processes, which will be integrated as part of the LMP once completed. The hours estimated in Appendix G assumes that Department staff worked with outside contractors to develop these plans.

5.1.2 Land Management Plan Updates

To promote long-term effectiveness, this plan should be implemented through an adaptive management process, which includes the following elements prepared each year:

1. Work plans and budgets, which are developed based on the priority actions in the plan and available funding; and
2. Reports, which summarize the prior year's activities including management and monitoring results, and recommends tasks for the subsequent year as well as adjustments to the LMP.

Through this annual cycle, management will be refined and adjusted based on changed conditions and new information.

Generally, the LMP should be reviewed every five years and updated as needed. Should Reserve conditions change, such as following the addition of new properties, the LMP will be reviewed sooner; the precise timing and nature of updates should be consistent with current LMP guidelines. Over a longer period of time, such as 20 to 40 years, it may be advantageous to prepare a new LMP to reflect the changes made during plan implementation.

Tule Elk at Sunset in the Carrizo Plains Ecological Reserve
(Photograph by Mike Post)

References

Ahlborn, G. 2005a. Tule elk life history notes. California Wildlife Habitat Relationship System. California Department of Fish and (Game) Wildlife and California Interagency Wildlife Task Group. 2 pages Accessed at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=2629&inline=1

Ahlborn, G. 2005b. Mule deer life history account. California Wildlife Habitat Relationships System. California Department of Fish and (Game) Wildlife and California Interagency Wildlife Task Group. 3 pages. Accessed at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=2637&inline=1

Altman, B. 2003. Vesper sparrow *Pooecetes gramineus*. In: Marshall, D.B., Hunter, M.G., and A.L. Contreras, editors. Birds of Oregon: A General Reference. Oregon State University Press. Corvallis, Oregon. Pages 542–545.

Altman, B. and R. Sallabanks. 2000. Olive-sided flycatcher (*Contopus cooperii*). In: Poole, A. and F. Gill, editors. The Birds of North America, No. 502. The Birds of North America, Inc., Philadelphia, Pennsylvania.

Andreasen, K. 2005. Implications of molecular systematic analyses on the conservation of rare and threatened taxa: contrastic examples from Malvaceae. Conservation Genetics 6: 399-412. doi: 10.1007/s10592-005-4977-z.

Audubon Society. 2007. Online database of watch list species. Accessed at: http://www.audubon.org/sites/default/files/documents/watchlist2007_printable_list_populations.pdf Accessed September 1, 2010.

Baldwin, B. G., Goldman, D. H., Keil, D. J., Patterson, R., Rosatti, T. J. and D. H. Wilken, editors. 2012. The Jepson manual: vascular plants of California, second edition. University of California Press, Berkeley. 1568 pages.

Ballantyne, K. 2011. Personal communication with Kate. Ballantyne, Phase I archaeological investigation of portions of the Carrizo Plains Ecological Reserve. Various communications.

Barrett, R.H. 1978. The feral hog on the Dye Creek Ranch, California. Hilgardia. 46: 283-355. doi: 10.3733/hilg.v46n09p283. Accessed at: http://ucanr.edu/sites/UCCE_LR/files/203249.pdf

Bat Conservation International. 2011. *Eumops perotis* species profile. Accessed at: http://www.batcon.org/resources/media-education/species-profiles/detail/2203 Accessed on October 12, 2011.

Beal, F.E.L. 1912. Food of our more important flycatchers. U.S. Department of Agriculture. Biological Survey Bulletin. No. 44. 67 pages.

Bean, W. T., Stafford, R., Prugh, L. R., Scott Butterfield, H. and J.S. Brashares. 2012. An evaluation of monitoring methods for the endangered giant kangaroo rat. Wildlife Society Bulletin 36: 587-593. doi: 10.1002/wsb.171.

Beebe, F.L. 1974. Field studies of the Falconiformes of British Columbia. British Columbia, Canada. Occasional Papers. No. 17. 163 pages.

Beedy, E.C. and W.J. Hamilton III. 1997. Tricolored Blackbird status update and management guidelines. Prepared for the U.S. Fish and Wildlife Service, Migratory Birds and Habitat Program and the California Department of Fish and (Game) Wildlife, Bird and Mammal Conservation Program. Portland, Oregon and Sacramento, California. 55 pages.

Beedy, E.C. and W.J. Hamilton III. 1999. Tricolored blackbird (*Agelaius tricolor*). In: Poole, A. and Gill, F., editors. The Birds of North America. No. 423. The Birds of North America, Inc., Philadelphia, Pennsylvania.

Bent, A.C. 1940. Life histories of North American cuckoos, goatsuckers, hummingbirds, and their allies. U.S. National Museum Bulletin. No. 176. 506 pages

Bent, A.C. 1942. Life histories of North American flycatchers, larks, swallows, and their allies. U.S. National Museum Bulletin. No. 179. 555 pages.

Bent, A.C. 1968. Life histories of North American cardinals, grosbeaks, buntings, towhees, finches, sparrows, and allies. O.L. Austin, Jr., editor. 3 Parts. U.S. National Museum Bulletin. No 237. 1889 pages.

Bidlack, A. 2007. Mesocarnivore responses to changes in habitat and resource availability in California. Doctoral Dissertation. University of California at Berkeley. Berkeley, California. 190 pages.

Bildstein, K. L. 1988. Northern Harrier (*Circus cyaneus*). In: Palmer, R.S., editor. Handbook of North American Birds vol. 4. Yale University Press. New Haven, Connecticut. Pages 251-303.

Bogan, M.A., Valdez, E.W., and K.W. Navo. 2005. Long-eared myotis. Western Bat Working Group. Accessed at: http://wbwg.org/western-bat-species/

Bolster, B.C. 2005a. Western red bat species account. Western Bat Working Group. Accessed at: http://wbwg.org/western-bat-species/ Accessed on October 17, 2010.

Bolster, B.C. 2005b. Hoary bat (*Lasiurus cinereus*). Western Bat Working Group. Accessed at: http://wbwg.org/western-bat-species/ Accessed on February 6, 2012.

Boyce, W., Kreuder, C., Anderson, R., and C. Barker. 2004. Potential impacts of West Nile virus on wildlife in California. UC Davis Wildlife Health Center Report. Accessed at: http://www.vetmed.ucdavis.edu/whc/pdfs/wnvreport.pdf Accessed on November 20, 2010.

Brand, C.J., editor. 2009. Surveillance plan for the early detection of H5N1 highly pathogenic avian influenza virus in migratory birds in the United States: surveillance year 2009. U.S. Geological Survey General Interest Publication. No 92. Reston, Virginia. 14 pages.

Brooks, M.L., D'Antonio, C.M., Richardson, D.M., Grace, J.B., Keeley, J.E., DiTomaso, J.M., Hobbs, R.J., Pellant, M., and D. Pyke. 2004. *Effects of invasive alien plants on fire regimes.* BioScience. 54: 677-688. doi: 10.1641/0006-3568.

Brooks, M.L., Esque, T.C., and C.R. Schwalbe. 1999. Effects of exotic grasses via wildlife on desert tortoise and their habitat. Twenty-Fourth Annual Meeting and Symposium of the Desert Tortoise Council. March 5-8, 1999.

Bulger, J.B., Scott, N.J. Jr., and R. B. Seymour. 2003. Terrestrial activity and conservation of adult California red-legged frogs *Rana aurora draytonii* in coastal forests and grasslands. Biological Conservation 110: 85–95. doi: 10.1016/S0006-3207(02)00179-9.

Bull, E.L. and C. T. Collins. 1996. Nest site fidelity, breeding age, and adult longevity in the Vaux's Swift. North American Bird Bander 21: 49–51.

Bunn, D., Mummert, A, Hoshovsky, M, Gilardi, K., and S. Shanks. 2007. California wildlife: conservation challenges. California's Wildlife Action Plan. Prepared by the UC Davis Wildlife Health Center. California Department of Fish and (Game) Wildlife. Sacramento, CA. 624 pages.

Burchman, L.T. 1974. Fire and chaparral before European settlement. In: Rosenthal, M., editor. Symposium on Living with Chaparral. Sierra Club. San Francisco, California. Pages 101-120.

Bureau of Land Management (BLM). 2009. Infrastructure, utility lines, roads, and trails within the Carrizo Plain National Monument [GIS data]. Accessed at: http://www.blm.gov/ca/gis/

Bureau of Land Management (BLM). 2010a. Carrizo Plain National Monument website. Accessed at: www.blm.gov/ca/st/en/fo/bakersfield/Programs/carrizo/mission_statement.html Accessed on March 12, 2010.

Bureau of Land Management (BLM). 2010b. Carrizo Plain National Monument approved resource management plan and record of decision. April 2010. United States Department of the Interior. Bakersfield Field Office. Bakersfield, California. 356 pages. Accessed at: http://www.blm.gov/style/medialib/blm/ca/pdf/bakersfield/carrizo.Par.8414.File.dat/CarrizoPlainNationalMonumentApprovedROD.pdf

Bureau of Land Management (BLM). 2014. Record of decision and approved resource management plan for the Bakersfield office. United States Department of the Interior. Bakersfield, California. 320 pages. Accessed at: http://www.blm.gov/style/medialib/blm/ca/pdf/bakersfield/planning/Bakersfield_ARMP_ROD.Par.35153.File.dat/Bakersfield_ROD-ARMP.pdf

Burridge, B., editor. 1995. Sonoma County breeding bird atlas. Madrone Audubon Society. Santa Rosa, California. 204 pages.

Bury, R.B. 1972. Habits and home range of the Pacific pond turtle, *Clemmys marmorata*, in a stream community. Ph.D. Dissertation. University of California, Berkeley. Berkeley, California.

Busch, D. E. 1995. Effects of fire on Southwestern riparian plant community structure. Southwestern Naturalist 40: 259-267.

Butterworth, G. 2009. E-mail correspondence between Jodi McGraw and George Butterworth, California Department of Fish and Wildlife, Region 4, Fresno, CA. Various communications.

Butterworth, G. 2016. Plant species list for the Carrizo Plains Ecological Reserve. Excel database updated July 2016.

Byers, J.A. 1997. American pronghorn: social adaptations and the ghosts of predators past. University of Chicago Press. Chicago, Illinois. 300 pages.

Cain, J.W. III, Morrison, M.L., and H. L. Bombay. 2003. Predator activity and nest success of willow flycatchers and yellow warblers. Journal of Wildlife Management 67: 600–610. doi: 10.2307/3802717.

California Department of Fish and (Game) Wildlife (CDFW). 2004. Strategic plan for wild turkey management. State of California. The Resources Agency. 41 pages. Accessed at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=83157

California Department of Fish and (Game) Wildlife (CDFW). 2007a. California Department of Fish and Game avian influenza supplemental progress report. October 2007. Wildlife Investigations Laboratory. Rancho Cordova, California. 22 pages. Accessed at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=82701&inline Accessed on December 4, 2010.

California Department of Fish and (Game) Wildlife (CDFW). 2007b. A guide and annotated outline for writing land management plans. December 2007. State of California, The Resources Agency, Department of Fish and (Game) Wildlife, Lands Program Wildlife Branch. 32 pages.

California Department of Fish and (Game) Wildlife (CDFW). 2010a. List of California terrestrial natural communities recognized by the California Natural Diversity Database. Vegetation Classification and Mapping Program. Accessed at: https://www.wildlife.ca.gov/Data/VegCAMP/Natural-Communities

California Department of Fish and (Game) Wildlife (CDFW). 2010b. Life history accounts and range maps from the California wildlife habitat relationship system. Accessed November-December 2010. Accessed at: http://www.dfg.ca.gov/biogeodata/cwhr/cawildlife.aspx

California Department of Fish and (Game) Wildlife (CDFW). 2010c. Vegetation of the California Department of Fish and Game Carrizo Plains Ecological Reserve, including the Chimineas, American, Panorama, and Elkhorn Units, San Luis Obispo County, California. GIS data and Metadata and Mapping Report. Vegetation Classification and Mapping Program. California Department of Fish and Game. 58 pages. Accessed at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=15231

California Department of Fish and (Game) Wildlife (CDFW). 2010d. Carrizo Plains Ecological Reserve boundary and acquisition history, permit stations on the South Chimineas Unit, ponds on the CPER, and roads on the Chimineas units [GIS data]. Region 4, Fresno, CA.

California Department of Fish and (Game) Wildlife (CDFW). 2011a. DFG going green: next steps toward sustainability. September 20, 2011. Ecosystem Conservation Division. 24 pages.

California Department of Fish and (Game) Wildlife (CDFW). 2011b. Mitigated negative declaration for grazing lease allotment Carrizo Plains Ecological Reserve (Chimineas Ranch), San Luis Obispo County. Region 4. Fresno, California.

California Department of Fish and (Game) Wildlife (CDFW). 2012a. Staff report on burrowing owl mitigation. March 2012. Accessed at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=83843

California Department of Fish and (Game) Wildlife (CDFW). 2012b. Swainson's hawks in California. Accessed at: http://www.dfg.ca.gov/wildlife/nongame/raptors/swha/index.html Accessed on June 1, 2012.

California Department of Fish and (Game) Wildlife (CDFW). 2012c. Fences and rare species occurrences within the Carrizo Plains Ecological Reserve [GIS data]. Region 4, Fresno, CA.

California Department of Fish and (Game) Wildlife (CDFW). 2016a. Rare species and community occurrences [GIS Data]. May 2016. California Natural Diversity Database (CNDDB). Sacramento, CA.

California Department of Fish and Wildlife (CDFW). 2016b. Special animals list. July 2016. California Natural Diversity Database (CNDDB). Periodic publication. 51 pages. Accessed at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=109406

California Department of Fish and Wildlife (CDFW). 2016. Environmental impact report for the Carrizo Plains Ecological Reserve. Prepared by DiLeo and Moran. October 2016.

California Department of Forestry and Fire Protection (CalFire). 2015. Fire perimeters between 1954 and 2015 [GIS Data]. Department of Forestry and Fire Protection, Fire and Resource Assessment Program. Santa Rosa, CA. Accessed at: http://frap.fire.ca.gov/data/frapgisdata-sw-fireperimeters_download

California Department of Forestry and Fire Protection (CalFire). 2011. Watersheds [GIS data]. Department of Forestry and Fire Protection. Accessed at: http://frap.fire.ca.gov/data/frapgisdata-sw-calwater_download

California Department of Public Health (CDPH). 2016. West Nile Virus activity site in California. Maintained by the State of California. Accessed at: http://www.westnile.ca.gov/ Accessed on March 31, 2016.

California Department of Water Resources (CDWR). 2003. Boundaries of basins [GIS data]. California's Groundwater Bulletin. No. 118. 265 pages. Accessed at: www.water.ca.gov/groundwater/bulletin118/gwbasin_maps_descriptions.cfm and https://gis.water.ca.gov/app/boundaries/ Accessed May 2, 2010.

California Invasive Plant Council. 2016. Invasive plant inventory and species profiles. Accessed at: http://www.cal-ipc.org/ip/management/plant_profiles/index.php Accessed in June and December 2010.

California Native Plant Society. 2012. Inventory of rare and endangered plants. Online edition, Sacramento, California. Accessed at: http://www.cnps.org/inventory

California Water Resources Control Board (CWRCB). 2010. Electronic water rights information management system (eWRIMS). Electronic database maintained by the CWRCB. Accessed at: http://www.waterboards.ca.gov/waterrights/water_issues/programs/ewrims/index.shtml Accessed March 2010.

Callaway, R. M., and F. W. Davis. 1993. Vegetation dynamics, fire, and the physical environment in coastal central California. Ecology 74: 1567-1578. doi: 10.2307/1940084.

Carlsen, T.M., Menke, J.W., and B. M. Pavlik. 2000. Reducing competitive suppression of a rare annual forb by restoring native California perennial grasslands. Restoration Ecology 8: 18-29. doi: 0.1046/j.1526-100x.2000.80004.x.

Castleberry, D.T. and J. J. Cech. 1986. Physiological responses of a native and an introduced desert fish to environmental stressors. Ecology 67: 912-918. doi: 10.2307/1939813.

Center for Disease Control and Prevention (CDC). 2016. Zika virus. Accessed at: https://www.cdc.gov/zika/about/overview.html Accessed on October 29, 2016

Chambers, C. and M. Herder. 2005. Spotted Bat (*Euderma maculatum*). Western Bat Working Group. Accessed at: http://wbwg.org/western-bat-species/ Accessed on October 12, 2012.

Chimineas Ranch Foundation (CRF). 2006. Chimineas Ranch Foundation Working Group Charter. September 16, 2006.

Chipping, D.H. 1987. The geology of San Luis Obispo County: a brief description and field guide. California Polytechnic State University. San Luis Obispo, California. 190 pages.

Collins, M.C. and E. Manning. 2010. Johne's disease information center. University of Wisconsin School of Veterinary Medicine. Accessed at: http://www.johnes.org/elk/epidemiology.html Accessed on December 17, 2010.

Collins, P.W. 1998. Tulare grasshopper mouse (*Ohychomys torridus tularensis*). In: Bolster, B.C., editor. 1998. Terrestrial Mammal Species of Special Concern in California. Draft final report to California Department of Fish and (Game) Wildlife, Wildlife Management Division, Nongame Bird and Mammal Conservation Program for Contract No. FG3146WM. Pages 126-128.

Consortium of California Herbaria. 2010. Rare plant location information. UC Jepson online. Accessed at: http://ucjeps.berkeley.edu Accessed on May 24, 2010.

Cook, L.F. 1996. Nesting adaptations of tricolored blackbirds (*Agelaius tricolor*). Master's Thesis. University of California, Davis. Davis, California.

Cook, L.F. and C. A. Toft. 2005. Dynamics of extinction: population decline in the colonially nesting tricolored blackbird *Agelaius tricolor*. Bird Conservation International 15: 73–88. doi: 10.1017/S0959270905000067.

County of San Luis Obispo. 2001. Fault zones and energy transmission lines in San Luis Obispo County [GIS data]. Accessed at: http://lib.calpoly.edu/gis/browse.jsp?by=th&th=7

County of San Luis Obispo. 2007. Geologic formations in San Luis Obispo County [GIS data]. Accessed at: http://lib.calpoly.edu/gis/browse.jsp?by=th&th=7

County of San Luis Obispo. 2010. Assessors parcels in San Luis Obispo County [GIS data].

County of San Luis Obispo. 2016. Zika virus. Accessed at: http://www.slocounty.ca.gov/health/publichealth/Zika.htm Accessed on October 29, 2016.

Craig, D. and P.L. Williams. 1998. Willow flycatcher (*Empidonax traillii*). In: Riparian Habitat Joint Venture (RHJV). 2004. Version 2.0. The riparian bird conservation plan: a strategy for reversing the decline of riparian-associated birds in California. California Partners in Flight. Accessed at: http://www.prbo.org/calpif/htmldocs/riparian_v-2.html

Craighead, J.J. and F.C. Craighead Jr. 1956. Hawks, owls and wildlife. Stackpole Books. Harrisburg, Pennsylvania. 443 pages.

Crosbie, S.P., Koenig, W.D., Reisen, K., Kramer, V.L., Marcus, L., Carney, R., Pandolfino, E., Bolen, G.M., Crosbie, L.R., Bell, D.A., and H.B Ernest. 2008. Early impact of West Nile virus on the yellow-billed magpie (*Pica nuttalli*). The Auk 125: 542-550. doi: 10.1525/auk.2008.07040.

Cunningham, J.D. 1955. Arboreal habits of certain reptiles and amphibians in southern California. Herpetologica 11: 217-220.

Cunningham, J.D. 1959. Reproduction and food of some California snakes. Herpetologica. 15: 17-19.

Cushman, H., Tierney, T.A., and J. M. Hinds. 2004. Variable effects of feral pig disturbances on native and exotic plants in a California Grassland. Ecological Applications 14: 1746-1756. doi: 10.1890/03-5142.

Cypher, B.L., S.E. Phillips, and P.A. Kelly. 2007. Habitat suitability and potential corridors for San Joaquin kit fox in the San Luis Unit, Fresno, Kings, and Merced Counties. California. Prepared for the U.S. Bureau of Reclamation, South-Central California Area Office, and the U.S. Fish and Wildlife Service, Endangered Species Program. 38 pages. Accessed at: http://esrp.csustan.edu/publications/reports/usbr/esrp_2007_sanluisunitkitfox_e.pdf

Cypher, E.A. 1994a. Demography of *Caulanthus californicus*, *Lembertia congdonii*, *Eriastrum hooveri*, and vegetation characteristics of endangered species populations in the southern San Joaquin Valley and the Carrizo Plain Natural Area in 1993. Final report to the California Department of Fish and (Game) Wildlife. Sacramento, California. 50 pages. Accessed at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentVersionID=3656

Cypher, E.A. 1994b. Progress report on 1994 grazing studies for Kern mallow and San Joaquin woolly-threads. Unpublished report to U.S. Bureau of Land Management. Bakersfield, California. 22 pages.

D'Antonio, C.M. and P.M. Vitousek. 1992. Biological invasion by exotic grasses, the grass/fire cycle, and global change. Annual review of Ecology and Systematics 23: 63-87.

Daszak, P., Berger, L., Cunningham, A., Hyatt, A., Green, D., and R. Speare. 1999. Emerging infectious diseases and amphibian population declines. Emerging Infectious Diseases 5: 735-748. doi: 10.3201/eid0506.990601.

Dechant, J. A., Sondreal, M.L., Johnson, D.H., Igl, L.D, Goldade, C.M., Nenneman, M.P., and B. R. Euliss. 1998 (revised 2002). Effects of management practices on grassland birds: grasshopper sparrow. Northern Prairie Wildlife Research Center. Jamestown, North Dakota. 28 pages.

DeHaven, R.W., Crase, F.T., and P.P. Woronecki. 1975a. Movements of tricolored blackbirds banded in the Central Valley of California 1965–1972. Bird Banding 46: 220–229. doi: 10.2307/4512139

DeHaven, R.W., Crase, F.T., and P.P. Woronecki. 1975b. Breeding status of the tricolored blackbird, 1969–1972. California Fish and (Game) Wildlife. 61: 166–180.

DeLong, J.P. 2004. Effects of management practices on grassland birds: golden eagle. Northern Prairie Wildlife Research Center. Jamestown, North Dakota. 22 pages.

Department of Conservation (DOC). 2008. Cultivated, grazing, and urban land in San Luis Obispo County. Farmland mapping and monitoring program. [GIS Data]. Accessed at: http://www.conservation.ca.gov/dlrp/fmmp/Pages/Index.aspx

DeVries, P. 2011. Results of the 2011 Kern mallow surveys of the Carrizo Plain. Prepared for the Bureau of Land Management.

Dibblee, T.W. Jr. 1973. Stratigraphy of the Southern Coast Ranges near the San Andreas Fault from Cholame to Maricopa, California – A discussion of the regional stratigraphy of the McLure Valley area, Temblor Range, Carrizo Plain, Cuyama Valley, Caliente Range, La Panza Range, and Sierra Madre Mountains. Geological Survey Professional Paper 764. U.S. Department of the Interior, United States Government Printing Office. Washington D.C.

Dimmitt, M.A. and R. Ruibal. 1980a. Environmental correlates of emergence in spadefoot toads (*Scaphiopus*). Journal of Herpetology 14: 21-29. doi: 10.2307/1563871.

Dimmitt, M.A. and R. Ruibal. 1980b. Exploitation of food resources by spadefoot toads (*Scaphiopus*). Copeia 4: 854-862. doi: 10.2307/1444465.

DiTomaso, J.M. and J. Gerlach. 2000. *Centaurea solstitialis* (Yellow starthistle). In: Bossard, C., Randall, J.M., and M. Hoshovsky, editors. Invasive plants of California's wildlands. California Exotic Pest Plant Council. University of California Press, Berkeley.

DiTomaso, J.M., M.J. Pitcairn and S.F. Enloe. 2007. Exotic plant management in California annual grasslands. In Stromberg, M.R., Corbin, J.D., and C.M. D'Antonio, editors. 2007. California grasslands: ecology and management. UC Press, Berkeley, CA. Pages 281-296.

Dixon, K.L., Dixon, R.E., and J.E. Dixon. 1957. Natural history of the white-tailed kite in San Diego County, California. Condor. 59: 156-165. doi: 10.2307/1364721.

Edell, T. 2006. The birds of San Luis Obispo county California. Morro Coast Audubon Society. Accessed at: https://drive.google.com/file/d/0B5mjyGr0wTeDdGZwLS1TUkpTRDA/view

Edson, L. and K. Hunting. 1999. Current status of the mountain plover in the Central Valley. Central Valley Bird Club Bulletin 2: 17–25.

eFloras. 2008. Online database of plant information. Missouri Botanical Garden, St. Louis, MO & Harvard University Herbaria, Cambridge, MA. Accessed at http://www.efloras.org Accessed in 2008.

Ehrlich, P.R., Dobkin, D.S., and D. Wheye. 1988. The birder's handbook. Simon and Schuster. New York City, New York. 785 pages.

Eichel, M.H. 1971. The Carrizo Plain: a geographic study of settlement, land use, and change. Master's Thesis. Department of Geography. San Jose State College. San Jose, California.

Eliason, S.A. and E. B. Allen. 1997. Exotic grass competition in suppressing native shrubland reestablishment. Restoration Ecology 5: 245–255. doi: 10.1046/j.1526-100X.1997.09729.x.

Endangered Species Recovery Program (ESRP). 2010. Species account for Lost Hills crownscale. Accessed at: http://www.esrp.org/publications/pubhtml.php?doc=sjvrp&file=chapter02.html Accessed on May 24, 2010.

Eng, L., Belk, D., and C. Eriksen. 1990. Californian Anostraca: distribution, habitat, and status. Journal of Crustacean Biology 10: 247-277. doi: 10.2307/1548485.

Environmental Systems Research Institute (ESRI). 2012. USGS 24k and 100k quadrangles [GIS data]. Redlands, CA. Accessed at: http://www.arcgis.com/home/

Eriksen, C. and D. Belk. 1999. Fairy shrimps of California's pools, puddles, and playas. Mad River Press. Eureka, California. 196 pages.

Feldman, M. 1982. Notes on reproduction in *Clemmys marmorata*. Herpetological Review 13: 10-11.

Fellers, G.M. and P.M. Kleeman. 2007. California red-legged frog (*Rana draytonii*) from movement and habitat use: implications for conservation. Journal of Herpetology 41: 276-286. doi: 10.1670/0022-1511.

Fisher, M.C., Garner, T.W.J. and S. F. Walker. 2009. Global emergence of *Batrachochytrium dendrobatidis* and amphibian chytridiomycosis in space, time, and host. Annual Review of Microbiology 63: 291–310. doi: 10.1146/annurev.micro.091208.073435.

Fisher, R.N, Suarez, A.V, and T. J. Case. 2002. Spatial patterns in the abundance of the coastal horned lizard. Conservation Biology 16:205-215. doi: 10.1046/j.1523-1739.2002.00326.x.

Fitch, H. S. 1970. Reproductive cycles in lizards and snakes. University of Kansas Museum of Natural History. Miscellaneous Publications 52: 1-247.

Fitton, S. D. 2008. Le Conte's thrasher (*Toxostoma lecontei*) (San Joaquin population). In Shuford, W.D. and T. Gardali, editors. California bird species of special concern: a ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California and California Department of Fish and (Game) Wildlife. Sacramento, California. Pages 321-326.

Fitzgerald, S.D., Patterson, J.S., Kiupel, M., Simmons, H.A., Grimes, S.D., Sarver, C.F., Fulton, R.M., Steficek, B.A., Cooley, T.M., Massey, J.P., and J. G. Sikarskie. 2003. Clinical and pathologic features of West Nile virus infection in native North American owls (Family Strigidae). Avian Disease 47: 602–610.

Fleischner, T. L. 1994. Ecological costs of livestock grazing in western North America. Conservation Biology 8: 629-644. doi: 10.1046/j.1523-1739.1994.08030629.x.

Fletcher, R.J. and R.R. Koford. 2004. Consequences of rainfall variation for breeding wetland blackbirds. Canadian Journal of Zoology 82: 1316-1325. doi: 10.1139/z04-107.

Frayer, W.E., Peters, D.D., and H. R. Pywell. 1989. Wetlands of the California Central Valley: status and trends. U.S. Fish and Wildlife Service. Portland, Oregon. 27 pages.

Freilich, J. E., Emlen, J. M., Duda, J. J., Freeman, D. C. and P. J. Cafaro. 2003. Ecological effects of ranching: a six-point critique. BioScience 53: 759-765. doi: 10.1641/0006-3568(2003)053[0759:EEORAS]2.0.C.

Fried, J. S., Torn, M.S., and E. Mills. 2004. The impact of climate change on wildfire severity: a regional forecast for northern California. Climatic Change 64: 169-191. doi: 10.1023/B:CLIM.0000024667.89579.ed.

Gaines, D. 1977. Birds of the Yosemite sierra: a distributional survey. California Syllabus Press. Oakland, California. 153 pages.

Gaines, D. 1992. Birds of Yosemite and the east slope, 2nd ed. Artemisia Press. Lee Vining, California. 352 pages.

Garrett, K. and J. Dunn. 1981. Birds of southern California: status and distribution. Los Angeles Audubon Society. Los Angeles, California. 408 pages.

Germano, D. J., Rathbun, G. B., and L. R. Saslaw. 2001. Managing exotic grasses and conserving declining species. Wildlife Society Bulletin 29: 551-559.

Germano, D.J. and D. F. Williams. 1992. Recovery of the blunt-nosed leopard lizard: past efforts, present knowledge, and future opportunities. Transactions of the Western Section of the Wildlife Society 28: 38-47.

Germano, D.J. and D. F. Williams. 1994. Population ecology of blunt-nosed leopard lizards in 1994 on the Elkhorn Plain, San Luis Obispo County, California. Unpublished report to U.S. Bureau of Land Management. Bakersfield Field Office. Bakersfield, California. 32 pages.

Germano, D.J. and D. F. Williams. 2005. Population ecology of blunt-nosed leopard lizards in high elevation foothill habitat. Journal of Herpetology 39: 1-18. doi: 10.1670/0022-1511(2005)039[0001:PEOBLL]2.0.CO;2.

Germano, D.J., Rathbun, G.B., Cypher, E., Saslaw, L.R., and S. Fitton. 2003. Effects of livestock grazing on a community of species at risk of extinction in the San Joaquin Valley, California. Annual report: the Lokern grazing study project. Bureau of Land Management. Bakersfield Field Office. Bakersfield, California. 30 pages. Accessed at: http://www.blm.gov/style/medialib//blm/ca/pdf/pdfs/bakersfield_pdfs.Par.0938fb21.File.pdf/lkgsrpt03.pdf Accessed in October 2009.

Gernon, W.J. 1978. Habitat utilization by sandhill cranes (*Grus canadensis*) on the Carrizo Plain, San Luis Obispo County, California. Unpublished report. Natural Resources Management Department of California Polytechnic State University. San Luis Obispo, California.

Gervais, J. A., and R. G. Anthony. 2003. Chronic organochlorine contaminants, environmental variability, and the demographics of a burrowing owl population. Ecological Applications 13: 1250-1262. doi: 10.1890/02-5202.

Gervais, J.A., Hunter, C.M., and R. G. Anthony. 2006. Interactive effects of prey and DDE on burrowing owl population dynamics. Ecological Applications. 16: 666–677. doi: 10.1890/1051-0761(2006)016[0666:IEOPAP]2.0.CO;2.

Gervais, J.A., Rosenberg, D.K., and L. A. Comrack. 2008. Burrowing owl species account. In: Shuford, W. D. and T. Gardali, editors. California bird species of special concern: a ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of Western Birds. Western Field Ornithologists and California Department of Fish and (Game) Wildlife. Camarillo and Sacramento, California. Pages 218-226.

Gillespie, I.G. 2003. Ecology and restoration of *Erodium macrophyllum*. Doctoral Dissertation. University of California, Riverside. Riverside, California.

Gillespie, I.G. and E.D. Allen. 2004. Fire and competition in a southern California grassland: impacts on the rare forb *Erodium macrophyllum*. Journal of Applied Ecology 41: 643-652. doi: 10.1111/j.0021-8901.2004.00935.x.

Gillespie, I.G. and E.D. Allen. 2006. Effects of soil and mycorrhizae from native and invaded vegetation on a rare California forb. Applied Soil Ecology 32: 6-12. doi: 10.1016/j.apsoil.2005.03.008.

Gillespie, I.G. and E.D. Allen. 2008. Restoring the rare forb *Erodium macrophyllum* to exotic grassland in southern California. Endangered Species Research 5: 65-72. doi: 10.3354/esr00110.

Graf, W.L. 1978. Fluvial adjustments to the spread of tamarisk in the Colorado Plateau region. Geological Society of America Bulletin 89: 1491-1501. doi: 10.1130/0016-7606(1978)89<1491:FATTSO>2.0.CO;2.

Graul, W.D. and L.E. Webster. 1976. Breeding status of the mountain plover. Condor 78: 265–267. doi: 10.2307/1366868.

Green, G.A. and R. G. Anthony. 1989. Nesting success and habitat relationships of burrowing owls in the Columbia Basin, Oregon. Condor 91: 347–354. doi: 10.2307/1368313.

Green, G.A., Fitzner, R.E., Anthony, R.G., and L.E. Rogers. 1993. Comparative diets of burrowing owls in Oregon and Washington. Northwest Science 67: 88–93.

Greenfield, D.W. and G. D. Deckert. 1973. Introgressive hybridization between *Gila orcutti* and *Hesperoleucus symmetricus* (Pisces: Cyprinidae) in the Cuyama River Basin, California: II. Ecological Aspects. Copeia 1973: 417-427. doi: 10.2307/1443104.

Greenfield, D.W. and T. Greenfield. 1972. Introgressive hybridization between *Gila orcutti* and *Hesperoleucus symmetricus* (Pisces: Cyprinidae) in the Cuyama River Basin, California: I. Meristics, morphometrics and breeding. Copeia 1972: 849-859. doi: 10.2307/1442745.

Grinnell, J. and A. H. Miller. 1944. The distribution of the birds of California. Pacific Coast Avifauna. No. 27. Cooper Ornithological Club. Berkeley, California. 608 pages. Accessed at: https://sora.unm.edu/sites/default/files/journals/pca/pca_027.pdf

Grossman, D.H., Faber-Langendoen, D., Weakley, A.S., Anderson, M., Bourgeron, P., Crawford, R., Goodin, K., Landaal, S., Metzler, K., Patterson, K.D., Pyne, M., Reid, M., and L Sneddon. 1998. International classification of ecological communities: terrestrial vegetation of the United States, Vol. I. The national vegetation classification system: development, status, and applications. The Nature Conservancy, Arlington, Virginia. 127 pages. Accessed at: http://www.natureserve.org/library/vol1.pdf

Guthery, F.S. 1972. Food habits, habitat, distribution and subspecies of sandhill cranes wintering in southern Texas. Master's Thesis. Texas A&M University. College Station, Texas.

Haidinger, T.L. and J. Keeley. 1993. Role of fire frequencies in destruction of mixed chaparral. Madroño 40: 141-147.

Halstead, B.J., Mushinsky, H.R., and E. D. McCoy. 2009. *Masticophis flagellus* selects Florida scrub habitat at multiple spatial scales. Herpetologica 65: 268-279. doi: 10.1655/08-043R2.1.

Hamilton, W. J., III. 1998. Tricolored blackbird itinerant breeding in California. Condor 100: 218–226. doi: 10.2307/1370263.

Hamilton, W. J., III. 2000. Tricolored blackbird 2000 breeding season census and survey — observations and recommendations. Available from Division Environmental Studies of the University of California, Davis. Davis, California. 61 pages. Accessed at: http://tricolor.ice.ucdavis.edu/files/trbl/Hamilton%202000%20%20TRBL%20breeding%20census%20&%20survey%20in%202000%20observ%20and%20recs2.pdf

Hamilton, W.J., III, Cook, L., and R. Grey. 1995. Tricolored blackbird project 1994. Unpublished report to U.S. Fish and Wildlife Service. Portland, Oregon.

Harris, J.H. 1993. Diet of the San Joaquin antelope ground squirrel, *Ammospermophilus nelsoni*. National Tech. Info. Serv. Rep. PB95-123378. U.S. Fish and Wildlife Service. San Simeon, California. 14 pages.

Harrison, C. 1978. A field guide to the nests, eggs and nestlings of North American birds. W. Collins Sons and Co. Cleveland, Ohio. 416 pages.

Haug, E.A., Millsap, B.A., and M. S. Martell. 1993. Burrowing owl (*Speotyto cunicularia*). In: Poole, A. and F. Gill, editors. The birds of North America, No. 61. Academy of Natural Sciences. Philadelphia, Pennsylvania.

Hawbecker, A.C. 1942. A life history study of the white-tailed kite. Condor 44: 267-276. Accessed at: https://sora.unm.edu/sites/default/files/journals/condor/v044n06/p0267-p0276.pdf

Hayes, M.P. and M. R. Tennant. 1985. Diet and feeding-behavior of the California red-legged frog, *Rana aurora draytonii* (Ranidae). Southwestern Naturalist. 30: 601-605. doi: 10.2307/3671057.

Heath, S.K. 2008. Yellow warbler species account. In: Shuford, W.D. and T. Gardali, editors. California bird species of special concern: a ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of Western Birds. Western Field Ornithologists and California Department of Fish and (Game) Wildlife. Camarillo and Sacramento, California. Pages 332-339.

Helm, B. 1997. The biogeography of eight large branchiopods endemic to California. In: Witham, C.W., Bauder, E., Belk, D., Ferrin, W., and R. Ornduff, editors. Ecology, Conservation, and Management of Vernal Pool Ecosystems – Proceedings from a 1996 conference. California Native Plant Society. Sacramento, California. Pages 124-139.

Hickman, J.C., editor. 1993. The Jepson Manual – Higher Plants of California. University of California Press. Berkeley and Los Angeles, California. 1400 pages.

Hilty, J.A. and A. M. Merenlender. 2004. Use of riparian corridors and vineyards by mammalian predators in Northern California. Conservation Biology 18: 126-135. doi: 10.1111/j.1523-1739.2004.00225.x.

Hobbs, J. 2016. Personal communications with Joe Hobbs, Wildlife Biologist, California Department of Fish and Wildlife. April 1, 2016.

Hobbs, R. J. and L. F. Huenneke. 1992. Disturbance, diversity, and invasion: implications for conservation. Conservation Biology 6: 324-337. doi: 10.1046/j.1523-1739.1992.06030324.x.

Holland, D.C. 1994. The western pond turtle: habitat and history. U.S. Department of Energy, Bonneville Power Administration. Portland, Oregon. 11 chapters + appendices.

Holmes, A.L. and G. R. Geupel. 1998. Avian population studies at Naval Weapons Systems Training Facility Boardman, Oregon. Unpublished report to the Department of the Navy and the Oregon Department of Fish and Wildlife. Petaluma, California.

Holt, D.W. and S. M. Leasure. 1993. Short-eared owl (*Asio flammeus*). In: Poole, A. and F. Gille, editors. The birds of North America, No. 62. Academy of Natural Sciences. Philadelphia, Pennsylvania. 22 pages.

Horney, M., Standiford, R.B., McCreary, D., Tecklin, J., and R. Richards. 2002. Effects of wildfire on blue oak in northern Sacramento Valley. General Technical Report PSW-GTR-184. USDA Forest Service, Pacific Southwest Research Station. Albany, California. Pages 261-267.

Humphrey, S. and T. Kunz. 1976. Ecology of a Pleistocene relict, the western big-eared bat (Plecotus townsendii) in the southern Great Plains. Journal of Mammalogy 57: 470-494. doi: 10.2307/1379297.

Humple, D. 2008. Loggerhead shrike species account. In: Shuford, W.D. and T. Gardali, editors. California bird species of special concern: a ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of Western Birds. Western Field Ornithologists and California Department of Fish and (Game) Wildlife. Camarillo and Sacramento, California. Pages 271-277.

Humple, D.L.K. and A.L Holmes. 2006. Effects of fire on a breeding population of loggerhead shrikes in sagebrush steppe habitat. Journal of Field Ornithology 77: 21-26. doi: 10.1111/j.1557-9263.2006.00004.x.

Hunt, W.G., Jackman, R.E., Brown, T.L., Driscoll, D.E., and L. Culp. 1997. A population study of golden eagles at the Altamont Pass Wind Resource Area: second year progress report. Report to National Renewable Energy Laboratory, Subcontracts XAT-5-15174-01 and XAT-6-16459-01. Predatory Bird Research Group, University of California, Santa Cruz. Santa Cruz, California. 93 pages.

Hunt, W.G., Jackman, R.E., Brown, T.L., Gilardi, J.G., Driscoll, D.E., and L. Culp. 1995. A pilot golden eagle population study in the Altamont Pass Wind Resource Area, California. Report to National Renewable Energy Laboratory, Subcontract No. XCG-4-14200. Predatory Bird Research Group, University of California, Santa Cruz. Santa Cruz, California. 219 pages.

Hunter, J.E. and M. J. Mazurek. 2003. Characteristics of trees used by nesting and roosting Vaux's Swifts in northwestern California. Western Birds Journal 34: 225–229.

Hunter, J.E., Fix, D., Schmidt, G.A., and J. C. Power. 2005. Atlas of the breeding birds of Humboldt County, California. Redwood Region Audubon Society. Eureka, California. 440 pages.

Hunting, K. 2008. Long-eared owl species account. In: Shuford, W.D. and T. Gardali, editors. California bird species of special concern: a ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of Western Birds. Western Field

Ornithologists and California Department of Fish and (Game) Wildlife. Camarillo and Sacramento, California. Pages 234-241.

Hunting, K., Fitton, S., and L. Edson. 2001. Distribution and habitat associations of the mountain plover (*Charadrius montanus*) in California. Trans. Western Section Wildlife Society 37: 37–42.

Huntsinger, L., J.M., Bartolome, J. W., and C. M. D'Antonio. 2007. Grazing management on California's Mediterranean grasslands. In: Stromberg, M.R., Corbin, J.D., and C.M. D'Antonio, editors. California grasslands: ecology and management, University of California Press, Berkeley, California. Pages 233-253.

Hutto, R.L. and J. S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service. Gen. Tech. Rep. RMRS-GTR-32 to U.S. Forest Service, Rocky Mountain Research Station. Ogden, Utah. 79 pages.

Ingles, L. G. 1965. Mammals of the Pacific states. Stanford University Press, Stanford, California. 506 pages

Jackson, L.E. 1985. Ecological origins of California's Mediterranean grasses. Journal of Biogeography 12: 349-361. doi: 10.2307/2844866.

Janes, S.W. 1983. Status, distribution, and habitat selection of the grasshopper sparrow in Morrow County, Oregon. Murrelet 64: 51–54. doi: 10.2307/3534692.

Jaramillo, A. and P. Burke. 1999. New world blackbirds: the Icterids. Princeton University Press. Princeton, New Jersey. 431 pages.

Jennings, M.R. and M. P. Hayes. 1994. Amphibian and reptile species of special concern in California. Final report contract no. 8023 to the California Department of Fish and (Game) Wildlife. Rancho Cordova, California. 255 pages.

Johnson, D., Longshore, K., Lowrey, C., and D. B. Thompson. 2015. Habitat selection and survival of pronghorn fawns at the Carrizo Plain National Monument, California. California Fish and (Game) Wildlife 101: 267-279.

Jolley, D.B., Ditchkoff, S.S., Sparklin, B. D., Hanson, L. B., and M.S. Mitchell. 2010. Estimate of herpetofauna depredation by a population of wild pigs. Journal of Mammalogy 91: 519-524. doi: 10.1644/09-MAMM-A-129.1.

Jones, K.B. and Whitford, W.G. 1989. Feeding behavior of free-roaming *Masticophis flagellum*: an efficient ambush predator. Southwestern Naturalist 34: 460-467. doi: 10.2307/3671503.

Jongsomjit, D., Tietz, J. R., Michaile, S., Fonseca, T., and G. R. Geupel. 2012. Le Conte's thrasher monitoring in the Carrizo Plain National Monument. Report to the Bureau of Land Management. July 2012. 41 pages. Accessed at: https://www.researchgate.net/publication/266871458_Le_Conte's_Thrasher_Monitoring_in_the_Carrizo_Plain_National_Monument_Report_to_the_Bureau_of_Land_Management

Judd, S.W. 1901. The relation of sparrows to agriculture. Biological Survey Bulletin No. 15. U.S. Department of Agriculture Division of Biological Survey. Washington, D.C. 98 pages.

Jump, P.M., Longcore, T. and C. Rich. 2006. Ecology and distribution of a newly discovered population of the federally threatened *Euproserpinus euterpe* (Sphingidae). Journal of the Lepidopterists' Society 60: 41-50.

Keeler-Wolf, T. 2009. E-mail correspondence between Jodi McGraw and Todd Keeler-Wolf regarding the VegCAMP survey data, Senior Vegetation Ecologist, California Department of Fish and Wildlife. Various communications.

Keeley, J. E. and S. C. Keeley. 1981. Post-fire regeneration of southern California chaparral. American Journal of Botany 68: 524-530. doi: 10.2307/2443028.

Keeley, J.E. 2002. Fire management of California shrubland landscapes. Environmental Management 29: 395-408. doi: 10.1007/s00267-001-0034-Y.

Keeley, J.E. and S. C. Keeley. 1987a. Role of fire in the germination of chaparral herbs and suffrutescents. Madroño 34: 240-249.

Keeley, J.E. and S. C. Keeley. 1987b. Role of fire in the germination of California chaparral and coastal sage scrub. American Journal of Botany 74: 653-653.

Keeley, J.E., Fotheringham C.J., and M. Baer-Keeley. 2005. Determinants of post-fire recovery and succession in Mediterranean-climate shrublands of California. Ecological Applications 15: 1515–1534. doi:10.1890/04-1005.

Keeley, J.E., Fotheringham, C.J., and M Baer-Keeley. 2006. Demographic patterns of post-fire regeneration in Mediterranean-climate shrublands of California. Ecological Monographs 76: 235-255. doi: 10.1890/0012-9615(2006)076[0235:DPOPRI]2.0.CO;2.

Kilpatrick A.M., Briggs, C.J., and P. Daszak. 2009. The ecology and impact of chytridiomycosis: an emerging disease of amphibians. Trends in Ecology & Evolution 25: 109-118. doi: 10.1016/j.tree.2009.07.011

Knick, S.T. and D. L. Dyer. 1997. Relationship of spatial distribution of habitats used by black-tailed jackrabbits in southwestern Idaho to wildfire and military training. Journal of Wildlife Management 61: 75-85.

Knopf, F.L. 1996. Mountain plover (*Charadrius montanus*). In: Poole, A. and F. Gill, editors. The birds of North America, No. 211. Academy of Natural Sciences. Philadelphia, Pennsylvania and The American Ornithologists' Union, Washington, D.C.

Knopf, F.L. and J. R. Rupert. 1995. Habits and habitats of mountain plovers in California. Condor 97: 743–751. doi: 10.2307/1369182.

Koch, A.J. and J. D. Yoakum. 2002. Reintroduction and status of pronghorn on the Carrizo Plain National Monument and surrounding areas in southern California. Proceeding of the 20th Biennial Pronghorn Workshop.

Kochert, M.N., Steenhof, K., McIntyre, C.L., and E. H. Craig. 2002. Golden eagle (*Aquila chrysaetos*). In Poole, A. and F. Gill, editors. The birds of North America, No. 684. The Birds of North America, Inc. Philadelphia, Pennsylvania.

Koenig, W. 2003. European starlings and their effect on native cavity-nesting birds. Conservation Biology 17: 1134-1140. doi: 10.1046/j.1523-1739.2003.02262.x.

Koopman, M.E., Nauman, R.S., and J. Leonard. 2010. Projected future climatic and ecological conditions in San Luis Obispo County. National Center for Conservation Science and Policy. Ashland, Oregon. 33 pages.

Kotanen, P.M. 1997. Effects of experimental soil disturbance on revegetation by natives and exotics in coastal California meadows. Journal of Applied Ecology 34: 631-644. doi: 10.2307/2404912.

Krebs, C.J. 1966. Demographic changes in fluctuating populations of *Microtus californicus*. Ecological Monographs 36: 239–273. doi: 10.2307/1942418.

Kyle, K. and R. Kelsey. 2011. Results of the 2011 tricolored blackbird statewide survey. Audubon California. Sacramento, CA. 27 pages.

Lederer, R. J., Mazen, W. S., and P. J. Metropulos. 1975. Population fluctuation in a yellow-headed blackbird marsh. Western Birds 6: 1–6.

Leeman, L. and L. Edson. 2002. Distribution and abundance of vesper sparrow in the Central Valley. Central Valley Bird Club Bulletin 5: 4–10.

Lehman, P.E. 2016. The birds of Santa Barbara County, California. The Vertebrate Museum, University of California, Santa Barbara. Santa Barbara, California. 420 pages.

Levine, J.M., Montserrrat, V., D'Antonio, C.M., Dukes, J.S., Grigulis, K., and S. Lavorel. 2003. Mechanisms underlying the impacts of exotic plant invasions. The Royal Society of London. 240: 775-781. doi: 10.1098/rspb.2003.2327.

Lewis, R. 1997. 1997 field inventory for *Layia heterotricha, Layia munzii, Layia discoidea, Lepidium jaredii* ssp. *jaredii, Acanthomintha lanceolata*, Carrizo Plain Natural Area, Clear Creek Management Area. Unpublished report to Bureau of Land Management, Bakersfield, CA. 18 pages and maps.

Littlefield, C.D. 1986. Autumn sandhill crane habitat use in southeast Oregon. Wilson Bulletin 98: 131–137.

Littlefield, C.D. 1999. The coastal segment of the Pacific Flyway population of lesser sandhill cranes. Unpublished report to Perkins Coie, LLP. Seattle, Washington.

Littlefield, C.D. 2002. Winter foraging habitat of greater sandhill cranes in northern California. Western Birds 33: 51–60.

Littlefield, C.D. and S.P. Thompson. 1982. The Pacific Coast population of lesser sandhill cranes in the contiguous United States. In: Lewis, J.C., editor. Proceedings of the 1981 Crane Workshop. National Audubon Society. Tavernier, Florida. Pages 288–294.

Longshore, K. and C. Lowrey. 2008. Habitat suitability and food habits of pronghorn antelope in the Carrizo Plains National Monument, California. U.S. Geological Survey report prepared for Carrizo Plains National Monument, Bureau of Land Management. 43 pages

Loughman, D.L. and M.R. McLandress. 1994. Reproductive success and nesting habitats of northern harriers in California. California Waterfowl Association. Sacramento, California.

Lovich, J. 2000. *Tamarix* spp. In: Bossard, C.C., Randall, J.M., and M.C. Hoshovsky, editors. Invasive plants of California wildlands. University of California Press. Berkeley and Los Angeles, California. Pages 312-316.

Lovich, J.E. and R. G. de Gouvenain. 1998. Salt cedar invasion in desert wetlands of the southwestern United States: ecological and political implications. In: Majumdar, S.K., Miller, E.W., and F.J. Brenner, editors. Ecology of Wetlands and Associated Systems. Pennsylvania Academy of Science. Pages 447-467.

MacWhirter, R.B. and K. L. Bildstein.1996. Northern harrier (*Circus cyaneus*). In: Poole, A. and F. Gill, editors. The birds of North America, No. 210. Academy of Natural Sciences. Philadelphia, Pennsylvania.

Madsen, C.R. 1967. Food and habitat selection of fall migrant sandhill cranes in Kidder County, North Dakota. Master's Thesis. Michigan State University, East Lansing. East Lansing, Michigan.

Malanson, G.P. and W.E. Westman. 1985. Post-fire succession in California coastal sage scrub: the role of continual basal sprouting. American Midland Naturalist 113: 309-318. doi: 10.2307/2425576.

Manley, P.N., Murphy, D.D., Campbell, L.A., Heckmann, K.E., Merideth, S., Parks, S.A., Sanford, M.P., and M. D. Schlesinger. 2006. Biotic diversity interfaces with urbanization in the Lake Tahoe Basin. California Agriculture 60: 59–64. doi: 0.3733/ca.v060n02p59.

Marks, J. S., Evans, D.L., and D. W. Holt. 1994. Long-eared owl (*Asio otus*). In: Poole, A. and F. Gill, editors. The birds of North America, No. 211. Academy of Natural Sciences. Philadelphia, Pennsylvania.

Marks, J.S. 1986. Nest site characteristics and reproductive success of long-eared owls in southwestern Idaho. The Wilson Bulliten 98: 547–560.

Martin, A. C., Zim, H.S., and A. L. Nelson. 1961. American wildlife and plants: a guide to wildlife food habits. Dover Publications, Inc. New York City, New York. 500 pages.

Marty, J.T. 2005. Effects of cattle grazing on diversity in ephemeral wetlands. Conservation Biology 19: 1626-1632. doi: 10.1111/j.1523-1739.2005.00198.x.

Mazer, S.J. and B.A. Hendrickson. 1993. Demography and reproductive biology of San Joaquin woolly-threads (*Lembertia congdonii*: Asteraceae). Final report to the California Department of Fish and (Game) Wildlife. Sacramento, California. 54 pages.

Mazer, S.J., LeBuhn, G., and D.E. Meade. 1993. Demography and reproductive biology of Kern mallow (*Eremalche kernensis*: Malvaceae). Report to California Department of Fish and (Game) Wildlife. Sacramento, California. 300 pages + appendices.

McCaskie, G., De Benedictis, P., Erickson, R., and J. Morlan. 1979. Birds of northern California, an annotated field list, 2nd ed. Golden Gate Audubon Society, Berkeley. Berkeley, California. 84 pages.

McCullough, D.R. 1969. The tule elk: its history, behavior, and ecology. University of California Press, Berkeley. Berkeley, California.

McCullough, D.R., Fischer, J.K., and J.D. Ballou. 1996. From bottleneck to metapopulation: recovery of the tule elk in California. In: McCullough, D.R., editor. Metapopulations and Wildlife Conservation. Island Press. Washington, D.C. Pages 374-404.

McGahan, J. 1968. Ecology of the golden eagle. The Auk 85: 1-12. doi: 10.2307/4083617.

McGraw, J.M. 2004. Interactive effects of disturbance and exotic species on the structure and dynamics of an endemic sandhills plant community. Doctoral Dissertation. University of California, Berkeley. Berkeley, California. 309 pages.

McLaughlin, B. C. and E. S. Zavaleta. 2013. Shifting bottom-up and top-down regulation of oak recruitment across a regional resource gradient. Global Ecology and Biogeography 22: 718-727. doi: 10.1111/geb.12028.

McNaughton, S. J., Oesterheld, M., Frank, D. A. and K. J. Williams. 1989. Ecosystem-level patterns of primary productivity and herbivory in terrestrial habitats. Nature 341: 142-144. doi: 10.1038/341142a0.

Meese, R.J. 2006. Settlement and breeding colony characteristics of tricolored blackbirds in 2006 in the Central Valley of California. Final report to U.S. Fish and Wildlife Service, Sacramento, California and Audubon California, Emeryville, California. 37 pages. Accessed at: http://tricolor.ice.ucdavis.edu/files/trbl/2006%20Final%20report.pdf

Meng, H.K. 1951. The Cooper's hawk, *Accipiter cooperii* (Bonaparte). Doctoral Thesis. Cornell University. Ithaca, New York. 202 pages.

Mensing, S.A. 1992. The impact of European settlement on blue oak (*Quercus douglasii*) regeneration and recruitment in the Tehachapi Mountains, California. Madroño 39: 36-46.

Merenlender, A.M. 2000. Mapping vineyard expansion provides information on agriculture and the environment. California Agriculture 54: 7–12. doi: 10.3733/ca.v054n03p7.

Miller, C.M. 1944. Ecologic relations and adaptations of the limbless lizards of the genus *anniella*. Ecological Monographs 14: 271-289. doi: 10.2307/1948444.

Miller, R.R. 1968. Records of some native freshwater fishes transplanted into various waters of California, Baja California, and Nevada. California Department of Fish and (Game) Wildlife 54: 170-179.

Mitchell, G.J. 1980. The pronghorn Antelope in Alberta. Alberta Department Lands and Forests, Fish and Wildlife Division, and the University of Regina. Regina, Saskatchewan, Canada. 165 pages.

Monk, G. 1981. California peregrine falcon reproductive outcome and management efforts. Endangered Species Report to U.S. Fish and Wildlife Service. Sacramento, California. 27 pages.

Moyle, P.B. 1973. Effects of introduced bullfrogs, *Rana catesbeiana*, on the native frogs of the San Joaquin Valley, California. Copeia 1973: 18-22. doi: 10.2307/1442351.

Moyle, P.B. 1976. Inland fishes of California. University of California Press. Berkeley. Berkeley, California. 405 pages.

Moyle, P.B., Smith, J.J., Daniels, R.A., and D.M. Baltz. 1982. Distribution and ecology of stream fishes of the Sacramento-San Joaquin drainage system, California: a review. University of California Press, publications in Zoology. Pages 225-256.

Moyle, P.B., Yoshiyama, R.D., Williams, J.E., and E. D. Wikramanayake. 1995. Fish species of special concern in California, 2nd ed. Final report for contract no. 21281F to California Department of Fish and (Game) Wildlife, Inland Fisheries Division. 277 pages.

National Audubon Society, Inc. 2012. Swainson's hawk watchlist. Accessed at: http://www.audubon.org/field-guide/bird/swainsons-hawk Accessed on June 1, 2012.

National Park Service (NPS). 2010. Point Reyes National Seashore website. Accessed at: http://www.nps.gov/pore/naturescience/diseases.htm Accessed on December 18, 2010.

NatureServe. 2006. NatureServe explorer: an online encyclopedia of life. Arlington, Virginia. Accessed at: http://explorer.natureserve.org Accessed June 2006.

Navo, K. 2005. Big free-tailed bat species account. Western Bat Working Group. Accessed at: http://wbwg.org/western-bat-species/ Accessed on October 18, 2010.

Neff, J.A. 1937. Nesting distribution of the tri-colored red-wing. Condor. 39: 61–81. doi: 10.2307/1363776.

Noss, R.F., LaRoe III, E.T., and J. M. Scott. 1995. Endangered ecosystems of the United States: a preliminary assessment of loss and degradation. Biological report 28 to National Biological Survey. U.S. Department of the Interior. Washington, D.C. 95 pages. Accessed at: http://noss.cos.ucf.edu/papers/Noss%20et%20al%201995.pdf

Nussbaum, R.A., Brodie, E.D. Jr., and R.M. Storm. 1983. Amphibians and reptiles of the Pacific Northwest. University Press of Idaho. Caldwell, Idaho. 332 pages.

O'Gara, B. W. and J. D. Yoakum. 2004. Pronghorn: ecology and management. Wildlife Management Institute. University Press of Colorado. Boulder, Colorado. 903 pages.

O'Hare, J.P. and B.G Hallock. 1980. Soil survey of Los Padres National Forest Area, California. United States Department of Agriculture, Forest Service and Soil Conservation Service. University of California Agricultural Experiment Station. 234 pages.

O'Connor, P.M. 1988. Homerange and habitat use by tule elk at Cache Creek, California. Master's Thesis. Humboldt State University, Arcata, California. 95 pages.

Orfila, R. and L. Draucker. 2008. Archaeological and historical investigations of the Carrizo Plains Ecological Reserve, San Luis Obispo County, California. Unpublished, Center for Archaeological Research, CSUB. Bakersfield, California.

Orians, G.H. 1961. The ecology of blackbird (*Agelaius*) social systems. Ecological Monographs 31: 285–312. doi: 10.2307/1948556.

Orians, G.H. 1980. Some adaptations of marsh-nesting blackbirds. Monographs in Population Biology 14: 1-295. Princeton University Press. Princeton, New Jersey.

Orians, G.H. and Willson, M.F. 1964. Interspecific territories of birds. Ecology. 45: 736–744.

Oster, K. and E.N. Vinson. 2003. Soil survey of San Luis Obispo County, California, Carrizo Plain Area. United States Department of Agriculture. National Resource Conservation Services. 620 pages. Accessed at: http://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/california/CA667/0/carrizo.pdf

Padgett-Flohr, G.E. 2008. Pathogenicity of *Batrachochytrium dendrobatidis* in two threatened California amphibians: *Rana draytonii* and *Ambystoma californiense*. Herpetological Conservation and Biology 3: 182-191.

Painter, E. L. and A. J. Belsky. 1993. Application of herbivore optimization theory to rangelands of the western United States. Ecological Applications 3: 2-9. doi: 10.2307/1941780.

Pandolfino, E.R. 2013. Lack of recovery of the yellow-billed magpie from the West Nile virus in California's Central Valley. Western Birds 44: 143-149.

Patton, J. L., Huckaby, D. G., and S.T. Álvarez-Castañeda. 2007. The evolutionary history and a systematic revision of woodrats of the *Neotoma Lepida* group. University of California Press. Berkeley, California. 411 pages.

Patton, J.L., Huckaby, D.G., and S.T. Álvarez-Castañeda. 2014. The evolutionary history and a systematic revision of woodrats of the *Neotoma lepida* group. University of California Press, publications in Zoology, volume 135. Berkeley and Los Angeles, California. 411 pages.

Penrod, K., Spencer, W., Rubin, E., and C. Paulman. 2010. Habitat connectivity planning for selected focal species in the Carrizo Plain. Prepared for County of San Luis Obispo by South Coast Wildlands.

Pianka, E.R., and W. S. Parker. 1975. Ecology of horned lizards: a review with special reference to *Phrynosoma platyrhinos*. Copeia 1: 141-162. doi: 10.2307/1442418.

Picman, J. and A. Isabelle. 1995. Sources of nesting mortality and correlates of nesting success in yellow-headed blackbirds. The Auk. 112: 183-191. doi: 10.2307/4088777.

Pierson, E.D. and M. S. Siders. 2005. Western mastiff bat species account. Western Bat Working Group. Accessed at: http://wbwg.org/western-bat-species/ Accessed on October 22, 2010.

Pierson, E.D. and W.D. Rainey. 1998a. Pallid bat (*Antrozous pallidus*). In: Bolster, B.C., editor. 1998. Terrestrial Mammal Species of Special Concern in California. Draft final report to California Department of Fish and (Game) Wildlife, Wildlife Management Division, Nongame Bird and Mammal Conservation Program for contract no. FG3146WM. Pages 31-34.

Pierson, E.D. and W.D. Rainey. 1998b. Townsend's big-eared bat (*Corynorhinus towsendii*). In: Bolster, B.C., editor. 1998. Terrestrial Mammal Species of Special Concern in California. Draft Final report to California Department of Fish and (Game) Wildlife, Wildlife Management Division, Nongame Bird and Mammal Conservation Program for contract no. FG3146WM. Pages 35-41.

Pilliod, D.S., Welty, J.L., and R. Stafford. 2013. Terrestrial movement patterns of western pond turtles (*Actinemys marmorata*) in central California. Herpetological Conservation and Biology 8: 207–221.

Poglayen-Neuwall, I. and D. E. Toweill. 1988. *Bassariscus astutus*. Mammalian Species 327: 1-8.

PRBO Conservation Science (PRBO). 2011. Projected effects of climate change in California: ecoregional summaries emphasizing consequences for wildlife. Version 1.0. PRBO Conservation Science. Petaluma, California. Accessed at: http://data.prbo.org/apps/bssc/climatechange

Prugh, L. and J. Brashares. 2009. Carrizo Plain ecosystem project: 2009 report. UC Berkeley Department of Ecosystems Sciences, Policy, and Management. Berkeley, California. 22 pages.

Prugh, L. and J. Brashares. 2010. Carrizo Plain Ecosystem Project 2010 Report. Field and mapping key for distinguishing vegetation types in the California Department of Fish and Game Carrizo Plains Ecological Reserve. Unpublished report provided to the California Department of Fish and (Game) Wildlife. 23 pages.

Prugh, LR and J. Brashares. 2012. Carrizo Plain ecosystem project. November 2012. Prepared by Rachel Endicott. 35 pages. Accessed at: carrizoscience.org/storage/Carrizo%20Report%202012.pdf

Purcell, K.L. and J. Verner. 1999. Nest predators of open and cavity nesting birds in oak woodlands. Wilson Bulletin 111: 251-256.

Quinn, J. and T. Diamond. 2011. North American badger species of special concern report. Department of Ecology, University of California, Davis. Davis, California.

Rathburn, G.B., Jennings, M.R., Murphey, T.G., and N. R. Siepel. 1993. Status and ecology of sensitive aquatic vertebrates in lower San Simeon and Pico Creeks, San Luis Obisbo County, California. Final report for cooperative agreement no. 14-16-0009-91-1909 to the National Ecology Research Center, Piedras Blancas Research Station. San Simeon, California. 103 pages.

Reinecke, K.J. and G. L. Krapu. 1986. Feeding ecology of sandhill cranes during migration in Nebraska. Journal of Wildlife Management 50: 71–79. doi: 10.2307/3801490.

Richmond, J., Barr, K., Backlin, A., Fisher, R., and A. Vandergast. 2011. Population genetics of the California red-legged frog (*Rana draytonii*): effects of wildfires on genetic diversity and strategies for selecting source populations for translocation in southern California. Data summary. U. S. Geological Survey, Western Ecological Research Center. San Diego, CA.

Roberson, D. 1993. Northern harrier. In: Roberson, D. and C. Tenney, editors. Atlas of the breeding birds of Monterey County, California. Monterey Peninsula Audubon Society. Carmel, California. Pages 90–91.

Roberson, D. 2008. Short-eared owl species account. In: Shuford, W. D. and T. Gardali, editors. California bird species of special concern: a ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of Western Birds 1. Western Field Ornithologists and California Department of Fish and (Game) Wildlife. Camarillo and Sacramento, California. Pages 242-248.

Ronan, N.A. 2002. Habitat selection, reproductive success, and site fidelity of burrowing owls in a grassland ecosystem. Master's Thesis. Oregon State University. Corvallis, Oregon. Accessed at: http://ir.library.oregonstate.edu/xmlui/bitstream/handle/1957/28356/RonanNoelleA2002.pdf?sequence=1

Rosenberg, D.K. and K.L. Haley. 2004. The ecology of burrowing owls in the agroecosystem of the Imperial Valley, California. Studies in Avian Biology 27: 120–135.

Rosenberg, D.K., Trulio, L.A., and D. F. DeSante. 1998. The burrowing owl demography and space-use research project in California. Annual Report 1998. The Institute for Bird Populations publication number 96. Point Reyes Station, California.

Rossman, D.A., Ford, N.B., and R. A. Seigal. 1996. The garter snakes: evolution and ecology. Animal and Natural History Series, Vol. 2. University of Oklahoma Press. Norman, Oklahoma. Pages 194-197.

Ruibal, R., Tevis, L. Jr., and V. Roig. 1969. The terrestrial ecology of the spadefoot toad *Scaphiopus hammondii*. Copeia 1969: 571-584. doi: 10.2307/1441937.

Sala, A., Smith, S.D., and D. A. Deitt. 1996. Water use by *Tamarix ramosissima* and associated phreatophytes in a Mojave Desert floodplain. Ecological Applications 6: 888-898. doi: 10.2307/2269492.

San Diego Zoo. 2011. Animal bytes: California condor. The Zoological Society of San Diego's Center for Conservation and Research for Endangered Species. Accessed at: http://www.sandiegozoo.org/animalbytes/t-condor.html Accessed October 11. 2011.

Sankary, M. H. and M. G. Barbour. 1972. Autecology of *Atriplex polycarpa* from California. Ecology 53: 1155–1162. doi: 10.2307/1935429.

Sauer, J.R., Hines, J.E., and J. Fallon. 2005. The North American breeding bird survey, results and analysis 1966–2004, version 2005.2. USGS Patuxent Wildlife Research Center. Laurel, Maryland. Accessed at: http://www.mbr-pwrc.usgs.gov/bbs/bbs2004.html

Sawyer, J.O., Keeler-Wolf, T., and J. M. Evens. 2009. A manual of California vegetation, 2nd ed. California Native Plant Society. Sacramento, CA. 1300 pages.

Schiffman, P. 2007. Ecology of native animals in California grasslands. In: Stromberg, M., Corbin, J., and C.M. D'Antonio, editors. California grasslands: ecology and management. University of California Press. Berkeley, California. Pages 180-190.

Schweizer, T. and D. L. Chesemore. 1996. Recent and historical raptor populations in Fresno, Madera, and Merced counties, California. Transactions of the Western Section. Wildlife Society. 32: 18–22.

Selleck, D. M. and B. Glading. 1943. Food habits of nesting barn owls and marsh hawks at Dune Lakes, California, as determined by the "cage nest" method. California Department of Fish (Game) Wildlife. 29: 123–131.

Shaffer, H.B., Fellers, G.M., Voss, S.R., Oliver, J.C., and G. B. Pauly. 2004. Species boundaries, phylogeography and conservation genetics of the red-legged frog (*Rana aurora/draytonii*) complex. Molecular Ecology. 13: 2667-2677. doi: 10.1111/j.1365-294X.2004.02285.x.

Sheppard, J.M. 1996. Le Conte's thrasher (*Toxostoma lecontei*). In: Poole, A. and F. Gill, editors. The birds of North America, No. 230. Academy of Natural Sciences. Philadelphia, Pennsylvania.

Sherwin, R. and D. A. Paiggio. 2005. Townsend's big-eared bat species account. Western Bat Working Group. Accessed at: http://wbwg.org/western-bat-species/

Sherwin, R. and D. A. Rambaldini. 2005. Pallid bat species account. Western Bat Working Group. Accessed at: http://wbwg.org/western-bat-species/ Accessed on October 25, 2010.

Shipman, G.E. 1972. Soil survey of Northern Santa Barbara area, California. United States Agriculture Department. Soil Conservation Service. University of California Agricultural Experiment Station. 201 pages.

Shuford, W.D. and T. Gardali, editors. 2008. California bird species of special concern: a ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of Western Birds. Western Field Ornithologists and California Department of Fish and (Game) Wildlife. Camarillo and Sacramento, California. 450 pages.

Shultz, T.A. 1997. Observations, resightings, and encounters of rehabilitated, orphaned, and relocated burrowing owls. Journal of Raptor Research Report 9: 128-131.

Single, J.R., Germano, D.J., and M. H. Wolfe. 1996. Decline of kangaroo rats during a wet winter in the southern San Joaquin Valley, California. Transactions of the Western Section of the Wildlife Society. 32: 34-41.

Skinner, M.W., Pavlik, B.M., and L.A. Vorobik, editors. 1994. Inventory of rare and endangered vascular plants of California, 5th ed. Special Publication, No. 1. California Native Plant Society. Sacramento, California. 338 pages.

Skorupa, J.P., Hothem, R.L., and R. W. DeHaven. 1980. Foods of breeding tricolored blackbirds in agricultural areas of Merced County, California. Condor 82: 465-467. doi: 10.2307/1367578.

Small, A. 1994. California birds: their status and distribution. Ibis Publications. Vista, California. 342 pages.

Smith, D.G. and J. R. Murphy. 1973. Breeding ecology of raptors in the eastern Great Basin of Utah. Science Bulletin Biology No. 3. Brigham Young University. Provo, Utah. 76 pages.

Smith, R.L. 1963. Some ecological notes on the grasshopper sparrow. Wilson Bulletin 75: 159-165.

Sogge, M.K., Sferra, S.J., and E. H. Paxton. 2008. *Tamarix* as habitat for birds: implications for riparian restoration in the southwestern United States. Restoration Ecology 16: 146-154. doi: 10.1111/j.1526-100X.2008.00357.x.

Sommer, M.L. 2012. California pronghorn antelope status report and management plan update. In partial fulfillment of PR Grant W-83-R-1 to the California Department of Fish and Wildlife, Big Game Program. 48 pages.

Sommer, M.L., Barboza, R.L., Botta, R.A., Kleinfelter, E.B., Schauss, M.E. and J. R. Thompson. 2007. Habitat guidelines for mule deer: California Woodland Chaparral Ecoregion. Mule Deer Working Group, Western Association of Fish and Wildlife Agencies. 50 pages.

Spencer, W.D., Beier, P., Penrod, K., Winters, K., Paulman, C., Rustigian-Romsos, H., Strittholt, J., Parisi, M., and A. Pettler. 2010. California essential habitat connectivity project: a strategy for conserving a connected California. Prepared for California Department of Transportation, California Department of Fish and (Game) Wildlife, and Federal Highways Administration. 313 pages.

Stafford, R. 2010. Personal communication with Robert (Bob) Stafford, Senior Environmental Specialist, California Department of Fish and Wildlife, Region 4. Various communications.

Stafford, R. 2011. Personal communication with Robert (Bob) Stafford, Senior Environmental Specialist, California Department of Fish and Wildlife, Region 4. Various communications.

Stafford, R. 2012. Personal communication with Robert (Bob) Stafford, Senior Environmental Specialist, California Department of Fish and Wildlife, Region 4. Various communications.

Stafford, R. 2018. Personal communication with Robert (Bob) Stafford, Senior Environmental Specialist, California Department of Fish and Wildlife, Region 4. Various communications.

Stafford, R. and J. Hobbs. 2013. Habitat use and home range estimates for tule elk (*Cervus elaphus nannodes*) in eastern San Luis Obispo County. Presented at Western Section of the Wildlife Society, Sacramento, CA.

Stafford. R. 2016. Vertebrate species of the Carrizo Plains Ecological Reserve. Excel database. Accessed September 2016.

Stebbins, R.C. 1954. Amphibians and reptiles of western North America. McGraw-Hill Book Company. New York City, New York. 536 pages.

Stebbins, R.C. 1972. California amphibians and reptiles. University of California Press. Berkeley, California. 152 pages.

Stebbins, R.C. 1985. Western reptiles and amphibians, 2nd ed. Houghton-Mifflin Company. Boston, Massachusetts. 448 pages.

Stebbins, R.C. 2003. Western reptiles and amphibians, 3rd ed. Houghton Mifflin Company. New York City, New York. 560 pages.

Steenhof, K., Kochert, M.N., and T. L. McDonald. 1997. Interactive effects of prey and weather on golden eagle reproduction. Journal of Animal Ecology 66: 350-362. doi: 10.2307/5981.

Stromberg, M. R. and J. R. Griffin. 1996. Long-term patterns in coastal California grasslands in relation to cultivation, gophers, and grazing. Ecological Applications 6: 1189-1211. doi: 10.2307/2269601.

Suarez, A.V, Richmond, J.Q., and T. J. Case. 2000. Prey selection in horned lizards following the invasion of argentine ants in southern California. Ecological Applications 10: 711-725. doi: 10.1890/1051-0761(2000)010[0711:PSIHLF]2.0.CO;2.

Sudbrock, A. 1993. Tamarisk control. I. Fighting back: an overview of the invasion, and a low-impact way of fighting it. Restoration and Management Notes 11: 31–34.

Sutter, B. and G. Ritchison. 2005. Effects of grazing on vegetation structure, prey availability, and reproductive success of grasshopper sparrows. Journal of Field Ornithology 76: 345-351. doi: 10.1648/0273-8570-76.4.345.

Terres, J.K. 1980. The Audubon Society encyclopedia of North American birds. A. Knopf. New York. 1100 pages.

Thomson, R. C., Wright, A. N. and H. B. Shaffer. 2016. California amphibian and reptile species of special concern. California Department of Fish and Wildlife and University of California Press. Oakland, CA. 408 pages.

Timbrook, J., Johnson, J.R., and D. D. Earle. 1982. Vegetation burning by the Chumash. Journal of California and Great Basin Anthropology 4: 163-186.

Tollestrup, K. 1979. The ecology, social structure, and foraging behavior of two closely related species of leopard lizards, *Gambelia silus* and *Gambelia wislizenii*. Doctoral Thesis. University of California, Berkeley. Berkeley, California. 146 pages.

Tollestrup, K. 1982. Growth and reproduction in two closely related species of leopard lizards, *Gambelia silus* and *Gambelia wislizenii*. American Midland Naturalist 108: 1-20. doi: 10.2307/2425287.

Tres, J. 1992. Breeding biology of the arroyo chub, *Gila orcutti* (Pisces: Cyrpindae). Unpublished Master's Thesis. California State Polytechnic University. Pomona, California. 73 pages.

Tricolored Blackbird Working Group. 2009. Conservation plan for the tricolored blackbird (*Agelaius tricolor)* 2.0 update. Susan Kester (ed.). Sustainable Conservation. San Francisco, California. 54 pages.

Accessed at: http://tricolor.ice.ucdavis.edu/files/trbl/Conservation%20Plan%20MOA%202009%202.0%20update.pdf

Trulio, L. 1997. Burrowing owl demography and habitat use at two urban sites in Santa Clara County, California. Raptor Research Report 9: 84–89. doi: 10.3398/064.072.0309.

Twedt, D.J. and R. D. Crawford. 1995. Yellow-headed blackbird (*Xanthocephalus xanthocephalus*). In: Poole, A. and F. Gill, editors. The Birds of North America, No. 192. Academy of Natural Sciences. Philadelphia, Pennsylvania.

Tyler, C.M., Kuhn, B., and F. W. Davis. 2006. Demography and recruitment limitations of three oak species in California. The Quarterly Review of Biology 81: 127-152. doi: 10.1086/506025.

U.S. Department of Agriculture (USDA). 2005. Record of decision Los Padres National Forest land management plan. U.S. Department of Agriculture, Forest Service, Pacific Southwest Region. 26 pages. Accessed at: https://fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5337803.pdf

United States Census Bureau. 2010a. Population 2010 interactive population database. Accessed at: http://www.census.gov/2010census/popmap/ipmtext.php

United States Census Bureau. 2010b. California County boundaries, state highways, and major roads [GIS data]. Accessed at: http://www.census.gov/geo/www/tiger/

United States Department of Agriculture (USDA). 2003. North Santa Barbara County soil survey {GIS data}. Accessed at: http://websoilsurvey.nrcs.usda.gov/app/

United States Department of Agriculture (USDA). 2004. Carrizo Plain area soil survey [GIS data]. Accessed at: http://websoilsurvey.nrcs.usda.gov/app/

United States Department of Agriculture (USDA). 2011. Larkspur fact sheet. Accessed at http://www.ars.usda.gov/Services/docs.htm?docid=9943 Accessed on October 10, 2011.

United States Fish and Wildlife Service (USFWS). 1990. Endangered and threatened wildlife and plants: determination of endangered or threatened status for five plants from the southern San Joaquin Valley. Federal Register 55: 29361-29370.

United States Fish and Wildlife Service (USFWS). 1992. Endangered and threatened wildlife and plants: 90-day finding and commencement of status reviews for a petition to list the western pond turtle and California red-legged frog. Federal Register 57: 45761-45762.

United States Fish and Wildlife Service (USFWS). 1993. Endangered and threatened wildlife and plants: notice of a 1-year petition finding on the western pond turtle. Federal Register 58: 42717-42718.

United States Fish and Wildlife Service (USFWS). 1994. Endangered and threatened wildlife and plants: determination of endangered status for the conservancy fairy shrimp, longhorn fairy shrimp, and the vernal pool tadpole shrimp, and threatened status for the vernal pool fairy shrimp. Federal Register 59**:** 48136–48153.

United States Fish and Wildlife Service (USFWS). 1996. California Condor Recovery Plan, 3rd Revision. U.S. Fish and Wildlife Service Region 1. Portland, Oregon. 62 pages. Accessed at: https://www.fws.gov/cno/es/calcondor/CondorResources.cfm

United States Fish and Wildlife Service (USFWS). 1998. Recovery plan for upland species of the San Joaquin Valley, California. U.S. Fish and Wildlife Service Region 1. Portland, Oregon. 319 pages. Accessed at: http://esrp.csustan.edu/publications/recoveryplan.php

United States Fish and Wildlife Service (USFWS). 2002. Recovery plan for the California red-legged frog (*Rana aurora draytonii*). U.S. Fish and Wildlife Service. Portland, Oregon. viii + 173 pages.

United States Fish and Wildlife Service (USFWS). 2003. Endangered and threatened wildlife and plants: withdrawal of the proposed rule to list the mountain plover as threatened. Federal Register 68: 53083-53101.

United States Fish and Wildlife Service (USFWS). 2005a. Recovery plan for vernal pool ecosystems of California and southern Oregon. Portland, Oregon. xxvi + 606 pages.

United States Fish and Wildlife Service (USFWS). 2005b. Revised guidance on site assessments and field surveys for the California red-legged frog. August 2005. U.S. Fish and Wildlife Service. 26 pages.

United States Fish and Wildlife Service (USFWS). 2007. Longhorn fairy shrimp (*Cranchinecta longiantenna*) 5-year review: summary and evaluation. U.S. Fish and Wildlife Service. Sacramento, California. 27 pages.

United States Fish and Wildlife Service (USFWS). 2010. Giant kangaroo rat (*Dipodomys ingens*) 5-year review: summary and evaluation. February 2010. U.S. Fish and Wildlife Service. Sacramento, California. 47 pages.

United States Forest Service (USFS). 2003. Los Padres National Forest Soil Survey [GIS Data]. Accessed at: http://websoilsurvey.nrcs.usda.gov/app/

United States Forest Service (USFS). 2010. Los Padres National Forest website. Accessed at: http://www.fs.usda.gov/lpnf/ Accessed on March 14, 2010.

United States Geologic Survey (USGS). 2005. Digital elevation model and hillshade layer for California [GIS data]. Accessed at: http://seamless.usgs.gov/

United States Geological Survey (USGS). 2010. Streams, water bodies, and seeps and springs in California [GIS data]. Sacramento, CA. Accessed at: http://water.usgs.gov/maps.html

Unitt, P. 2004. San Diego County bird atlas. Proceedings of the San Diego Society of Natural History. San Diego, California. 645 pages.

Verner, J. 1980. Bird communities of mixed-conifer forests of the Sierra Nevada. In: DeGraff, R.M., technical coordinator. Management of western forests and grasslands for nongame birds. Gen. Tech. Rep. INT-86 to U.S. Forest Service, Intermountain Forest and Range Experiment Station. Ogden, Utah. Pages 198–223.

Vickery, P.D., Hunter, M.L. Jr., and S. M. Melvin. 1994. Effect of habitat area on the distribution of grassland birds in Maine. Conservation Biology 8: 1087–1097. doi: 10.1046/j.1523-1739.1994.08041087.x.

Vickery, P.D., Tubaro, P.L., Cardosa da Silva, J.M., Peterjohn, B.G., Herkert, J.R., and R. B. Cavalcanti. 1999. Conservation of grassland birds in the western hemisphere. Studies in Avian Biology 19: 2–26.

Waian, L.B. and R. C. Stendell. 1970. The white-tailed kite in California with observations of the Santa Barbara population. California Department of Fish and (Game) Wildlife 56: 188-198.

Walkinshaw, L.H. 1973. Cranes of the world. Winchester Press. New York City, New York. 370 pages.

Walters, C. J., and C.S. Holling. 1990. Large-scale management experiments and learning by doing. Ecology 71: 2060-2068. doi: 10.2307/1938620.

Ward, M.P. 2005. The role of immigration in the decline of an isolated migratory bird population. Conservation Biology 19: 1528-1536. doi: 10.1111/j.1523-1739.2005.00245.x.

Warner, J.S. and R. L. Rudd. 1975. Hunting by the white-tailed kite (*Elanus leucurus*). Condor 77: 226-230. doi: 10.2307/1365804.

Warrick, G.D, Kato, T.T, and B. R. Rose. 1998. Microhabitat use and home range characteristics of blunt-nosed leopard lizards. Journal of Herpetology 32: 183-191. doi: 10.2307/1565295.

Weeks, K.D. and A.E. Grimmer. 1995. The secretary of the interior's standards for the treatment of historic properties with guidelines for preserving, rehabilitating, restoring and reconstructing historic buildings. U.S. Department of the Interior, National Park Service, Cultural Resource Stewardship and Partnerships, and Heritage Preservation Services. Washington, D.C. 177 pages.

Weller, T.J. 2005. Fringed Myotis (*Myotis thysanodes*). Western Bat Working Group. Accessed on February 6, 2012. Accessed at: http://wbwg.org/western-bat-species/

Wells, A.W. and J. S. Diana. 1975. Survey of the freshwater fishes and their habitats in the coastal drainages of southern California. Final Report submitted to California Department of Fish and (Game) Wildlife, Inland Fisheries Branch from the L.A. County Museum of Natural History. Los Angeles, California. 360 pages.

Western Regional Climate Center (WRCC). 2016. Climate data for the COOP station located at the New Cuyama fire station between January 1974 and December 2015. Accessed at http://www.wrcc.dri.edu/ Accessed on October 14, 2016.

Westman, W.E. 1976. Vegetation conversion for fire control in Los Angeles. Urban Ecology 2: 119-137. doi: 10.1016/0304-4009(76)90020-6.

Westman, W.E. 1979. A potential role of coastal sage scrub understories in the recovery of chaparral after fire. Madroño 26: 64-68.

Whitley, D.S. 2003. Reconnaissance level archaeological survey of portions of the Carrizo Plain National Monument, San Luis Obispo County, California. Bureau of Land Management. Bakersfield, California.

Whitley, D.S. 2004. Class II inventory of portions of the Carrizo Plain National Monument, San Luis Obispo County, California. Bureau of Land Management. Bakersfield, California.

Whitley, D.S. 2007. Class III inventory of portions of the Carrizo Plain National Monument, San Luis Obispo County, California. Bureau of Land Management. Bakersfield, California.

Whitley, D.S. 2011. Cultural resources overview and reconnaissance, Carrizo Plains Ecological Preserve, San Luis Obispo County, California. February 2011. Prepared for Jodi McGraw Consulting. Prepared by RPA ASM Affiliates, Inc. Tehachapi, California. 99 pages.

Whitley, D.S., Simon, J. and J.H.N. Loubser. 2007. The Carrizo collapse: art and politics in the past. In: Kaldenberg, R.L, editor. A festschrift honoring the contributions of California archaeologist Jay von Werlhof. Maturango Museum Publication 20. Ridgecrest, California. Pages 199-208. Accessed at: http://www.academia.edu/3179288/The_Carrizo_Collapse_Art_and_Politics_in_the_Past

Wiens, J.A. 1969. An approach to the study of ecological relationships among grassland birds. Ornithological Monographs No. 8. 93 pages. doi: 10.2307/40166677.

Willett, G. 1933. A revised list of the birds of southwestern California. Pacific Coast Avifauna Issue 21. Pages 1-204.

Williams, D.F. 1980. Distribution and population status of the San Joaquin antelope squirrel and giant kangaroo rat. Final report E-W-R, IV-10.0 to the California Department of Fish and (Game) Wildlife, Nongame Wildlife Investigations. Sacramento, California. 48 pages.

Williams, D.F. 1986. Mammalian species of special concern in California. Administrative report 86-1 to the California Department of Fish and (Game) Wildlife. Sacramento, California. 112 pages.

Williams, D.F. 1992. Geographic distribution and population status of the giant kangaroo rat, *Dipodomys ingens* (Rodentia, Heteromyidae) In: Williams, D.F., Byrne, S., and T. A. Rado, editors. Endangered and sensitive species of the San Joaquin Valley, California: their biology, management and conservation. California Energy Commission. Sacramento, California. Pages 130-328.

Williams, D.F., Germano, D.J., and W. Tordoff III. 1993. Population studies of endangered kangaroo rats and blunt-nosed leopard lizards in the Carrizo Plain Natural Area, California. Final report 93-01:1-114 to the California Department of Fish and (Game) Wildlife, Wildlife Management Division, Nongame Bird and Mammal Section. Access at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentVersionID=3612 Accessed June 2006.

Williams, D.F., Tordoff III, W., and J.H. Harris. 1988. San Joaquin antelope squirrel (*Ammospermophilus nelsoni*) study - 1988. Final report FG-7398 to the California Department of Fish and (Game) Wildlife, Endangered Wildlife Program. Sacramento, California. 62 pages.

Willson, M.F. 1966. Breeding ecology of the yellow-headed blackbird. Ecological Monographs 36: 51–77. doi: 10.2307/1948488.

Wilson, L.D. 1970. The coachwhip snake, *Masticophis flagellum* (Shaw): taxonomy and distribution. Tulane Studies in Zoology and Botany 16: 31-99.

Woodbridge, B. 1998. Swainson's hawk species account. California Partners in Flight Riparian Bird Conservation Plan. Accessed at: http://www.prbo.org/calpif/htmldocs/species/riparian/swainsons_hawk.htm Accessed on June 1, 2012.

Wright, A.H. and A.A. Wright. 1957. Handbook of frogs and toads of the United States and Canada. Cornell University Press. New York City, New York. 640 pages.

Yoakum, J.D. 2004a. Distribution and abundance. In: O'Gara, B.W. and J.D. Yoakum, editors. Pronghorn: ecology and management. University Press of Colorado. Boulder, Colorado. Pages 75-105.

Yoakum, J.D. 2004b. Habitat characteristics and requirements. In: O'Gara, B.W. and J. D. Yoakum, editors. Pronghorn: ecology and management. University Press of Colorado. Boulder, Colorado. 903 pages.

York, M., Rosenberg, D.K., and K.K. Sturm. 2002. Diet and food-niche breadth of burrowing owls (*Athene cunicularia*) in the Imperial Valley, California. Western North American Naturalist 62: 280-287.

Zeiner, D.C., Laudenslayer, W.F. Jr., Mayer, K.E., and M. White, editors. 1990. California's wildlife, Volumes I-III. California Department of Fish and (Game) Wildlife. Sacramento, California. Accessed at: http://www.dfg.ca.gov/biogeodata/cwhr/cawildlife.aspx

Zink, R.M., Blackwell, R.C., and O. Rojas-Soto. 1997. Species limits in the Le Conte's thrasher. Condor 99: 132-138. doi: 10.2307/1370231.

The Carrizo Plain with the Temblor Range in the Distance during Spring

Appendix A

Geographic Information System Data

Table A- 1: GIS layers used in the Carrizo Plains Ecological Reserve Land Management Plan maps

Dataset	Reference	Source Link
Land Use, Ownership, and Jurisdictions		
California Counties	US Census Bureau 2010b	http://www.census.gov/geo/www/tiger/
San Luis Obispo County Assessor Parcels	County of San Luis Obispo 2010a	Not available on-line
CPER Boundaries and Acquisition History	CDFW 2010d	not available on-line
Carrizo Plain National Monument Boundary	BLM 2009	http://www.blm.gov/ca/gis/
Public Land Survey System	BLM 2009	http://www.blm.gov/ca/gis/
Urban	DOC 2008	http://www.conservation.ca.gov/dlrp/fmmp/Pages/Index.aspx
Permit Stations	CDFW 2010d	not available on-line
Cultivation	BLM 2009	not available on-line
Geology and Soils		
Geologic Formations	County of San Luis Obispo 2007	http://lib.calpoly.edu/gis/browse.jsp?by=th&th=7
Faults and Fault Zones	County of San Luis Obispo 2001	http://lib.calpoly.edu/gis/browse.jsp?by=th&th=7
Carrizo Plain Area Soil Survey	USDA 2004	http://SoilDataMart.nrcs.usda.gov/
North Santa Barbara County Soil Survey	USDA 2003	http://SoilDataMart.nrcs.usda.gov/
Los Padres National Forest Soil Survey	USFS 2003	http://SoilDataMart.nrcs.usda.gov/
Hydrology		
Streams	USGS 2010	http://nhd.usgs.gov/
Water Bodies	USGS 2010	http://nhd.usgs.gov/
Seeps and Springs	USGS 2010	http://nhd.usgs.gov/
Ponds	CDFW 2010d	not available on-line
Watersheds	CalFire 2011	http://frap.cdf.ca.gov/data/frapgisdata-sw-calwater_download

Table A- 1: GIS layers used in the Carrizo Plains Ecological Reserve Land Management Plan maps

Dataset	Reference	Source Link
<u>Biodiversity</u>		
Vegetation	CDFW 2010c	not available on-line
Fire History	CalFire 2015	http://frap.cdf.ca.gov/data/frapgisdata/select.asp
Rare Species	CDFW 2016a	not available on-line
<u>Transportation</u>		
Chimineas Unit Roads	CDFW 2010d	not available on-line
Carrizo Plain National Monument Roads	BLM 2009	http://www.blm.gov/ca/gis/
State Highways	US Census Bureau 2010b	http://www.census.gov/geo/www/tiger/
Major Roads	US Census Bureau 2010b	http://www.census.gov/geo/www/tiger/
Carrizo Plain National Monument Trails	BLM 2009	http://www.blm.gov/ca/gis/
<u>Infrastructure</u>		
Carrizo Plain National Monument Infrastructure (Points)	BLM 2009	http://www.blm.gov/ca/gis/
Carrizo Plain National Monument Utility Lines	BLM 2009	http://www.blm.gov/ca/gis/
Carrizo Plains Ecological Reserve Fences	CDFW 2012c	not available on-line
Electrical Transmission Lines	County of San Luis Obispo 2001	http://lib.calpoly.edu/gis/browse.jsp?by=th&th=10
<u>Physical</u>		
CA Hillshade (30 m)	USGS 2005	http://seamless.usgs.gov/
Digital Elevation Model (30 m)	USGS 2005	http://seamless.usgs.gov/
USGS 24k and 100k quadrangles (Digital Raster Graphics of Topographic Maps)	ESRI 2012	http://www.arcgis.com/home/

Appendix B

Plant Communities

Appendix B Plant Communities

To facilitate development and implementation of the CPER LMP, the California Department of Fish and Wildlife Vegetation Classification and Mapping Program (VegCAMP) conducted a site-specific vegetation classification and mapping project. Working with the California Native Plant Society as well as Department biologists with the Resource Assessment Program, VegCAMP biologists collected data at 379 sites located throughout the CPER between 2005 and 2008 using the Rapid Assessment Protocol utilized for floristic-based vegetation classification.

Biologists analyzed the plant abundance (cover) data using cluster analysis and samples with similar dominant, characteristic, or indicator species were grouped using a hierarchical classification scheme, which was based upon, but modified from, the National Vegetation Classification System (Grossman et al. 1998) and used by the California Native Plant Society (Sawyer et al. 2009). This classification scheme has eight hierarchical levels which, from most general to most specific, are: formation class, formation sub class, formation, division, macrogroup, group, alliance, and association. The six highest levels are based on physiognomic characteristics while the two lowest levels are based on species composition (Sawyer et al. 2009). The classification for the CPER resulted in three formation classes, five formation sub classes, nine formations, 11 divisions, 16 macrogroups, 24 groups, 42 alliances, and 30 associations. Of these, four alliances and one association are provisional: vegetation types for which additional data and analysis is needed to confidently describe in terms of California's overall vegetation (Sawyer et al. 2009).

In 2009, VegCAMP biologists used the classification system to map the vegetation within the CPER primarily through interpretation of 2007 one-foot resolution aerial imagery. Polygons were attributed to the lowest level of the classification hierarchy that could confidently be identified from the image. This was typically the alliance level; however, for herbaceous communities, including grasslands and wetlands, in which dominant species could not be identified in the aerial imagery, groups were mapped. Attribution of over half (58%) of the vegetated polygons was verified with field checks in 2009 and 2010.

To inform management as part of the LMP, the 57 mapped vegetation types were categorized into ten elements (Table B-1, Figure 16). These systems support similar animal species assemblages, and will generally require similar management and respond similarly to management, owing to similarities in the ecology of the plant species and disturbance ecology. For each of the 10 vegetation elements, the following sections describe the mapped vegetation types and identify their dominant or common species, building on the general descriptions of structure, condition, and disturbance ecology provided in Section 3.1 of the Plan. Additional information about many of these community types is provided in A Manual of California Vegetation (Sawyer et al. 2009).

Vegetation types were identified as 'sensitive' if they met one or more of the following criteria:

- Listed as a 'special community' on the Department's current list of sensitive plant communities (CDFW 2010b);
- Ranked S1 or S2 on The Nature Conservancy Heritage Program; and/or
- Identified as locally rare or unique, including disjunct occurrences or more widespread communities (e.g., coast live oak woodland).

Sensitive communities are listed in bold font in Table B-1 and illustrated in Figures B-3 through B-8.

Table B-1: Mapped vegetation and other land cover within 10 Vegetation Elements, showing acres and percent of each unit or group of units (i.e., for the Chimineas units) of the CPER. Sensitive communities are shown in bold font.

		American		Chimineas		Elkhorn		Panorama		Total	
Element	Mapped Vegetation (or other cover)	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
Grassland	*Amsinckia* (*A. menziesii, A. tessellata*)		0.0%	33.3	0.1%		0.0%		0.0%	33.3	0.1%
	California Annual and Perennial Grassland	5,957.0	94.7%	12,468.6	42.1%	118.8	71.8%	2,473.2	86.9%	21,017.6	54.0%
	Lasthenia californica-Plantago erecta- Vulpia microstachys		**0.0%**		**0.0%**		**0.0%**	**4.5**	**0.2%**	**4.5**	**0.0%**
	Med. CA naturalized ann. and per. grassland		0.0%	245.3	0.8%		0.0%		0.0%	245.3	0.6%
	Nassella cernua Provisional	5.2	0.1%		0.0%		0.0%		0.0%	5.2	0.0%
	Grassland Total	**5,962.2**	**94.8%**	**12,747.2**	**43.0%**	**118.8**	**71.8%**	**2,477.8**	**87.0%**	**21,305.9**	**54.7%**
Coastal Scrub	*Artemisia californica*		0.0%	90.8	0.3%		0.0%		0.0%	90.8	0.2%
	Artemisia californica - Eriogonum fasciculatum		0.0%	646.3	2.2%		0.0%		0.0%	646.3	1.7%
	Eriogonum elongatum Provisional		0.0%	101.7	0.3%		0.0%		0.0%	101.7	0.3%
	Eriogonum fasciculatum	71.1	1.1%	2,486.0	8.4%	1.2	0.7%	2.6	0.1%	2,560.9	6.6%
	Eriogonum nudum Provisional		0.0%	26.3	0.1%		0.0%		0.0%	26.3	0.1%
	Gutierrezia californica Provisional		0.0%	55.3	0.2%		0.0%	4.1	0.1%	59.4	0.2%
	Lupinus albifrons	31.8	0.5%	39.7	0.1%		0.0%		0.0%	71.4	0.2%
	Salvia leucophylla		0.0%	964.8	3.3%		0.0%		0.0%	964.8	2.5%
	Salvia mellifera		0.0%	103.1	0.3%		0.0%		0.0%	103.1	0.3%
	Coastal Scrub Total	**102.9**	**1.6%**	**4,513.9**	**15.2%**	**1.2**	**0.7%**	**6.8**	**0.2%**	**4,624.7**	**11.9%**
Chaparral	*Adenostoma fasciculatum*		0.0%	1,007.2	3.4%		0.0%		0.0%	1,007.2	2.6%
	Adenostoma fasciculatum - Salvia mellifera		0.0%	54.1	0.2%		0.0%		0.0%	54.1	0.1%
	Arctostaphylos glauca		0.0%	182.3	0.6%		0.0%		0.0%	182.3	0.5%
	Cercocarpus montanus		0.0%	6.9	0.0%		0.0%		0.0%	6.9	0.0%
	Chaparral Total		**0.0%**	**1,250.5**	**4.2%**		**0.0%**		**0.0%**	**1,250.5**	**3.2%**
Desert Scrub	***Allenrolfea occidentalis***	34.7	0.6%		0.0%		0.0%		0.0%	34.7	0.1%
	Artemisia tridentata		0.0%	1.0	0.0%		0.0%		0.0%	1.0	0.0%
	Atriplex canescens		0.0%	232.7	0.8%		0.0%		0.0%	232.7	0.6%
	Atriplex polycarpa		0.0%	647.6	2.2%		0.0%	154.0	5.4%	801.6	2.1%
	Atriplex polycarpa-Atriplex canescens (mapping unit)		0.0%	157.8	0.5%		0.0%		0.0%	157.8	0.4%
	Atriplex spinifera	58.9	0.9%		0.0%		0.0%	191.2	6.7%	250.1	0.6%
	Eastwoodia elegans Provisional		0.0%	53.4	0.2%	1.4	0.8%	2.8	0.1%	57.7	0.1%
	Ephedra californica		0.0%		0.0%	44.1	26.7%	14.7	0.5%	58.8	0.2%

Table B-1: Mapped vegetation and other land cover within 10 Vegetation Elements, showing acres and percent of each unit or group of units (i.e., for the Chimineas units) of the CPER. Sensitive communities are shown in bold font.

		American		Chimineas		Elkhorn		Panorama		Total	
Element	Mapped Vegetation (or other cover)	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
	Ericameria linearifolia	16.8	0.3%	2,710.2	9.1%		0.0%		0.0%	2,727.1	7.0%
	Eriodictyon crassifolium		0.0%	0.8	0.0%		0.0%		0.0%	0.8	0.0%
	Isomeris arborea Provisional	11.8	0.2%	428.2	1.4%		0.0%		0.0%	440.0	1.1%
	Krascheninnikovia lanata		0.0%		0.0%		0.0%	0.4	0.0%	0.4	0.0%
	Ribes quercetorum Provisional	0.6	0.0%	7.4	0.0%		0.0%		0.0%	7.9	0.0%
	Desert Scrub Total	122.7	2.0%	4,239.0	14.3%	45.5	27.5%	363.1	12.8%	4,770.4	12.3%
Juniper Woodland	Juniperus californica	**2.4**	**0.0%**	**3,034.8**	**10.2%**		**0.0%**		**0.0%**	**3,037.2**	**7.8%**
Oak Woodland	***Quercus agrifolia***		0.0%	0.7	0.0%		0.0%		0.0%	0.7	0.0%
	Quercus douglasii		0.0%	2,742.0	9.2%		0.0%		0.0%	2,742.0	7.0%
	Quercus john-tuckeri		0.0%	804.0	2.7%		0.0%		0.0%	804.0	2.1%
	Oak Woodland Total		**0.0%**	**3,546.7**	**12.0%**		**0.0%**		**0.0%**	**3,546.7**	**9.1%**
Wetland	**Arid West freshwater emergent marsh**		0.0%	6.3	0.0%		0.0%		0.0%	6.3	0.0%
	CA warm temperate marsh/seep		0.0%	10.5	0.0%		0.0%		0.0%	10.5	0.0%
	CA mixed freshwater vernal pool/swale bottomland	11.0	0.2%	5.1	0.0%		0.0%		0.0%	16.0	0.0%
	Distichlis spicata	31.8	0.5%		0.0%		0.0%		0.0%	31.8	0.1%
	Playa	41.9	0.7%		0.0%		0.0%		0.0%	41.9	0.1%
	Wetland Total	**84.6**	**1.3%**	**21.9**	**0.1%**		**0.0%**		**0.0%**	**106.5**	**0.3%**
Ponds	Reservoirs & Ponds		**0.0%**	**7.4**	**0.0%**		**0.0%**		**0.0%**	**7.4**	**0.0%**
Riparian and Riverine	*Baccharis salicifolia*		0.0%	17.8	0.1%		0.0%		0.0%	17.8	0.0%
	Ericameria nauseosa		0.0%	1.9	0.0%		0.0%		0.0%	1.9	0.0%
	Lepidospartum squamatum		**0.0%**	**24.1**	**0.1%**		**0.0%**		**0.0%**	**24.1**	**0.1%**
	Perennial Stream Channel		0.0%	0.2	0.0%		0.0%		0.0%	0.2	0.0%
	Pluchea sericea		0.0%	123.2	0.4%		0.0%		0.0%	123.2	0.3%
	Populus fremontii	0.7	0.0%	4.4	0.0%		0.0%		0.0%	5.0	0.0%
	River & Lacustrine Flats & Streambeds		0.0%	22.2	0.1%		0.0%		0.0%	22.2	0.1%
	Salix exigua		0.0%	21.6	0.1%		0.0%		0.0%	21.6	0.1%

Table B-1: Mapped vegetation and other land cover within 10 Vegetation Elements, showing acres and percent of each unit or group of units (i.e., for the Chimineas units) of the CPER. Sensitive communities are shown in bold font.

		American		Chimineas		Elkhorn		Panorama		Total	
Element	Mapped Vegetation (or other cover)	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
	Salix laevigata		0.0%	1.1	0.0%		0.0%		0.0%	1.1	0.0%
	Salix lasiolepis		0.0%	3.1	0.0%		0.0%		0.0%	3.1	0.0%
	SW N. American riparian/wash scrub		0.0%	21.3	0.1%		0.0%		0.0%	21.3	0.1%
	Tamarix		0.0%	19.4	0.1%		0.0%		0.0%	19.4	0.0%
	Riparian and Riverine Total	0.7	0.0%	260.3	0.9%		0.0%		0.0%	261.0	0.7%
Cliffs and Rocks		**7.3**	**0.1%**	**3.1**	**0.0%**		**0.0%**		**0.0%**	**10.4**	**0.0%**
Other	Developed	3.1	0.0%	14.8	0.0%		0.0%		0.0%	17.8	0.0%
	Exotic trees & shrubs	3.7	0.1%		0.0%		0.0%		0.0%	3.7	0.0%
	Road		0.0%	10.5	0.0%		0.0%		0.0%	10.5	0.0%
	Unknown		0.0%	0.3	0.0%		0.0%		0.0%	0.3	0.0%
	Other Total	6.8	0.1%	25.5	0.1%		0.0%		0.0%	32.2	0.1%
	Grand Total	**6,289.6**	**100.0%**	**29,650.2**	**100.0%**	**165.5**	**100.0%**	**2,847.6**	**100.0%**	**38,952.9**	**100.0%**

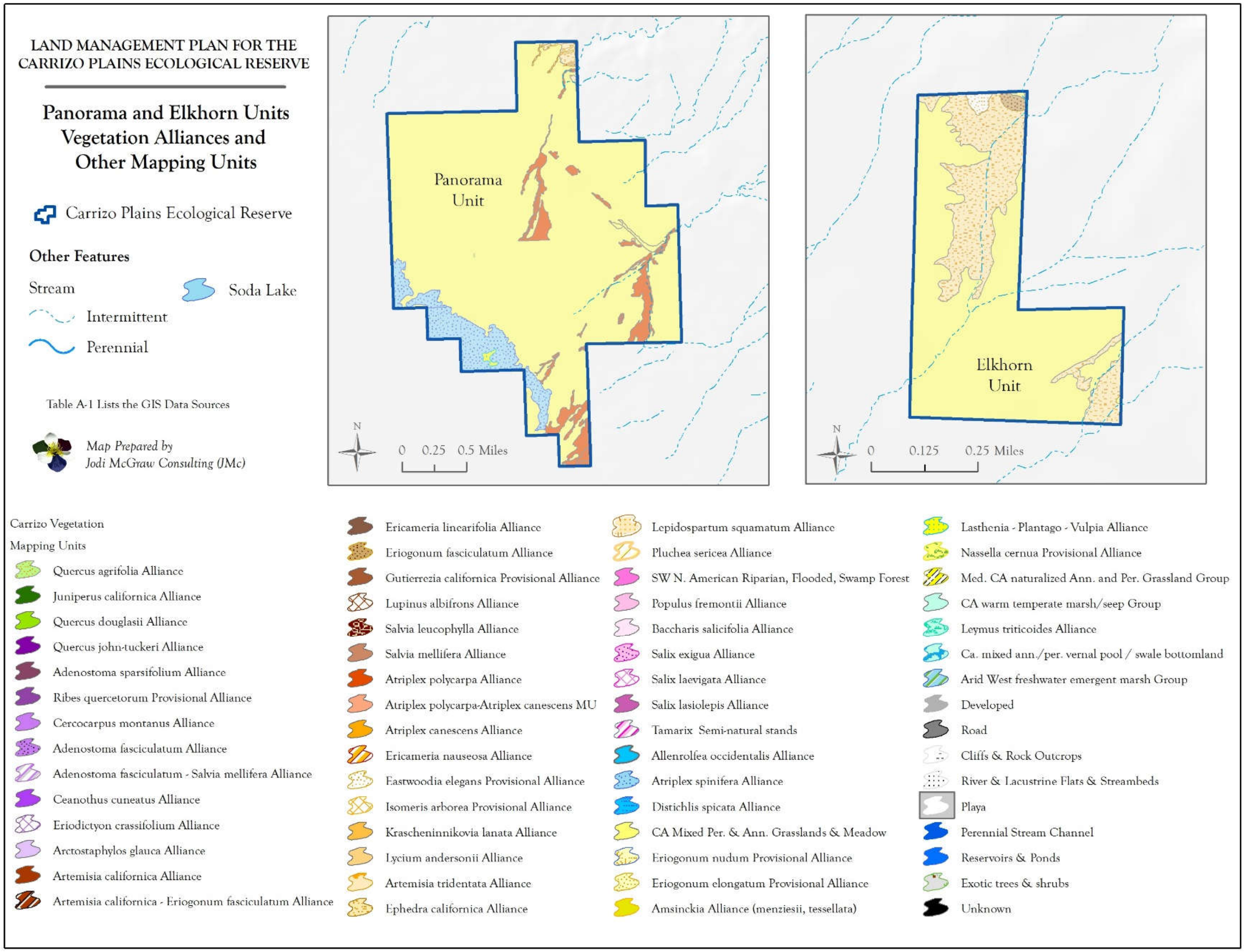


Figure: B-1: Vegetation alliances and mapping units in the Panorama and Elkhorn units of the CPER

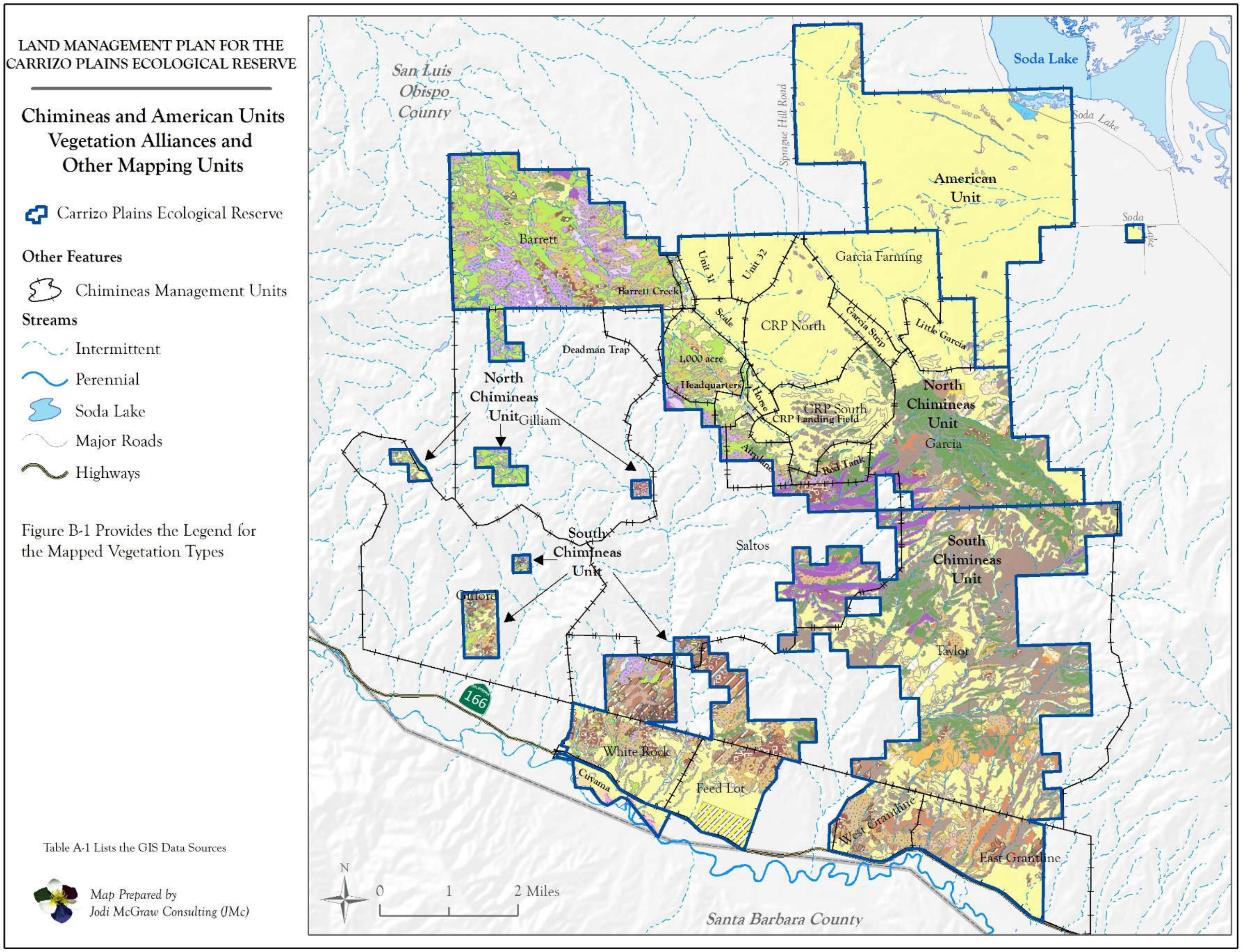


Figure B-2: Vegetation alliances and mapping units in the American and Chimineas units of the CPER

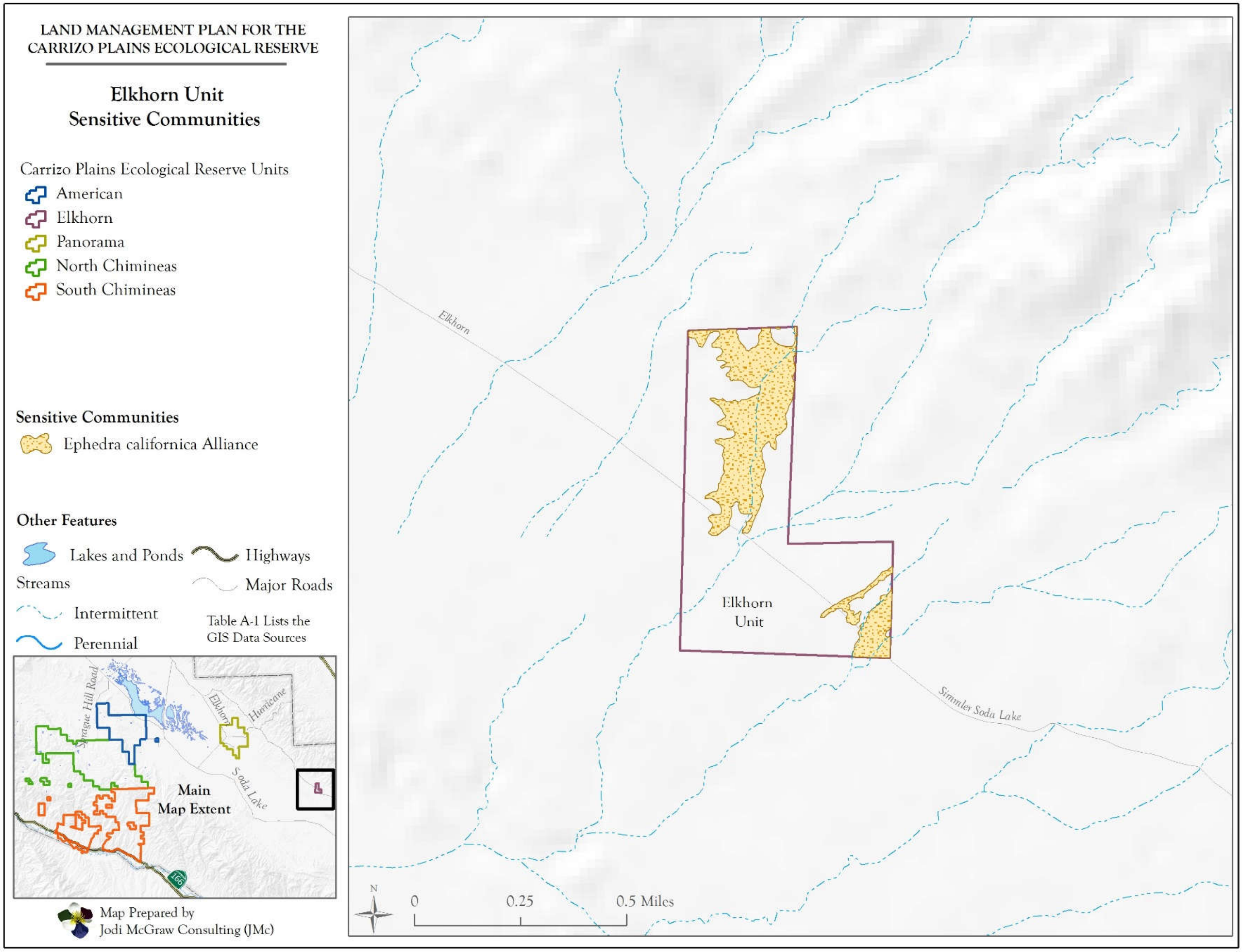


Figure B-3: Sensitive Communities of the Elkhorn Unit

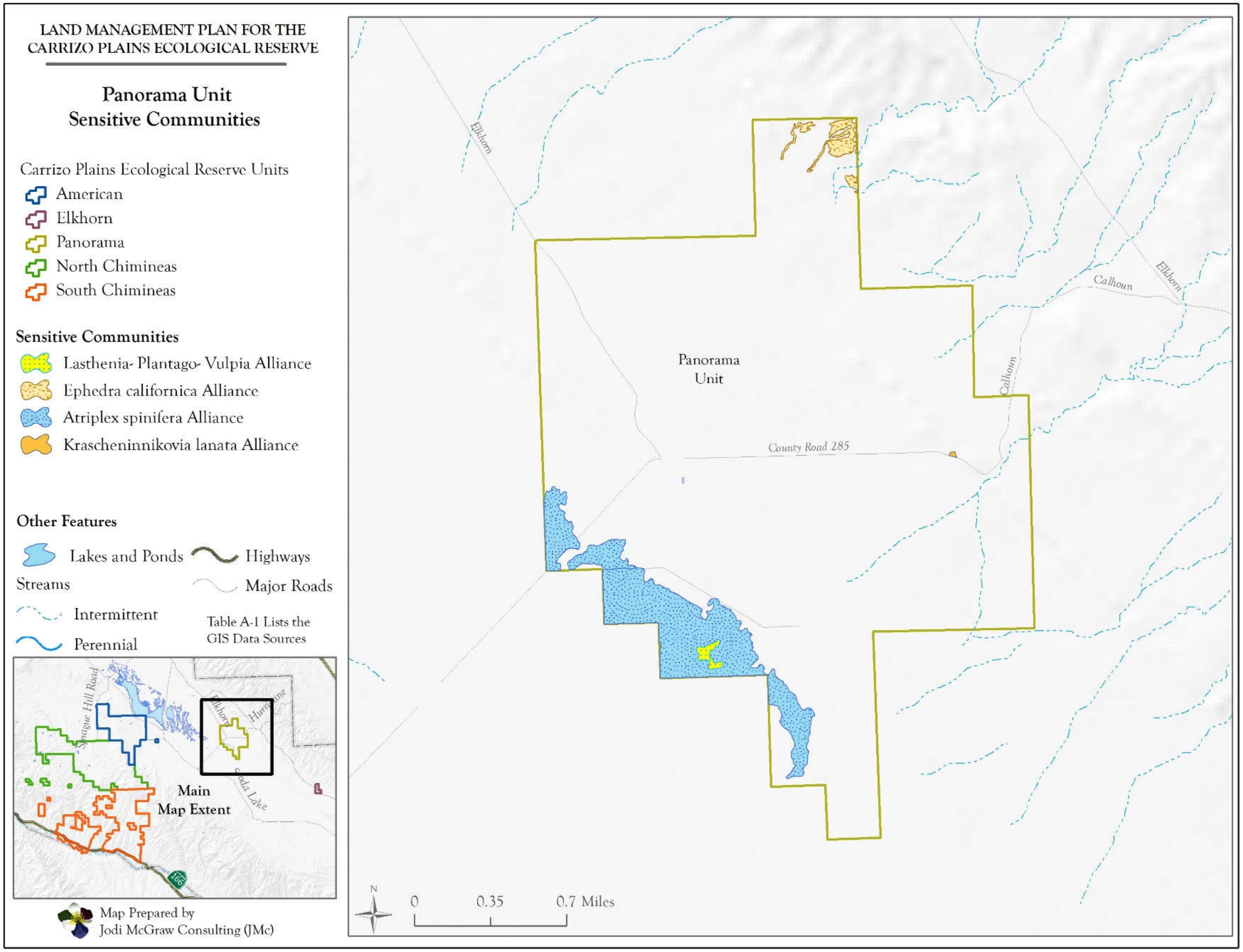


Figure: B-4: Sensitive Communities of the Panorama Unit

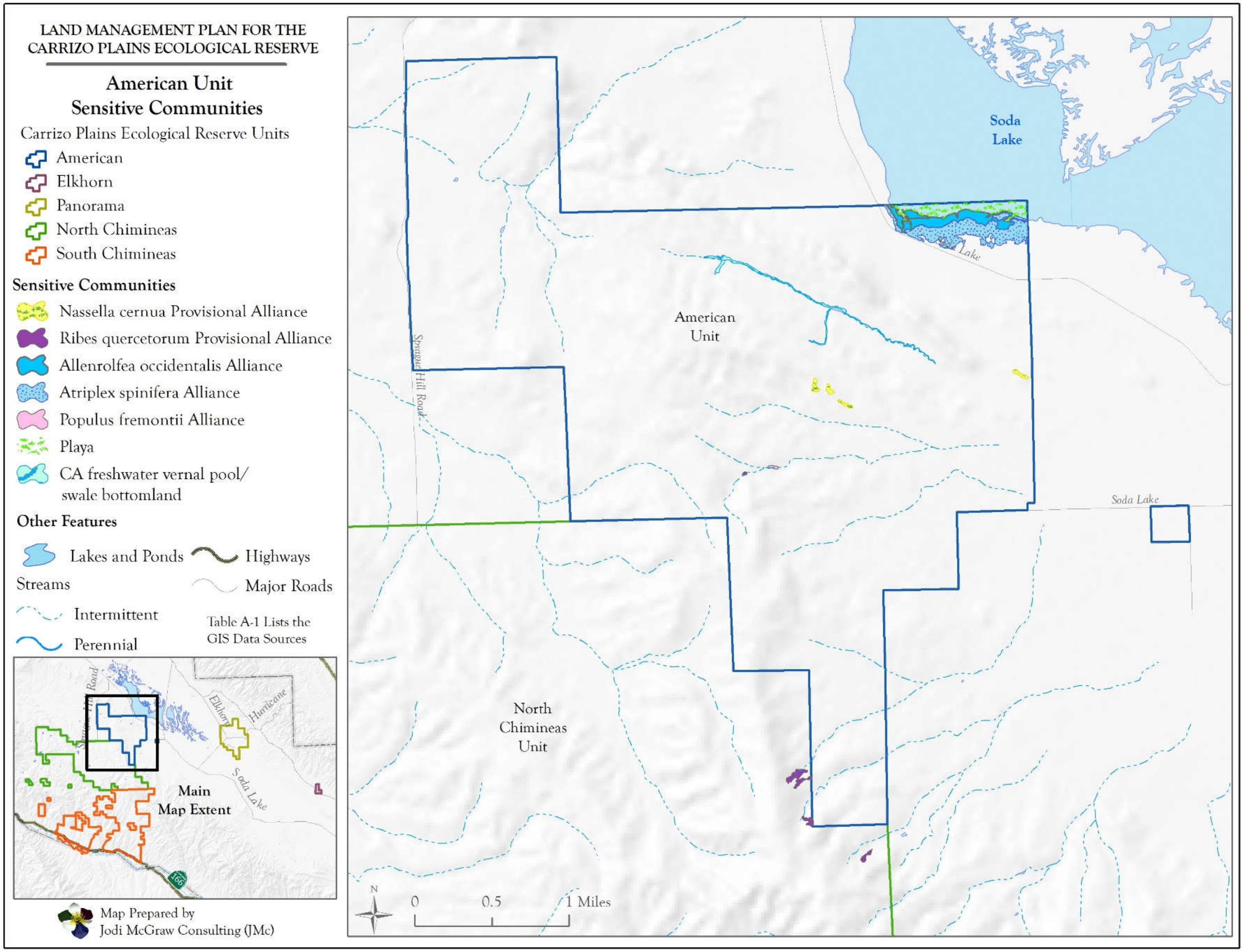


Figure B-5: Sensitive Communities of the American Unit

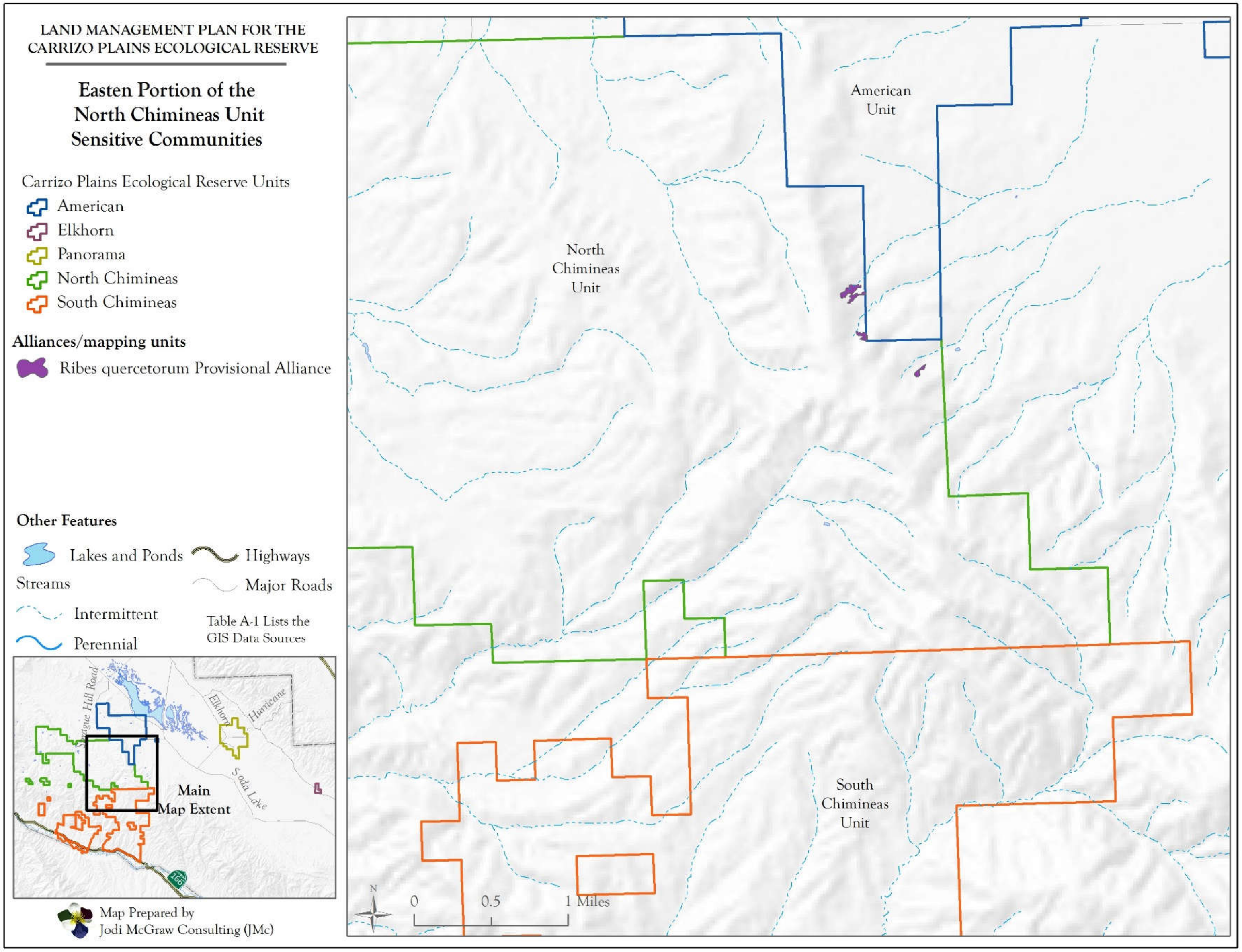


Figure B-6: Sensitive Communities of the Eastern North Chimineas Unit

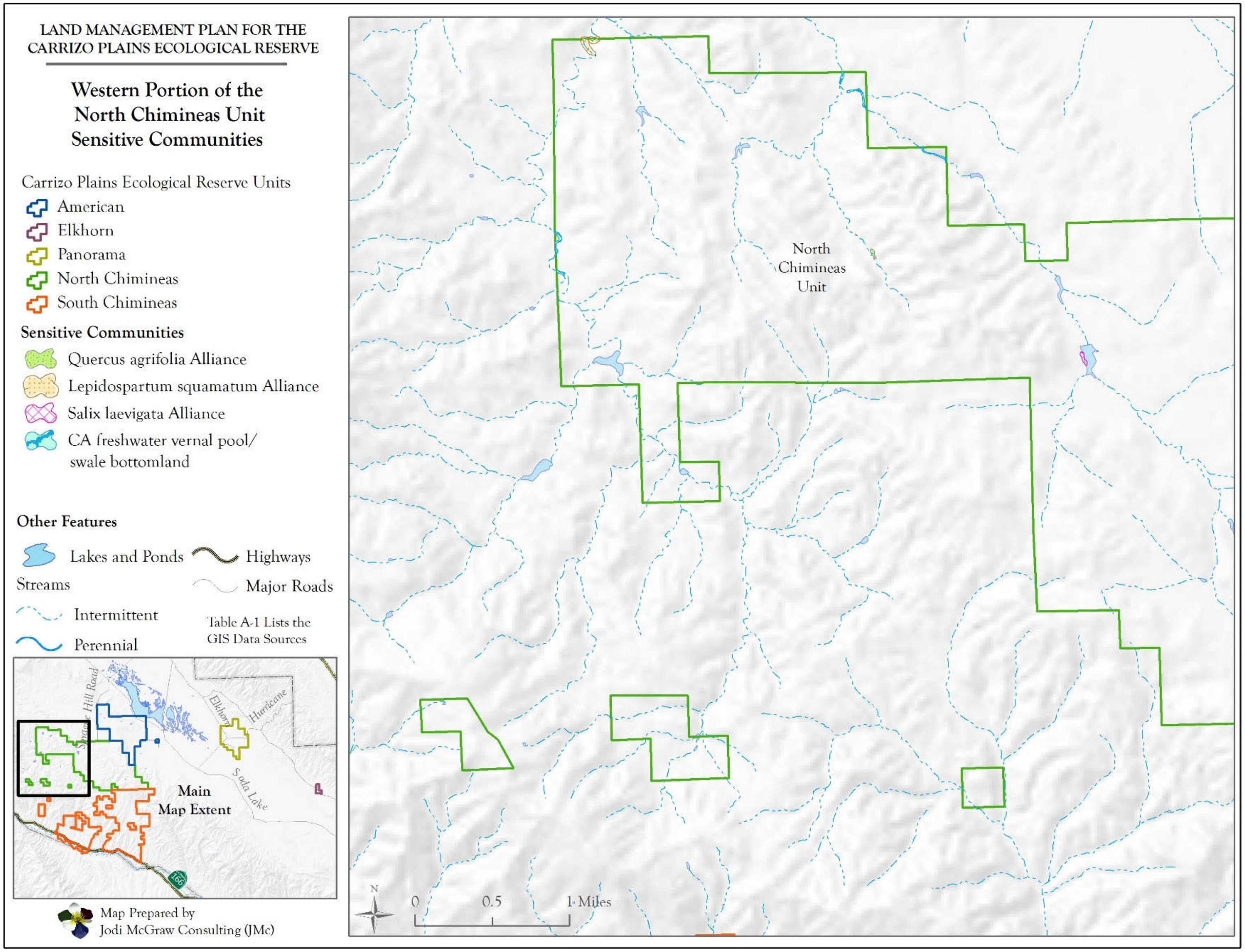


Figure B-7: Sensitive Communities of the Western North Chimineas Unit

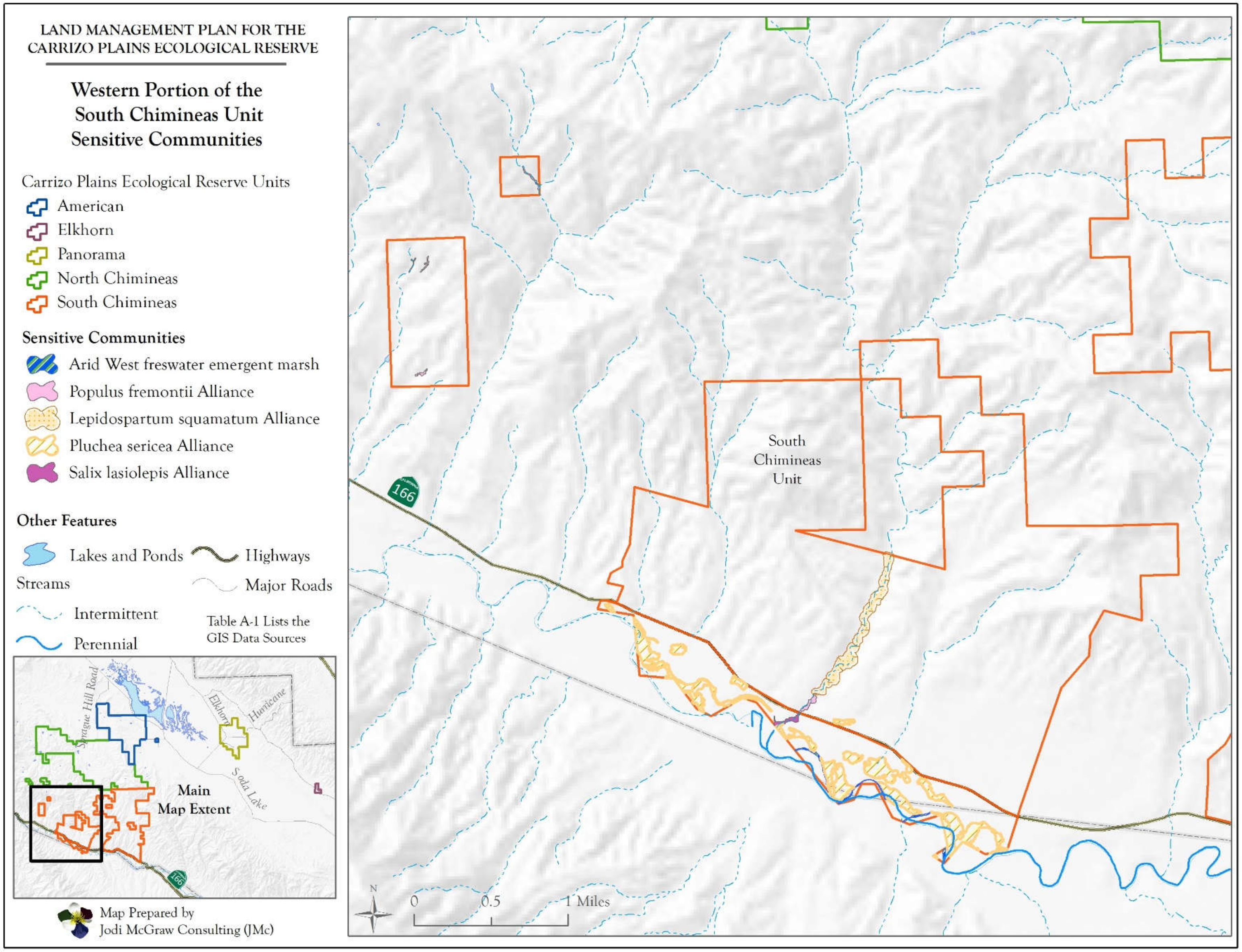


Figure B-8: Sensitive Communities of the Western South Chimineas Unit

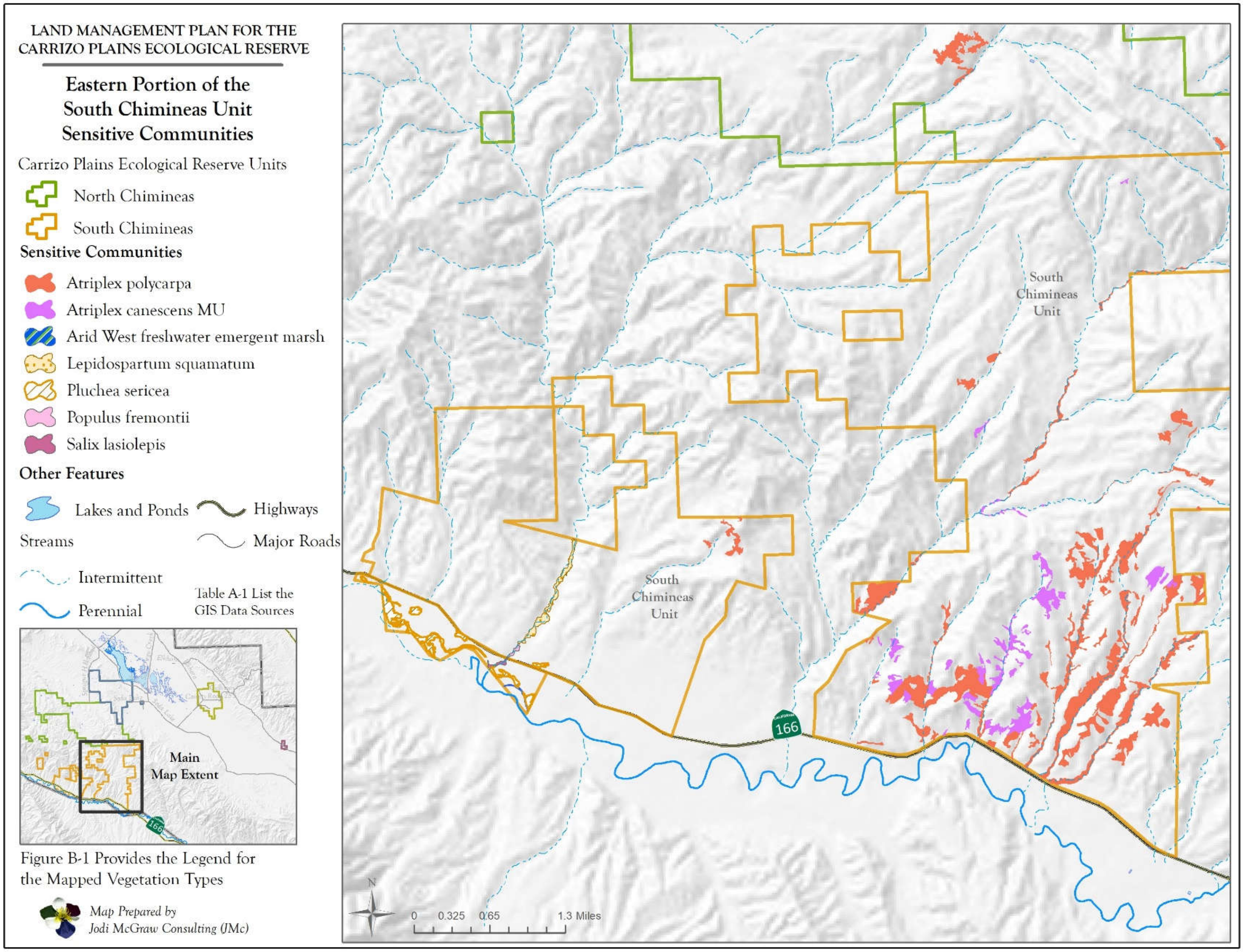


Figure B-9: Sensitive Communities of the Eastern South Chimineas Unit

B.1 Grasslands

Within the CPER, the grassland element features one macrogroup, one group, and three alliances, one of which is provisional. These various vegetation types, which were classified based on variability in plant species composition and structure, are all dominated by herbaceous plant species (CDFW 2010c). Because it was not possible to distinguish between grassland types based on interpretation of aerial photographs, the CPER grasslands were largely mapped at the macrogroup level such that the acreages mapped underestimate the extent of many of the alliances. A more detailed field-based mapping study of the grasslands in the Carrizo Plain region that includes floristic analyses is being conducted by VegCAMP and may facilitate management and monitoring of this important element of the Reserve. However, it should be noted that species composition, and ultimately alliances, within this element can vary greatly depending upon annual fluctuations in weather.

B.1.1 California Annual and Perennial Grassland Macrogroup

Found in all units of the CPER, grasslands mapped as part of this type cover 21,017 acres (54%) of the CPER, including most the Elkhorn (118 acres), Panorama (2,473 acres), and American (5,957 acres) units. In the Chimineas units, 12,469 acres were mapped as this type, which covers much of the northeastern quarter of the North Chimineas Unit and is present in many, often large areas in the southern part of the South Chimineas Unit (Figure B-2). This grassland type supports an assemblage of native annual or perennial herbs and grasses that are generally adapted to winter precipitation and summer drought (CDFW 2010c). The assemblage may have significant nonnative herbaceous cover including rattail fescue (*Festuca myuros*), vetch (*Vicia benghalensis*), redstem filaree (*Erodium cicutarium*), and red brome (*Bromus madritensis* ssp. *rubens*). However, all stands have diagnostic native species of forbs and/or grasses including common monolopia (*Monolopia lanceolata*), speckled clarkia (*Clarkia cylindrica*), thistle sage (*Salvia carduacea*), miniature lupine (*Lupinus bicolor*), broad leaf filaree (*Erodium botrys*), yellow pincushion (*Chaenactis glabriuscula*), and one-sided bluegrass (*Poa secunda*).

B.1.2 Fiddleneck (*Amsinckia menziesii*, *A. tessellata*) Alliance

In 2010, this alliance was mapped on 33 acres in the Chimineas units. A large occurrence is located 1.8 miles southwest of the Saucito Ranch in the Garcia Management Unit of the North Chimineas Unit and scattered patches can be found in the hills north of the Cuyama River in the East Grantline and West Grantline management units of the South Chimineas Unit (Figure B-2). The Fiddleneck alliance is generally characterized by native forbs evenly distributed across the herbaceous layer, though non-native forbs and grasses are sometimes present (CDFW 2010c). Within the CPER, characteristic members of this alliance include Menzies' fiddleneck (*Amsinckia menziesii*), checker fiddleneck (*Amsinckia tessellata*), slender keel fruit (*Tropidocarpum gracile*), and chia sage (*Salvia columbariae*). Associated non-native species include redstem filaree, slender wild oats (*Avena barbata*), wild oat (*A. fatua*), and rattail fescue. Underlying soils are often well-drained and loamy and may be associated with high levels of bioperturbation (e.g., kangaroo rat burrows). The presence of this alliance was highly variable with many hundreds of acres being present in 2016, which was the first year of significant rainfall after the drought of 2013-2015.

B.1.3 Mediterranean California Naturalized Annual and Perennial Grassland and Meadow Group

Mapped on 245 acres of the Chimineas units, this grassland type occurs within one mile of the Chimineas and Gifford ranches and in a large patch in the Feed Lot Management Unit just north of Highway 166. It is strongly dominated by non-native annual herbaceous and/or grass species including black medick (*Medicago lupulina*), bur medic (*Medicago polymorpha*), purple vetch, annual yellow sweetclover (*Melilotus indicus*), wild oat, and ripgut brome (*Bromus diandrus*).

B.1.4 Needle Grass (*Nassella cernua*) Provisional Alliance

This alliance, which is rare within the Reserve and on the Department's list of special communities (CDFW 2010a), occurs on a total of five mapped acres in the American Unit, where it occurs in small patches north and northeast of the American Ranch (Figure B-2). It is characterized by >2% absolute cover of needle grass (*Nassella cernua*) and occurs on well-drained soils. Non-native redstem filaree is usually present and co-dominant, though it may be dominant to needle grass. The alliance is comprised mainly of upland and mesic herbaceous species, including native and grasses and forbs such as short podded lotus (*Acmispon brachycarpus*), miniature lupine, and tarweed fiddleneck (*Amsinckia lycopsoides*), and non-native species such as red brome and shortfruit stork's bill (*Erodium brachycarpum*). This alliance often occurs on the same slopes with stands of lupine (*Lupinus* spp.), though the ecological basis for this association is unknown (T. Keeler-Wolf, pers. comm. 2009).

B.1.5 California Goldfields (*Lasthenia californica*) – California Plantain (*Plantago erecta*) – Small Fescue (*Festuca microstachys*) Alliance

Mapped as occurring on less than five acres near the southwestern boundary of the Panorama Unit, this alliance is uncommon and considered sensitive (Figure B-1). Native forbs are characteristic and evenly distributed across the herbaceous layer. Common members of this alliance within the CPER include California goldfields (*Lasthenia californica*), California plantain (*Plantago erecta*), net pepper grass (*Lepidium dictyotum*), iodine bush (*Allenrolfea occidentalis*), and Salinas River tarweed (*Hemizonia pentactis*). Non-native species including Arabian schismus (*Schismus arabicus*) and redstem filaree are also present. This highly variable alliance within the CPER, which often co-occurs with a cryptogamic crust, may contain potentially rare communities, which could be revealed by a detailed grassland analyses (T. Keeler-Wolf, pers. comm. 2009).

B.2 Coastal Scrub Element

Areas within the CPER that are dominated by short to medium height, soft-woody shrubs are referred to as coastal scrub. When compared with chaparral, coastal scrub supports a sparser cover of shorter statured shrubs that are less woody and oftentimes drought deciduous (Keeley 1984). Coastal scrub differs from desert scrub, which also features soft-woody shrubs, primarily in terms of the species composition.

B.2.1 Purple Sage (*Salvia leucophylla*) Scrub Shrubland Association

Part of the purple sage (*Salvia leucophylla*) scrub shrubland alliance, this association is found only in the Chimineas units, where it occurs on 965 acres located primarily within the South Chimineas Unit in the

Taylor, White Rock, Feed Lot, and Saltos management units, with some occurrences in the Garcia and Barrett management units in the North Chimineas Unit (Figure B-2).

Within purple sage scrub shrubland, purple sage is the sole dominant shrub but California sagebrush (*Artemisia californica*), chamise (*Adenostoma fasciculatum*), black sage (*Salvia mellifera*), and California buckwheat (*Eriogonum fasciculatum*) may be present. California juniper (*Juniperus californica*) is also occasionally observed and the CPER is one of the only places in California where it forms mixed stands with purple sage (T. Keeler-Wolf, pers. comm. 2009). In addition to the co-occurring shrubs, other common native plant species include chaparral yucca (*Hesperoyucca whipplei*) and calf lotus (*Acmispon wrangelianus*). Non-native plant species occur at varying densities and include red brome, redstem filaree, and tocalote (*Centaurea melitensis*).

The purple sage scrub within the CPER represents some of the most inland localities recorded for this association in California. The occurrence of this community, which is most commonly associated with areas of maritime influence, may result from fog incursion into the region in the winter and summer, or the slightly higher moisture that occurs here. These apparent climate associations may render this vegetation type an important bellwether for monitoring global change (T. Keeler-Wolf, pers. comm. 2009).

B.2.2 California Buckwheat (*Eriogonum fasciculatum*) Shrubland Association

Part of the California buckwheat shrubland alliance, this association covers 2,560 acres and occurs in small patches within all units of the CPER. The association primarily occurs in the Chimineas units, where it covers 2,486 acres in small outcrops in the Barrett and 1,000-Acre management units in the North Chimineas Unit, as well as in the Taylor, Feed Lot, White Rock, West Grantline, and East Grantline management units in the South Chimineas Unit (Figure B-2).

California buckwheat dominates an open canopy with other shrub species, including Jones's bush mallow (*Malacothamnus jonesii*), desert pincushion (*Chaenactis stevioides*), with desert candle (*Caulanthus inflatus*) having sparse cover. Linear-leaved goldenbush (*Ericameria linearifolia*) may occasionally be part of the shrub canopy and cryptogamic crust and dodder (*Cuscuta* sp.) are also common features. Common non-native species include redstem filaree and red brome.

Both interior (semi-desert) and coastal "races" of this association may be present within the CPER, with occurrences around the Elkhorn Plain and in/near the Temblor Range appearing more desert-like and those on steep rocky slopes in the Cuyama River drainage and in the Caliente Range resembling that typical of southern California coastal scrub (Todd Keeler-Wolf, pers. comm. 2009).

B.2.3 California Sagebrush (*Artemisia californica*) – California buckwheat (*Eriogonum fasciculatum*) Shrubland Association

Part of the California sagebrush – California buckwheat shrubland alliance, this association covers 646 acres in the Chimineas units, where it occurs in the Gifford and western areas of the Taylor management units, and in a few scattered patches within the Barrett Management Unit. These stands tend to feature relatively low plant cover and often occur on relatively steep, exposed slopes.

In this association, California sagebrush and California buckwheat codominate in the shrub canopy, with both having >30% relative cover (CDFW 2010c). Other commonly associated native plants include Granel forget me not (*Cryptantha decipiens*), padre's shootingstar (*Dodecatheon clevelandii*), and blue field gilia (*Gilia capitata*). Non-native species include redstem filaree, red brome, and rattail fescue.

B.2.4 California Sagebrush (*Artemisia californica*) Shrubland Association

Part of the California sagebrush shrubland alliance, this association covers 91 acres in the western portion of the South Chimineas Unit, within the Gifford and western Taylor management units (Figure B-2). Often found on relatively steep slopes and in association with cryptogamic crust, this association is dominated by California sagebrush with greater than 60% relative cover in the shrub canopy. Co-occurring native species include Jones's bush mallow, and California four o'clock (*Mirabilis californica*). Non-native species include redstem filaree and red brome, which typically occur at low relative cover.

B.2.5 Longstem Buckwheat (*Eriogonum elongatum*) Provisional Alliance

This alliance covers 102 acres in the Chimineas units, primarily in the Garcia, Taylor, White Rock, and Feed Lot management units where it occurs in small patches in a fine-scale mosaic with other coastal scrub vegetation types, as well as desert scrub and grassland types (Figure B-2). It tends to occur on shallow, open, sandy- or rocky-textured soils derived from sedimentary substrate and is more likely on flat rather than sloping terrain (CDFW 2010c).

In this provisional alliance, longstem buckwheat (*Eriogonum elongatum*) dominates the herbaceous layer. This species is often one of the first perennial forbs or subshrubs to colonize open areas and may indicate areas where there has been some recent disturbance such as fire, landslides, or grading (T. Keeler-Wolf, pers. comm. 2009).

B.2.6 Nude buckwheat (*Eriogonum nudum*) provisional Herbaceous Alliance

This alliance covers 26 acres in the Chimineas units, where it is found in the Airplane and Feed Lot management units on shallow soils derived from sedimentary rocks. Occurrences are often associated with steep and unstable south-facing slopes such as the ancient river terraces above the Cuyama River.
Nude buckwheat (*Eriogonum nudum*) characterizes the herbaceous layer on shallow soils derived from sedimentary substrate. As with longstem buckwheat, nude buckwheat is one of the first perennial forbs or subshrubs to colonize open, disturbed areas. Its occurrence could suggest a successional trend following disturbance (e.g., fire); however, monitoring might reveal it reflects microsite habitat conditions (e.g., sandier soils) that will render the distribution more stable.

B.2.7 Black sage (*Salvia mellifera*) Shrubland Alliance

This alliance covers 103 acres in the South Chimineas Unit, primarily in the western portion of the Taylor Management Unit west of Carrizo Canyon, and within the Gifford Management Unit (Figure B-2). Black sage is dominant or shares dominance with California buckwheat in the shrub canopy. Species of *Acmispon* are often present in the understory. When compared with other coastal scrub vegetation types, black sage shrubland alliance tends to occur on steeper slopes that feature coarser, more highly drained soils, which commonly support chaparral. Many stands within the CPER have sparse shrub cover that may reflect ongoing recovery following fire, such as the 1997 Logan Fire that burned the entire extent of this alliance within the CPER (Section 2.4.6). Black sage can be eliminated by too-frequent fire (T. Keeler-Wolf pers. comm. 2009).

B.2.8 Silver Lupine (*Lupinus albifrons*) Shrubland Alliance

This alliance covers 32 acres in northern and central portions of the American Unit and 40 acres in the North Chimineas Unit within the CRP North, CRP South, and Gifford management units (Figure B-2). Silver lupine (*Lupinus albifrons*) has >50% relative cover in the shrub canopy and grows on dry slopes that may be steep and unstable, or recently disturbed. A variety of other native coastal sage shrubs and herbs may also be present including linear-leaved goldenbush, checker fiddleneck, and stiffbranch bird's beak (*Cordylanthus rigidus*). Non-native species include soft chess (*Bromus hordeaceus*), red brome, and redstem filaree.

This alliance occurs as small patches (0.08 – 1.2 acre) imbedded within the widespread grasslands of the North Chimineas Unit and the American Unit (Figure B-2). This pattern, which is also exhibited by the linear-leaved goldenbush provisional shrubland alliance, a type of desert scrub, suggests shrub recolonization may be occurring following cessation of cultivation (Section 2.5.3) and perhaps in the absence of recent fire (Section 2.4.6; Todd Keeler-Wolf, pers. comm. 2009). Monitoring will be needed to evaluate whether this pattern indicates a successional process, or perhaps preferential occurrence of silver lupine and linear-leaved goldenbush on microsites within the grasslands (e.g., sandier soils). This may have important implications for management of the grasslands, as these shrubs within the matrix of herbaceous species provide singing perches for grasshopper sparrows, a special-status species (R. Stafford, pers. comm. 2010).

B.2.9 California Matchweed (*Gutierrezia californica*) Provisional Shrubland Alliance

This provisional alliance covers 58 acres of the Chimineas units, where it occurs in widely-scattered, small patches in the south and in a large patch near the northeastern border (Figure B-2). It also occurs on four acres in the southeastern portion of the Panorama Unit (Figure B-1). It features shrub species that share both coastal and desert scrub affinities (CDFW 2010c). California matchweed (*Gutierrezia californica*) dominates an open shrub canopy that also includes California mustard (*Guillenia lasiophylla*), speckled clarkia, clearwater cryptantha (*Cryptantha intermedia*), and short podded lotus. Cryptogamic crust and moss are frequently present. Non-native plants occur at low abundance and include primarily redstem filaree and red brome.

This alliance likely represents a post-disturbance vegetation type that is similar ecologically to those dominated by longstem buckwheat and nude buckwheat. It may require more intensive disturbance and establish only on bare sites cleared by erosion or intensive fires (Todd Keeler-Wolf, pers. comm. 2009).

B.3 Chaparral Element

Chaparral vegetation is dominated by medium to tall, woody shrubs featuring leaves that are hardened by a waxy cuticle (i.e., are sclerophyllous). When compared with coastal scrub, chaparral supports denser cover of taller shrubs that are more woody (Keeley and Keeley 1987a, b).

B.3.1 Chamise (*Adenostoma fasciculatum*) Shrubland Association

This association accounts for the vast majority of chaparral acreages within the CPER, 1,007 acres or 80% of the element total, and is concentrated in the Barrett Management Unit but is also in other western areas including the Taylor, Saltos, Airplane, and Red tank management units. Chamise (*Adenostoma fasciculatum*) is the sole dominant shrub and typically has greater than 40% absolute cover (CDFW 2010c). Other native species occur at relatively sparse cover and include Jones's bush mallow (*Malacothamnus jonesii*), buck brush (*Ceanothus cuneatus*), black sage, blue oak (*Quercus douglasii),* chaparral yucca, and manystem woolly sunflower (*Eriophyllum multicaule*). A relatively low diversity and cover of non-native species occurs in this association, which features primarily red brome and rattail fescue.

B.3.2 Big berry manzanita (*Arctostaphylos glauca*) shrubland Alliance

This alliance covers 182 acres within the foothills of the La Panza Range Mountains in the Barrett Management Unit and near the northernmost extent of the Saltos Management Unit within the North Chimineas Unit, where it occurs as a mosaic with blue oak woodland and other chaparral types including chamise shrubland association (Figure B-2). In this alliance, big berry manzanita (*Arctostaphylos glauca*) is the dominant shrub in this alliance. In the big berry manzanita - chamise association, which was classified in the project but not separately mapped in the CPER, the two namesake species are codominant (CDFW 2010c).

Other co-occurring species include primarily native herbs in the matrix between shrub canopies, such as common bedstraw (*Galium aparine*), miner's lettuce (*Claytonia perfoliata*), and Menzies' fiddleneck. Non-native plants occur at low abundance and include common chickweed (*Stellaria media*) and red brome.

Big berry manzanita does not resprout following fire and instead establishes solely from seed. Such obligate seeding species can be eliminated by frequent fire, if there is not sufficient time between fires to establish, grow, and produce sufficient seed (Sawyer et al. 2009). This important aspect of the species ecology may explain its distribution in the western portion of the North Chimineas Unit, which has not burned since 1922, and within other areas that have no recent history of fire (Section 2.4.6).

B.3.3 Chamise (*Adenostoma fasciculatum*) – Black sage (*Salvia mellifera*) Shrubland Association

Part of the chamise – black sage shrubland alliance, this association covers 65 acres along the southern edge of the Barrett Management Unit and near the western boundaries of the Saltos and Taylor management units in the Chimineas units (Figure B-2). It is often found on south-facing slopes and it occurs in a matrix of coastal scrub as well as other chaparral vegetation types.

In this association, black sage shares dominance of the shrub canopy with chamise, with the latter sometimes having twice as much cover as the former. Other commonly associated plant species include big berry manzanita, blue oak, narrow leaf miner's lettuce (*Claytonia parviflora*), silver puffs (*Uropappus lindleyi*), and woodland threadstem (*Pterostegia drymarioides*). The non-natives, redstem filaree and red brome, may also be present though typically occur at low relative cover.

B.3.4 Birch Leaf Mountain Mahogany (*Cercocarpus montanus*) Shrubland Alliance

This alliance occurs on nearly seven acres near the White Rock and Taylor management units (Figure B-2). It is typically associated with more mesic areas such as north-facing slopes (T. Keeler-Wolf, pers. comm. 2009, Sawyer et al. 2009). No site-specific floristic information was collected for this alliance within the

CPER (CDFW 2010c). Birch leaf mountain mahogany (*Cercocarpus montanus*) resprouts post-fire and also establishes from seed, though at low density (Sawyer et al. 2009).

B.4 Desert Scrub Element

Desert scrub vegetation is dominated by scale-like, microphyllous (small-leaved), or broad-leaved species, including drought-deciduous and cold-deciduous species, which are generally considered to be part of desert transition, riparian, coastal sage scrub, or other more soft-leaved shrub habitats.

In the CPER, desert scrub vegetation is comprised of 10 alliances (four of which are provisional), two associations, one provisional community and one mapping unit.

B.4.1 Linear-leaved goldenbush (*Ericameria linearifolia*) Provisional Shrubland Alliance

This alliance covers 2,710 acres in the Chimineas units, where it occurs throughout much of the east and southeast within the Caliente Mountains (i.e., CRP South, Garcia, Taylor, and West Grantline and East Grantline management units). It also occurs as small, scattered patches within the grasslands of the American Unit, where it covers a total of 17 acres (Figure B-2).

This alliance is generally comprised of shrubland species associated with desert, desert transition, or coastal scrub communities (CDFW 2010c). Linear-leaved goldenbush is dominant in the shrub canopy. Commonly associated plant species include annual bursage (*Ambrosia acanthicarpa*), narrow leaf miner's lettuce, calf lotus, wild heliotrope (*Phacelia distans*), and mosses growing on the soil surface. Non-native species occur at low to moderate abundance and include red brome, redstem filaree, and soft chess.

Linear-leaved goldenbush, like many plants in the Asteraceae, is a prolific seed producer. This likely explains its occurrence in the grasslands following cessation of cultivation and cattle grazing within the American Unit and North Chimineas Unit (e.g., CRP North and CRP South management units; T. Keeler-Wolf, pers. comm. 2009). The shrub may facilitate seedling establishment of California juniper: a species that has similarly spread into the grasslands in recent years (T. Keeler-Wolf pers. comm. 2009).

B.4.2 Allscale Saltbush (*Atriplex polycarpa*) Shrubland Alliance

This alliance covers 154 acres in the eastern half of the Panorama Unit (Figure B-1), and 647 acres scattered within the southeast portion of the Chimineas units and near the top of Saltos Canyon (Figure B-2). It is generally comprised of shrubland species that can tolerate saline or alkaline soils, as reflected in its occurrence on saline soils of the Chicote Complex soils in the Panorama Unit; however, shrubs in this alliance are not necessarily restricted to saline soils and also occur on loam soils within the Reserve. The alliance also supports species associated with desert or desert-transition communities (CDFW 2010c).

Within the CPER, allscale saltbush (*Atriplex polycarpa*) is dominant or co-dominant in the shrub canopy. Other associated species include calf lotus, common monolopia, and lacy phacelia (*Phacelia tanacetifolia*). Non-native herbaceous species occur at moderate abundance and include red brome, redstem filaree, and mouse barley (*Hordeum murinum*).

Allscale saltbush is believed to be the most common upland saltbush in the Reserve, with the congener shadscale (*Atriplex canescens*) believed to be more restricted to gypsum soils, though the ecological relationships between the species and alliances need further investigation (T. Keeler-Wolf, pers. comm. 2009).

B.4.3 Spiny Saltbush (*Atriplex spinifera*) Shrubland Association

This association covers 191 acres along the southwestern edge of the Panorama Unit (Figure B-1) and 59 acres in the northeastern corner of the American Unit (Figure B-2). Spiny saltbush (*Atriplex spinifera*) dominates the shrub canopy but may have as little as 2% absolute cover (CDFW 2010c). Like the Allscale Saltbush Shrubland Alliance, this association supports species that can tolerate alkaline soils (e.g., Chicote complex), but do not require them. The herbaceous layer has open to intermittent cover and may include species such as common monolopia, California goldfields, net pepper grass, and Munz's tidy tips (*Layia munzii*). Frequently associated non-native species include red brome, redstem filaree, and mouse barley.

Relative to the two other *Atriplex* alliances found within the CPER, this association tends to be found in more alkaline/saline settings, on finer-textured soils, at lower slope positions, and typically with higher water tables including around the margins of Soda Lake. This association is endemic to the semi-deserts of California and given that stands in the San Joaquin Valley have been compromised, those in the Carrizo Plain region represent some of the best remaining stands west of the Mojave (T. Keeler-Wolf, pers. comm. 2009). The spiny saltbush association is considered sensitive within the CPER and is listed as a "special community" in the CDFW's list of sensitive plant communities (CDFW 2010a).

B.4.4 Bladder Pod (*Isomeris arborea*) Provisional Community

This provisional community covers 428 acres in the Chimineas units, where it occurs in patches just west of Taylor Spring, just west of the summit of Saltos Mountain, and along the easternmost border with the American Unit in the Garcia and Taylor management units (Figure B-2). This community also occurs on 12 acres in the American Unit along its southern border with the North Chimineas Unit (Figure B-2). It occurs almost exclusively on loam and sandy loam soils of the Beam-Panoza-Hillbrick complex, which formed from weathering of the Monterey Shale formation. This community features bladder pod (*Isomeris arborea*) co-occurring with, but generally dominant to, linear-leaved goldenbush.

B.4.5 Shadscale (*Atriplex canescens*) Shrubland Alliance

This alliance covers 233 acres in the Chimineas units, primarily in two large patches one mile south of and another immediately adjacent to Taylor and Pearson springs, respectively (Figure B-2). Like the other *Atriplex*-dominated vegetation types, this alliance is generally comprised of shrubland species that can tolerate saline or alkaline soils but are not necessarily restricted to these soils (CDFW 2010c). Shadscale may be more restricted to gypsum-based, salty, or alkaline soils than its congener allscale saltbush (T. Keeler-Wolf, pers. comm. 2009). Shadscale dominates the shrub canopy with >2% absolute cover. Associated native plant species often include checker fiddleneck, chia sage, sleeping combseed (*Pectocarya penicillata*), and California dandelion (*Malacothrix californica*). Non-native species include primarily redstem filaree and red brome.

B.4.6 Allscale Saltbush (*Atriplex polycarpa*) – Shadscale (*Atriplex canescens*) Mapping Unit

This mapping unit, which accounts for 158 acres in the eastern portion of the South Chimineas Unit (Taylor and East/West Grantline management units), was used where allscale saltbush and shadscale were difficult to differentiate in the aerial imagery (Figure B-2). In general, in most parts of these species' ranges allscale saltbush typically grow on finer textured soil while shadscale tends to colonize more recently burned sites (T. Keeler-Wolf pers. comm. 2009).

B.4.7 Yellow Mock Aster (*Eastwoodia elegans*) Provisional Shrubland Alliance

Endemic to the Inner Coast Range Mountains, this alliance covers 53 acres in the eastern portion of the South Chimineas Unit in scattered patches near Pearson Spring (Figure B-2), and on less than three acres in the northeastern corners of the Elkhorn and Panorama units (Figure B-1). It is generally associated with shrublands characterized by desert or desert-transition shrubs or by coastal sage shrub species (CDFW 2010c). Yellow mock aster (*Eastwoodia elegans*) is dominant in the shrub canopy and appears to form stands on steep sedimentary rock (e.g., sandstone) slopes adjacent to grasslands or other herbaceous communities, often with high cover of fiddleneck (*Amsinckia* spp.) during some years (T. Keeler-Wolf pers. comm. 2009). Other native plants in this alliance include lacy phacelia, San Joaquin blazingstar (*Mentzelia pectinata*), and desert candle. Non-native plants occur at moderate abundance and include primarily red brome and redstem filaree.

B.4.8 California ephedra (*Ephedra californica*) Shrubland Association

Generally associated with desert or desert-transition shrubs, this association covers 44 acres in the Elkhorn Unit and 15 acres in the northeast corner of the Panorama Unit. Located often on sandy soils in low elevation uplands and washes, this association is characterized by California ephedra (*Ephedra californica*) featuring >1% absolute cover in an open shrub canopy (CDFW 2010c). Commonly associated native plant species include Kern tarweed (*Hemizonia pallida*), needle goldfields (*Lasthenia gracilis*), cheesebush (*Ambrosia salsola*), red maids (*Calandrinia ciliata*), and one-sided bluegrass. Cryptogamic crust is frequently present. Non-native plants occur at low abundance and include redstem filaree, red brome, and Meditteranean grass. While in the Mojave and Sonoran deserts this association occurs almost exclusively in washes, it is found primarily in upland areas across a range of slopes in the Carrizo Plain (T. Keeler-Wolf, pers. comm. 2009). It is listed as a "special community" in the CDFW's list of sensitive plant communities (CDFW 2010a).

B.4.9 Iodine Bush (*Allenrolfea occidentalis*) Shrubland Alliance

This alliance covers 35 acres within the American Unit where it occurs in the northeastern corner along and near the shore of Soda Lake (Figure B-2). It features species that can tolerate saline or alkaline soils but are not necessarily restricted to such conditions (CDFW 2010c). Iodine bush, which dominates the shrub canopy on intermittently saturated soils with >2% absolute cover, is a good indicator of alkaline soils and perennially present sub-surface brine or saline/alkaline water. Other common native plant species include shining pepper grass (*Lepidium nitidum* var. *oreganum*), California goldfields, Crum's monolopia (*Monolopia stricta*), and small fescue. Non-native herbs occur at low abundance and include redstem filaree, red brome, and soft chess.

B.4.10 Rock Gooseberry (*Ribes quercetorum*) Provisional Shrubland Alliance

This provisional alliance is mapped as occurring on only seven acres within the North Chimineas Unit and one acre in the American Unit (Figure B-2). Rock gooseberry (*Ribes quercetorum*) is the sole dominant shrub in the canopy and often grows clonally in stands that resprout after fire. Commonly associated species include blue elderberry (*Sambucus mexicana*). Non-native plants occur at very low abundance and include red brome, rattail fescue, and redstem filaree. Within the CPER, stands of rock gooseberry occur primarily on north-facing slopes and often near springs or seeps, though also in drier upland areas within juniper woodland (T. Keeler-Wolf pers. comm. 2009). Its distribution may be associated with rock outcrops (R. Stafford, pers. comm. 2010).

B.4.11 Big Sagebrush (*Artemisia tridentata*) Shrubland Alliance

Confined to roughly one acre along the Cuyama River near the southwestern end of the Cuyama Management Unit of the South Chimineas Unit (Figure B-2), this association features big sagebrush (*Artemisia tridentata*) as a dominant or co-dominant shrub on sandy alluvial soils in association with other desert or desert-transition shrubs. Stands tend to be small and are locally indicative of relatively deep, coarse, sandy alluvium in valleys in and adjacent to washes and intermittent stream courses (T. Keeler-Wolf, pers. comm. 2009).

B.4.12 Winterfat (*Krascheninnikovia lanata*) Shrubland Alliance

This alliance is mapped as occurring on less than one acre in a single patch in the Panorama Unit (Figure B-1), though additional unmapped stands also occur near Pearson Spring in the South Chimineas Unit (R. Stafford, pers. comm. 2010). It is dominated by winterfat (*Krascheninnikovia lanata*) which co-occurs within other species that can tolerate saline or alkaline soils and are associated with desert or desert-transition assemblages (CDFW 2010c). Associated native plant species include California buckwheat, yellow mock aster, and checker fiddleneck. Cryptogamic crust is present. Non-native herbs occur at moderate abundance and include redstem filaree, Arabian grass, and Mediterranean grass (*Schismus barbatus*).

Winterfat stands within the CPER may be relics of a prior climate, as the species is more typically found in cool desert environments of the Great Basin and the Inyo, White, and Panamint Mountains of the northern Mojave Desert bioregion (T. Keeler-Wolf pers. comm. 2009). It is listed as a "special community" in the CDFW's list of sensitive plant communities (CDFW 2010a).

B.5 Oak Woodland Element

The oak woodland element includes areas within the CPER that are dominated by oak species (*Quercus sp.*). The oak woodland vegetation element is composed of three different alliances which are differentiated by the species of oak (*Quercus* spp.). It is important to note that the two dominant oak species, blue oak (*Quercus douglasii*) and Tucker oak (*Quercus john-tuckeri*), hybridize within the Chimineas units, producing taller, largely evergreen trees in some places. These hybrids may represent locally-adapted genetic complexes within the dry inner coast range climate (T. Keeler-Wolf pers. comm. 2009). They also presented challenges to mapping the woodland types based on aerial photograph interpretation and in most cases tall oaks were mapped as blue oak woodland alliance (CDFW 2010c).

B.5.1 Blue Oak (*Quercus douglasii*) Woodland Alliance

The vast majority, 2,742 acres or 77%, of the oak woodlands within the CPER are dominated by blue oak. Three blue oak woodland associations were classified within the CPER, based on differences in tree and understory shrub species composition.

1. **Blue oak (*Quercus douglasii*) - Herbaceous Association**: In this savanna, annual grasses and forbs dominate the understory in which shrubs have low cover. The most common herb species are non-natives and include ripgut brome, soft brome, red brome, and redstem filaree. Native grasses include nodding needlegrass and pine bluegrass while native forbs include snakeroot (*Sanicula bipinnatifida*), narrow leaved miner's lettuce, and padre's shootingstar.
2. **Blue oak (*Quercus douglasii*) – California juniper (*Juniperus californica*) /linear-leaved goldenbush (*Ericameria linearifolia*) Association**: California juniper is a sub- to co-dominant tree in the overstory, and linear-leaved goldenbush (*Ericameria linearifolia*) is present in the shrub canopy; and
3. **Blue oak (*Quercus douglasii*) – linear-leaved goldenbush (*Ericameria linearifolia*) Association:** Linear-leaved goldenbush is present in the shrub understory perhaps with other shrubs including as California buckwheat, purple sage, California sagebrush, chamise, hollyleaf redberry *(Rhamnus ilicifolia), and bigberry manzanita.* California juniper is absent from the tree layer in this association.

Due to the limitations of aerial photograph interpretation, the blue oak woodland associations were not separately mapped. In general, the Blue Oak - California Juniper Woodland Association occurs adjacent to the California juniper woodland vegetation in the central and northern portions of the unit, while the other two associations occur throughout the extent of the alliance.

The associations may have different fire ecologies, owing to variability in the fuel in their understories. The blue oak woodland associations exhibit some of the highest diversities of native herbaceous plant species in any vegetation group (T. Keeler-Wolf pers. comm. 2009).

B.5.2 Coast Live Oak (*Quercus agrifolia*) Woodland Alliance

This alliance is only known to occur within a single 0.7-acre patch along an unnamed tributary to Barrett Creek near the center of the Barrett Creek Management Unit (Figure B-2). Coast live oak (*Quercus agrifolia*) dominates the tree canopy in this woodland patch, which occurs on high organic matter soils within the narrow canyon (T. Keeler-Wolf, pers. comm. 2009). Co-occurring species are primarily native and include chamise, miner's lettuce, small flowered melica (*Melica imperfecta*), and common bedstraw. Non-native herbs occur at low abundance and species richness and include ripgut brome and common chickweed.

Coast live oak woodland primarily occurs within the Outer Coast Range Mountains in central and northern California and its occurrence within the Reserve represents a disjunction in its distribution. As a result, this alliance is considered sensitive within the CPER.

B.5.3 Tucker Oak (*Quercus john-tuckeri*) Woodland Alliance

Oak woodlands dominated by predominantly shrub-sized Tucker oak (*Quercus john-tuckeri*) cover 804 acres within the Chimineas units primarily east of Saltos Canyon; however, a few patches also occur west of Barrett Creek (Figure B-2).

Throughout much of the acreage, including most of the area east of Saltos Canyon, Tucker oak codominates with California juniper with linear-leaved goldenbush present in the shrub layer, often along with other sub-dominant shrubs such as California buckwheat and purple sage. This Tucker oak/linear-leaved goldenbush/California Juniper Association, which could also be considered a type of juniper woodland, was not mapped separately from stands in which Tucker oak co-occurs with mountain mahogany and buck brush with an understory of native herbs including purple Chinese houses (*Collinsia heterophylla*), Paso Robles navarretia (M*avarretia mitracarpa)*, and miner's lettuce. Both the main alliance and the association have very low cover and richness of non-native plants, which include red brome and soft chess.

B.6 Juniper Woodland Element

Areas within the CPER that are dominated by California juniper constitute the juniper woodland element, which consists of four associations that were differentiated based on understory species structure and species composition. The element was mapped to the level of the California juniper Woodland Alliance owing to the limitations of aerial image interpretation for differentiating understory species (Figure B-2). This alliance is characterized by the presence of California juniper: a slow-growing, small (approximately 12-foot-tall) tree.

B.6.1 California juniper (*Juniperus californica*) Herbaceous Association

The understory of the California juniper canopy in this association primarily features native herbaceous plants including California goldfields, red maids, and Menzies' fiddleneck. Non-native herbs including primarily redstem filaree occur at relatively low abundance. This association features prominently developed cryptogamic crust, particularly on north-facing slopes (R. Stafford, pers. comm. 2010).

B.6.2 California juniper (*Juniperus californica*)/narrow leaved goldenbush (*Ericameria linearifolia*) Herbaceous Association

The understory in this association features narrow leaved goldenbush and other shrubs with desert and desert transitional affinities including green ephedra (*Ephedra viridis*) and bladder pod. Native herbaceous species include baby blue-eyes (*Nemophila menziesii*), manystem woolly sunflower, and white fiesta flower (*Pholistoma membranaceum*). Non-native herbs occur at relatively low abundance and include soft chess, red brome, and redstem filaree.

B.6.3 California juniper (*Juniperus californica*)/narrow leaved goldenbush (*Ericameria linearifolia*)-California buckwheat (*Eriogonum fasciculatum*) Provisional Association

The California juniper understory in this association features the linear-leaved goldenbush and California buckwheat as well as herbaceous species such as the checker fiddleneck (*Amsinckia tessellata*), sharp nut cryptantha (*Cryptantha oxygona*) and pale purple owl's-clover (*Castilleja exserta* ssp. *exserta*). Non-native herbs occur at relatively low abundance and include red brome and redstem filaree.

B.6.4 California juniper (*Juniperus californica*)/purple sage (*Salvia leucophylla*) Association

The understory in this association features purple sage and other shrubs including California buckwheat and yellow mock aster. Native herbs include woolly fishhooks (*Ancistrocarphus filagineus*) popcorn flowers (*Cryptantha* spp.), and one-sided bluegrass. Non-native herbs occur at relatively low abundance and include tocalote, red brome (*Bromus madritensis* ssp. *rubens*), redstem filaree, and soft chess.

B.7 Riparian and Riverine Element

Areas within the CPER that contain flowing water for at least part of the year constitute the riverine systems, while areas adjacent to the streams that are influenced by the hydrology are referred to as riparian. Most stream reaches are ephemeral, flowing only during and after rainfall events, with the amount and duration of water flowing determined largely by the quantity of precipitation, watershed size (i.e., area drained), and the surface and subsurface geology of the stream course (i.e., sand versus bedrock; Section 2.5.4). The exceptions are the Cuyama River, a perennial stream located on the southern border of the South Chimineas Unit (Section 2.4.5.2). Owing to the presence of water, riparian areas adjacent to streams support different structure and composition of plant species.

Within the CPER, riparian and riverine systems were mapped as part of seven alliances, one macrogroup, two habitat types, and one informally designated plant grouping (CDFW 2010c). All except tamarisk (*Tamarix* spp.) semi-natural shrubland stands are native.

B.7.1 Arrow weed (*Pluchea sericea*) Shrubland Alliance

Located on 123 acres in the southwestern area of the South Chimineas Unit almost exclusively within the Cuyama management unit, this shrubland alliance is characterized by species that can tolerate saline or alkaline soils and/or that grow in seasonally or intermittently flooded habitats, including springs, seeps, irrigation ditches, canyon bottoms, streamsides, and seasonally flooded washes (CDFW 2010c). It is characterized by the presence of arrow weed (*Pluchea sericea*) in the canopy with >2% absolute cover and no other shrub species have equal or greater cover, though in the CPER, arrow weed cover averages more than 20%. Other native species include mulefat (*Baccharis salicifolia*) and white rubber rabbitbush (*Ericameria nauseosus* var. *hololeuca*). Non-native herbaceous plants occur with moderate cover and include hare barley (*Hordeum murinum* ssp. *leporinum*), ripgut brome, redstem filaree, soft chess, annual yellow sweetclover, and red brome. The invasive shrub tamarisk (*Tamarix ramosissima*) also occurs in this alliance, but at low abundance (<2% cover).

B.7.2 Scale Broom (*Lepidospartum squamatum*) Shrubland Alliance

This alliance occurs on 24 acres in the Chimineas units, where it primarily occurs along lower Carrizo Creek but is also found along San Juan Creek in the northwestern portion of the Barrett management unit. The alliance features species that grow on alluvial soils in seasonally or intermittently flooded habitats, and it may occur along riparian and stream corridors, lake margins, permanent springs, mesic slopes, marshes, or washes (CDFW 2010c). Characterized by scale broom (*Lepidospartum squamatum*) occurring within an open shrub canopy, the alliance features native species including white rubber rabbitbrush, valley popcorn flower (*Plagiobothrys canescens*), and chick lupine (*Lupinus microcarpus*). Non-native plant species occur at relatively low abundance and include redstem filaree and red brome.

B.7.3 Mulefat (*Baccharis salicifolia*) Shrubland Alliance

This alliance covers 18 acres of the Chimineas units where it occurs in small patches along Barrett, San Juan, Carrizo, and Saltos creeks. It features mulefat as the dominant shrub. Commonly associated native species include seep monkey flower (*Mimulus guttatus*), California sagebrush, narrow scaled goldenbush (*Hazardia stenolepis*), and California buckwheat. Non-native species occur at moderate abundance and include primarily red brome but also annual yellow sweetclover and rabbit's foot grass (*Polypogon monspeliensis*).

B.7.4 White Rubber Rabbitbrush (*Ericameria nauseosa* var. *hololeuca*) Shrubland Alliance

These shrublands occur on approximately two acres along the Cuyama River (Figure B-2). Additional areas have been mapped on land owned by the federal government and managed by the BLM in Carrizo Canyon. The alliance is dominated by white rubber rabbitbrush, which has >50% relative cover in the shrub canopy. Associated native plant species occur at low abundance and include specklepod loco milkvetch (*Astragalus lentiginosus*), salt grass (*Distichlis spicata*), and one-sided bluegrass. Non-native species also occur at relatively low abundance and include red brome, redstem filaree, and rattail fescue.

This alliance occurs in seasonally or intermittently flooded habitats, often on alluvial soils along riparian and stream corridors, lake margins, permanent springs, mesic slopes, marshes, or washes. Its presence may be indicative of alluvial disturbance (Todd Keeler-Wolf, pers. comm. 2009).

B.7.5 Sandbar Willow (*Salix exigua*) Shrubland Alliance

This alliance covers 22 acres along the Cuyama River where it occurs adjacent to the channel. Though no site-specific floristic data were collected from stands in this alliance, it is characterized by sandbar willow (*Salix exigua*) as the dominant or co-dominant shrub with >50% relative cover. The short (3-12 foot-tall) tree colonizes fresh alluvium deposited along rivers both from seed and resprouts from underground shoot buds on lateral roots (i.e., suckers). It is relatively short-lived, compared to taller riparian woodland species such as arroyo willow (*Salix lasiolepis*) and Fremont cottonwood (*Populus fremontii*), which typically displace sand bar willow in the absence of flooding or other disturbance.

B.7.6 Arroyo Willow (*Salix lasiolepis*) Shrubland Alliance

The three acres of this alliance occurs in two patches: along an unnamed tributary to the Cuyama River east of the Gifford Ranch, and on Carrizo Creek near its confluence with the Cuyama River. Though no site-specific floristic data were collected from stands in this alliance, it is characterized by arroyo willow dominating the shrub or tree canopy, typically with >50% relative cover (CDFW 2010c).

B.7.7 *Tamarix* (spp.) Semi-natural Shrubland Stands

This assemblage, which covers roughly 19 acres in scattered locations along the Cuyama River, is dominated by stands of tamarisk, including tamarisk or salt cedar (*Tamarix ramosissima*). It occurs within the river floodplain in a mosaic with primarily arrow weed and sandbar willow shrubland alliances, which also feature tamarisk at lower abundance.

Tamarisk (*Tamarix* spp.) are non-native, trees that invade riparian and riverine areas and disrupt natural communities through competition for soil nutrients and water resources, salinization of soils, and by increasing the frequency and intensity of fires and floods (CalIPC 2010).

B.7.8 Red Willow (*Salix laevigata*) Woodland Alliance

This alliance is represented by a single, roughly one-acre patch along Barrett Creek just upstream of Number 3 pond in the northern portion of the North Chimineas Unit (Figure B-2). It is dominated by red willow (*Salix laevigata*) occurring at >50% relative cover in the tree canopy which may also include other riparian winter deciduous trees such as Fremont cottonwood (CDFW 2010c).

B.7.9 Fremont Cottonwood (*Populus fremontii*) Forest Alliance

This alliance is represented by patches in five locations: 1) in an unnamed drainage 0.6 miles west of the American Ranch headquarters, 2) on Carrizo Creek just upstream of Highway 166, 3) along Sycamore Creek one mile east of Gifford Spring, 4) in a swale on the southern edge of the Gifford Ranch parcel, and 5) in an unnamed drainage on the northern portion of the Gifford Ranch parcel (Figure B-2). In this forest alliance, which occurs along streams, springs, and valleys with a subsurface water supply, Fremont cottonwood is dominant with arroyo willow (*Salix lasiolepis*) occurring at low canopy cover (<5%).

The understory features a high cover (>50%) of non-native annual grasses and forbs including ripgut brome and mouse barley. Native species occur with low richness and abundance and include checker fiddleneck and Menzies' fiddleneck.

This riparian type provides very important nesting and roosting habitat for bird species including raptors (Todd Keeler-Wolf, pers. comm. 2009).

B.7.10 Southwestern North American Riparian Flooded and Swamp Forest Macro Group

Six stands of riparian vegetation totaling 18 acres within the South Chimineas Unit could not be differentiated based on interpretation of aerial imagery and so were classified as this higher level. These stands occur at Pearson Spring and downstream in Taylor Canyon, on Carrizo Creek downstream of Saltos Canyon, and on the Cuyama River (Figure B-2). Dominant species likely include sandbar willow, arroyo willow and perhaps also other willows, and mulefat, and Fremont cottonwood.

B.7.11 River and Lacustrine Flats and Streambeds, and Perennial Stream Channels

Located in and along ponds and streams including San Juan Creek, Barrett Creek, and the Cuyama River, 22 acres of the Chimineas units were mapped as part of this category, which was defined based on limited vegetation owing to ongoing or recent hydrologic disturbance (CDFW 2010c).

B.8 Wetland Element

The wetland element includes areas within the CPER that feature permanently or seasonally saturated soils. It consists of the Soda Lake playa and three vegetation types mapped to group, macrogroup, and alliance.

B.8.1 Playa

Located in the northeast corner of the American Unit, the CPER features 41 acres of Soda Lake that are often inundated, at least during the wet season (Figure B-2). This playa habitat may represent habitat for rare invertebrates (Todd Keeler-Wolf, pers. comm. 2009).

B.8.2 Saltgrass (*Distichlis spicata*) Herbaceous Alliance

Located just south of Soda Lake Road in the northeastern corner of the American Unit, this herbaceous alliance covering 32 acres is dominated or co-dominated by saltgrass (*Distichlis spicata*), which constitutes >30% relative cover, and typically occurs on alkaline or saline, poorly-drained soils (CDFW 2010c). Associated species are largely non-native and include flix weed (*Descurainia sophia*), redstem filaree, mouse barley, cheatgrass (*Bromus tectorum*), and tall tumblemustard (*Sisymbrium altissimum*). Native species, which include California goldfields and fiddlenecks (*Amsinckia* spp.), occur at low abundance (<5% cover).

B.8.3 California Mixed Annual/Perennial Freshwater Vernal Pool/Swale Bottomland Group

A total of 16 acres of the Reserve were mapped as part of this group, which is restricted to winter-flooded or at least winter-saturated substrates watered only by ambient precipitation (CDFW 2010c). It covers 11 acres in the American Unit along an unnamed stream that flows to Soda Lake one mile north of the American Ranch, and five acres within three locations in the Chimineas units: in Taylor Canyon one mile southwest of Taylor Spring, along Barrett Creek near the northern boundary of the Reserve, and along San Juan Creek south of Broken Dam Pond (Figure B-2).

B.8.4 California warm temperate march/seep group

This group covers 11 acres in three areas in the North Chimineas Unit: along Barrett Creek downstream of Number 3 Pond and Quarry Pond, on San Juan Creek on the western inlet to Broken Dam Pond, and on San Juan Creek upstream of Gillam Pond (Figure B-2). This vegetation type features freshwater wetland plant species that can withstand seasonal dry down. Site-specific floristic information is not available for this type, resulting in it being mapped to group.

B.8.5 Arid West Freshwater Emergent Marsh

This macrogroup covers a total of six acres within the Cuyama River. This marsh includes herbaceous plants adapted to saturated soil conditions and includes emergent vegetation such as southern cattail (*Typha domingensis*), spikerushes (*Eleocharis macrostachya* and *E. parishii*), rushes (*Juncus arcticus* and *J. bufonus*), and pondweeds (*Potamogeton* spp.). Owing to its tight association with the Cuyama River, this type could also be considered part of the riparian and riverine element.

B.9 Pond Element

Depressions within the CPER that feature standing water for at least part of the year are included in the pond element.

The ponds were not included as part of the vegetation classification conducted by VegCAMP (CDFW 2010c). However, the ponds were floristically evaluated. Ponds vegetation varies depending on hydroperiod, depth, soil conditions, and use by cattle. Native plant species common on the pond margins include arroyo willow, mulefat, heliotrope (*Heliotropium curassavicum*), saltgrass, rough cocklebur (*Xanthium strumarium*), and alkali heath (*Frankenia salina*). Emergent and floating vegetation include watercress (*Nasturtium officinale*), southern cattail, and spikerush (*Eleocharis macrostachya*). Non-native plants occur on the pond margins and include tamarisk, rabbit's foot grass, and bull thistle (*Cirsium vulgare*; CDFW 2010c).

B.10 Cliffs and Rock Outcrop Element

As part of the vegetation mapping project, cliffs and rock outcroppings were identified in four locations totaling 11 acres (0.03%) of the Reserve. The largest mapped occurrence covers just over nine acres and is located in the southern portion of the American Unit and crosses into the northern portion of the North Chimineas Unit (Figure B-2). The other three occurrences occur in the Chimineas units: one is an extension of the aforementioned occurrence, one occurs 0.8 miles southeast of it on the eastern border of the Garcia Management Unit, one is located near the central-southern border of the Saltos Management Unit, and one occurs just east of Carrizo Canyon in the Feed Lot Management Unit (Figure B-2).

Owing to the vertical nature and patchiness of most of the features, however, they are difficult to detect in examination of aerial imagery. Additional habitat occurs throughout the steeper sections of the Reserve, primarily within canyons located in the Chimineas units. Steep banks above roads may create similar conditions for many species.

Native plants occurring on cliffs and rock outcroppings include shrubs such as rock gooseberry, California buckwheat, and California fuchsia (*Epilobium canum ssp. canum)* as well as a diversity of herbaceous plants adapted to thin soils such as Lemmon's jewel flower (*Caulanthus lemmonii*), woodland threadstem, gold back fern (*Pentagramma triangularis* ssp. *triangularis*), and lance-leaf dudleya (*Dudleya laceolata*). The inimical soil conditions restrict the richness and abundance of non-native species within this element.

Wildflowers in the Desert Scrub within the Caliente Range Mountains in the South Chimineas Unit

Appendix C
Plant Species

Appendix C Plant Species

Table C-1 lists plant species within the Carrizo Plains Ecological Reserve. It was compiled based upon surveys conducted by the Department independently and in coordination with other agencies and organizations, including the 2005-2008 VegCAMP plant communication classification (CDFW 2010c), annual rare plant surveys conducted as part of the Department's Resource Assessment Program since 2007, and educational field trips and workshops conducted by the California Native Plant Society among other groups. The list will be updated by the Department, as resources allow, to reflect new species observed within the property, and address changes in taxonomy or nomenclature.

Table C-1: Plant Species of the CPER (Butterworth 2016)

Family	Scientific Name	Common Name	Status[1]	Native (N)/Exotic (E)	CA Endemic	Cal IPC[2]	Relative Abundance in Habitat Elements[3]											Abundance in CPER Units[3]				
							Grassland	Oak W.	Juniper W.	Coastal Scrub	Chaparral	Desert Scrub	Riparian	Pond	Rocks	Wayside	Alkali	American	N. Chimineas	S. Chimineas	Elkhorn	Panorama
Lycophytes																						
Selaginellaceae	*Selaginella bigelovii*	Spike moss		N			0	2	0	2	0	0	0	0	2	0	0	0	2	2	0	0
Ferns																						
Azollaceae	*Azolla filiculoides*	Duck fern		N			0	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0
Pteridaceae	*Adiantum jordanii*	California maidenhair		N			0	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0
Pteridaceae	*Cheilanthes covillei*	Coville's lip fern		N			0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0
Pteridaceae	*Pellaea andromedifolia*	Coffee fern		N			0	4	4	4	4	0	0	0	4	0	0	0	4	3	0	0
Pteridaceae	*Pellaea mucronata var. mucronata*	Bird's-foot fern		N			0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0
Pteridaceae	*Pentagramma triangularis* ssp. *triangularis*	Goldback fern		N			0	4	4	4	4	0	0	0	4	0	0	0	4	4	0	0
Gymnosperms																						
Cupressaceae	*Juniperus californica*	California Juniper		N			4	5	5	5	5	4	1	0	3	0	0	3	5	5	0	0
Ephedraceae	*Ephedra californica*	Desert tea		N			0	0	0	1	0	4	0	0	0	0	0	0	0	1	5	4
Ephedraceae	*Ephedra viridis*	Green ephedra		N			1	0	4	5	2	0	0	0	4	0	0	1	1	4	0	0
Magnolids																						
Saururaceae	*Anemopsis californica*	Yerba mansa		N			0	0	0	0	0	0	2	0	0	0	0	0	0	2	0	0
Eudicots																						
Adoxaceae	*Sambucus nigra* ssp. *caerulea*	Blue elderberry		N			0	2	2	2	1	0	2	0	2	0	0	0	2	2	0	0
Amaranthaceae	*Amaranthus albus*	Tumbleweed		E			0	0	0	0	0	0	2	2	0	2	0	1	2	0	0	0
Amaranthaceae	*Amaranthus blitoides*	Procumbent pigweed		N			0	0	0	0	0	0	0	1	0	1	0	0	1	1	0	0
Anacardiaceae	*Toxicodendron diversilobum*	Western poison oak		N			0	2	2	0	0	0	0	0	2	0	0	0	2	1	0	0
Apiaceae	*Apiastrum angustifolium*	Mock parsley		N			0	0	0	2	1	0	0	0	0	0	0	0	0	2	0	0
Apiaceae	*Apium graveolens*	Celery		E			0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0
Apiaceae	*Bowlesia incana*	Bowlesia		N			0	0	2	0	1	0	0	0	0	0	0	0	1	2	0	0
Apiaceae	*Daucus pusillus*	American wild carrot		N			1	1	2	4	2	1	1	0	0	0	0	2	2	4	0	0
Apiaceae	*Lomatium dasycarpum*	Woolly-fruited lomatium		N			0	0	0	0	1	0	0	0	0	0	0	0	1	1	0	0
Apiaceae	*Lomatium macrocarpum*	Big-seed biscuitroot		N			0	1	1	0	0	0	0	0	0	0	0	0	1	1	0	0

Table C-1: Plant Species of the CPER (Butterworth 2016)

							Relative Abundance in Habitat Elements[3]											Abundance in CPER Units[3]				
Family	**Scientific Name**	**Common Name**	**Status[1]**	**Native (N)/Exotic (E)**	**CA Endemic**	**Cal IPC[2]**	**Grassland**	**Oak W.**	**Juniper W.**	**Coastal Scrub**	**Chaparral**	**Desert Scrub**	**Riparian**	**Pond**	**Rocks**	**Wayside**	**Alkali**	**American**	**N. Chimineas**	**S. Chimineas**	**Elkhorn**	**Panorama**
Apiaceae	*Lomatium utriculatum*	Hog fennel		N			5	4	4	5	0	4	0	0	0	0	0	5	5	5	0	0
Apiaceae	*Perideridia pringlei*	Adobe yampah	List 4.3	N	✓		0	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0
Apiaceae	*Sanicula bipinnata*	Poison sanicle		N			2	4	0	0	0	0	0	0	0	0	0	0	4	1	0	0
Apiaceae	*Sanicula bipinnatifida*	Purple sanicle		N			2	4	0	0	0	0	0	0	0	0	0	0	4	1	0	0
Apiaceae	*Sanicula crassicaulis*	Pacific sanicle		N			0	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0
Apiaceae	*Sanicula tuberosa*	Tuberous sanicle		N			0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0
Apiaceae	*Yabea microcarpa*	California hedge parsley		N			3	3	3	0	0	0	0	0	0	0	0	0	0	1	0	0
Apocynaceae	*Asclepias eriocarpa*	Kotolo		N			1	1	0	0	0	0	2	0	0	1	0	1	1	2	0	0
Apocynaceae	*Asclepias fascicularis*	Narrow-leaf milkweed		N			2	0	0	0	0	0	4	0	0	3	0	0	4	3	0	0
Apocynaceae	*Asclepias vestita*	Woolly milkweed		N			0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Asteraceae	*Achillea millefolium*	Yarrow		N			1	0	0	0	0	0	1	0	1	0	0	1	1	0	0	0
Asteraceae	*Achyrachaena mollis*	Blow-wives		N			4	2	1	1	0	0	0	0	0	0	0	4	4	4	0	0
Asteraceae	*Acourtia microcephala*	Sacapellote		N			0	2	2	0	2	0	0	0	2	0	0	0	2	2	0	0
Asteraceae	*Agoseris grandiflora*	Giant mountain dandelion		N			1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Asteraceae	*Agoseris heterophylla*	Mountain dandelion		N			2	1	0	0	1	0	0	0	0	1	0	1	2	1	0	0
Asteraceae	*Ambrosia acanthicarpa*	Annual bur sage		N			0	0	0	0	0	0	1	0	0	4	0	0	1	4	0	0
Asteraceae	*Ambrosia confertiflora*	Bur sage		N			0	0	0	1	0	0	0	0	0	1	0	0	1	0	0	0
Asteraceae	*Ambrosia salsola*	Common burrobush		N			0	0	0	0	0	3	0	0	0	0	0	0	0	1	3	0
Asteraceae	*Ancistrocarphus filagineus*	Wooly fishhooks		N			0	0	5	2	2	1	0	0	0	0	0	1	4	5	0	0
Asteraceae	*Anthemis cotula*	Mayweed		E		NR	2	0	0	0	0	0	0	2	0	0	0	0	2	0	0	0
Asteraceae	*Artemisia californica*	CA sagebrush		N			1	5	0	5	5	2	5	0	0	0	0	4	5	5	0	0
Asteraceae	*Artemisia douglasiana*	Mugwort		N			0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0
Asteraceae	*Artemisia dracunculus*	Tarragon		N			0	0	1	1	0	0	0	0	0	0	0	0	0	1	0	0
Asteraceae	*Artemisia tridentata*	Sagebrush		N			0	0	0	0	0	0	2	0	0	0	0	0	0	2	0	0
Asteraceae	*Artemisia tridentata* ssp. *vaseyana*	Mountain sagebrush		N			0	0	0	0	0	0	2	0	0	0	0	0	0	2	0	0

Table C-1: Plant Species of the CPER (Butterworth 2016)

							Relative Abundance in Habitat Elements[3]											Abundance in CPER Units[3]				
Family	Scientific Name	Common Name	Status[1]	Native (N)/Exotic (E)	CA Endemic	Cal IPC[2]	Grassland	Oak W.	Juniper W.	Coastal Scrub	Chaparral	Desert Scrub	Riparian	Pond	Rocks	Wayside	Alkali	American	N. Chimineas	S. Chimineas	Elkhorn	Panorama
Asteraceae	*Baccharis pilularis*	Coyote brush		N			0	0	0	0	3	0	3	0	0	0	0	0	1	3	0	0
Asteraceae	*Baccharis salicifolia*	Mulefat		N			0	0	0	0	0	0	5	5	0	0	0	0	5	5	0	0
Asteraceae	*Blepharizonia laxa*	Big tarweed		N	✓		4	0	4	0	0	1	0	0	0	1	0	4	4	4	0	0
Asteraceae	*Centaurea melitensis*	Tocalote		E			5	4	5	5	4	4	4	0	0	5	0	5	5	5	1	0
Asteraceae	*Centaurea solstitialis*	Yellow star thistle		E		H	2	0	0	0	0	0	0	0	0	0	0	1	2	2	0	0
Asteraceae	*Centromadia fitchii*	Fitch spikeweed		N			1	0	0	0	0	0	0	0	0	3	0	1	3	0	0	0
Asteraceae	*Centromadia pungens*ssp. *pungens*	Common spikeweed		N			1	0	0	0	0	0	1	0	0	3	0	0	3	0	0	0
Asteraceae	*Chaenactis fremontii*	Fremont pincushion		N			3	0	0	0	0	2	0	0	0	0	0	0	0	3	0	0
Asteraceae	*Chaenactis glabriuscula*var. *glabriuscula*	Yellow pincushion		N			2	0	0	0	0	2	0	0	0	0	0	2	2	4	2	4
Asteraceae	*Chaenactis glabriuscula var lanosa*	Sand buttons		N			0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0
Asteraceae	*Chaenactis stevioides*	Desert pincushion		N			4	0	0	0	0	4	0	0	0	0	0	0	4	4	0	0
Asteraceae	*Cirsium occidentale* var. *venustum*	Venus thistle		N			1	4	0	0	1	0	2	0	0	2	0	0	4	2	0	0
Asteraceae	*Cirsium vulgare*	Bull thistle		E			0	0	0	0	0	0	2	2	0	0	0	0	2	1	0	0
Asteraceae	*Corethrogyne filaginifolia*	California aster		N			5	2	1	4	0	2	1	0	2	0	0	4	5	5	0	0
Asteraceae	*Cotula coronopifolia*	Brass buttons		E		L	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0
Asteraceae	*Deinandra pallida*	Kern tarplant		N			0	0	0	0	0	4	0	0	0	4	0	0	0	0	4	0
Asteraceae	*Deinandra pentactis*	Salinas River tarplant		N			4	1	0	0	1	0	0	0	0	0	0	1	2	2	0	0
Asteraceae	*Eastwoodia elegans*	Yellow mock aster		N			0	0	2	2	0	4	0	0	0	0	0	2	2	4	4	2
Asteraceae	*Ericameria linearifolia*	Interior goldenbush		N			4	5	5	5	5	5	2	0	0	0	0	2	5	5	2	2
Asteraceae	*Ericameria nauseosa* var. *hololeuca*	White rabbit brush		N			0	0	0	0	0	0	4	0	0	0	0	0	0	4	0	0
Asteraceae	*Erigeron bonariensis*	Flax-leaved horseweed		E			0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0
Asteraceae	*Erigeron canadensis*	Horseweed		N			0	0	0	0	0	0	0	0	0	4	0	1	0	4	0	0
Asteraceae	*Eriophyllum confertiflorum*	Golden yarrow		N			0	4	5	4	4	1	0	0	0	0	0	2	4	5	0	0
Asteraceae	*Eriophyllum multicaule*	Many-stem woolly sunflower		N			0	0	5	2	2	2	0	0	0	0	0	0	4	5	0	0
Asteraceae	*Gnaphalium palustre*	Lowland cudweed		N			0	0	0	0	0	0	1	1	0	0	0	0	1	1	0	0

Table C-1: Plant Species of the CPER (Butterworth 2016)

							Relative Abundance in Habitat Elements[3]											Abundance in CPER Units[3]				
Family	**Scientific Name**	**Common Name**	**Status[1]**	**Native (N)/Exotic (E)**	**CA Endemic**	**Cal IPC[2]**	**Grassland**	**Oak W.**	**Juniper W.**	**Coastal Scrub**	**Chaparral**	**Desert Scrub**	**Riparian**	**Pond**	**Rocks**	**Wayside**	**Alkali**	**American**	**N. Chimineas**	**S. Chimineas**	**Elkhorn**	**Panorama**
Asteraceae	*Grindelia camporum*	Gumplant		N			0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0
Asteraceae	*Gutierrezia californica*	California matchweed		N			4	2	5	5	2	5	1	0	0	0	0	2	5	5	5	5
Asteraceae	*Hazardia stenolepis*	Narrow-scaled goldenbush		N			4	1	1	4	0	0	1	0	0	0	0	1	4	2	0	0
Asteraceae	*Helianthus annuus*	Annual sunflower		N			0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0
Asteraceae	*Heterotheca grandiflora*	Telegraph weed		N			0	0	0	0	0	0	0	0	0	4	0	0	0	4	0	0
Asteraceae	*Heterotheca sessiliflora* ssp. *echioides*	Sessileflower golden aster		N			0	1	0	1	0	0	2	0	0	1	0	0	2	1	0	0
Asteraceae	*Isocoma acradenia* var. *bracteosa*	Alkali goldenbush		N			2	1	0	0	0	5	1	0	0	0	0	2	2	5	2	2
Asteraceae	*Iva axillaris*	Poverty weed		N			0	1	0	0	0	0	3	0	0	0	0	0	3	1	0	0
Asteraceae	*Lactuca serriola*	Prickly lettuce		E		NR	4	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0
Asteraceae	*Laennecia coulteri*	Coulter's horseweed		N			0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0
Asteraceae	*Lagophylla ramosissima*	Hare-leaf		N			5	0	2	0	0	0	0	0	0	0	0	4	4	0	0	0
Asteraceae	*Lasthenia ferrisiae*	Ferris' goldfields	CRPR 4.2	N	✓		0	0	0	0	0	0	0	0	0	0	5	5	0	0	0	0
Asteraceae	*Lasthenia gracilis*	Common goldfields		N			5	4	5	5	0	5	4	0	0	0	0	5	5	5	3	5
Asteraceae	*Lasthenia microglossa*	Small-ray goldfields		N			0	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0
Asteraceae	*Lasthenia minor*	Coastal goldfields		N			1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Asteraceae	*Layia glandulosa*	White layia		N			0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0
Asteraceae	*Layia heterotricha*	Pale-yellow layia	CRPR 1B.1	N	✓		2	0	2	0	0	1	0	0	0	0	0	0	0	4	0	0
Asteraceae	*Layia munzii*	Munz's layia	CRPR 1B.2	N	✓		0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0
Asteraceae	*Layia platyglossa*	Tidy tips		N			4	0	4	0	0	0	2	0	0	0	0	5	4	4	0	0
Asteraceae	*Lepidospartum squamatum*	Scale-broom		N			0	0	0	0	0	0	5	0	0	0	0	0	5	5	0	0
Asteraceae	*Leptosyne bigelovii*	Bigelow coreopsis		N			2	0	2	2	0	2	0	0	0	0	0	0	2	2	0	0
Asteraceae	*Leptosyne calliopsidea*	Leafy-stemmed coreopsis		N			0	0	0	0	0	2	0	0	0	0	0	0	0	2	0	0
Asteraceae	*Lessingia glanduliferavar.* *glandulifera*	Lemmon's lessingia		N			0	0	0	0	0	1	1	0	0	0	0	0	1	1	0	0
Asteraceae	*Lessingia pectinata* var. *tenuipes*	Valley lessingia		N			1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0

Table C-1: Plant Species of the CPER (Butterworth 2016)

							Relative Abundance in Habitat Elements[3]											Abundance in CPER Units[3]				
Family	Scientific Name	Common Name	Status[1]	Native (N)/Exotic (E)	CA Endemic	Cal IPC[2]	Grassland	Oak W.	Juniper W.	Coastal Scrub	Chaparral	Desert Scrub	Riparian	Pond	Rocks	Wayside	Alkali	American	N. Chimineas	S. Chimineas	Elkhorn	Panorama
Asteraceae	*Logfia filaginoides*	CA cottonrose		N			0	0	1	5	4	2	1	0	0	0	0	0	5	5	0	0
Asteraceae	*Madia gracilis*	Gumweed		N			0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Asteraceae	*Madia radiata*	Showy golden madia	CRPR 1B.1	N	✓		2	0	2	0	0	1	0	0	0	0	0	1	0	4	0	0
Asteraceae	*Malacothrix californica*	California desert dandelion		N			0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0
Asteraceae	*Malacothrix coulteri*	Snake head		N			4	0	1	1	0	4	0	0	0	0	0	2	2	4	2	2
Asteraceae	*Malacothrix floccifera*	Woolly desert dandelion		N			0	1	1	0	0	0	0	0	1	0	0	0	0	1	0	0
Asteraceae	*Malacothrix glabrata*	Desert dandelion		N			0	0	1	0	0	1	0	0	0	0	0	0	0	1	0	0
Asteraceae	*Malacothrix saxatilis*	Cliff desert dandelion		N	✓		0	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0
Asteraceae	*Matricaria discoidea*	Pineapple weed		E			0	0	0	0	0	2	0	0	0	2	0	2	2	2	0	0
Asteraceae	*Matricaria occidentalis*	Valley mayweed		N			0	0	0	0	0	0	0	0	0	0	5	5	0	0	0	0
Asteraceae	*Micropus californicus*	Q tips		N			4	0	4	2	0	0	1	0	0	0	0	2	4	2	0	0
Asteraceae	*Microseris campestris*	San Joaquin microseris		N			2	0	0	0	0	2	0	0	0	0	0	4	0	0	0	2
Asteraceae	*Microseris douglasii ssp douglasii*	Douglas' microseris		N			3	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0
Asteraceae	*Monolopia congdonii*	San Joaquin woollythreads	CRPR 1B.2, FE	N	✓		0	0	0	0	0	4	0	0	0	0	0	0	0	0	4	0
Asteraceae	*Monolopia lanceolata*	Common monolopia		N			5	0	5	2	0	5	0	0	0	0	0	2	5	5	0	2
Asteraceae	*Monolopia stricta*	Crum's monolopia		N			0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2
Asteraceae	*Packera breweri*	Brewer's ragwort		N			2	2	0	1	0	1	0	0	0	0	0	1	2	2	0	0
Asteraceae	*Pluchea sericea*	Arroweed		N			0	0	0	0	0	0	5	0	0	0	0	0	0	5	0	0
Asteraceae	*Pseudognaphalium californicum*	California everlasting		N			0	0	0	0	0	0	0	1	1	0	0	0	1	1	0	0
Asteraceae	*Pseudognaphalium luteoalbum*	Weedy cudweed		E			0	0	0	0	0	0	1	1	0	0	0	0	1	1	0	0
Asteraceae	*Pseudognaphalium microcephalum*	Wright's cudweed		N			0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0
Asteraceae	*Psilocarphus brevissimus* var. *brevissimus*	Dwarf woollyheads		N			1	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0
Asteraceae	*Psilocarphus chilensis*	Round woolly-marbles		N			0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0
Asteraceae	*Psilocarphus tenellus*	Slender woolly-marbles		N			0	0	0	1	0	0	0	0	0	0	0	0	1	1	0	0

Table C-1: Plant Species of the CPER (Butterworth 2016)

Family	Scientific Name	Common Name	Status[1]	Native (N)/Exotic (E)	CA Endemic	Cal IPC[2]	Relative Abundance in Habitat Elements[3]											Abundance in CPER Units[3]				
							Grassland	Oak W.	Juniper W.	Coastal Scrub	Chaparral	Desert Scrub	Riparian	Pond	Rocks	Wayside	Alkali	American	N. Chimineas	S. Chimineas	Elkhorn	Panorama
Asteraceae	*Rafinesquia californica*	California chicory		N			0	0	1	2	2	1	0	0	2	0	0	0	2	2	0	0
Asteraceae	*Rigiopappus leptocladus*	Wireweed		N			0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Asteraceae	*Senecio californicus*	California. ragwort		N			0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0
Asteraceae	*Senecio flaccidus*	Threadleaf ragwort		N			0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0
Asteraceae	*Senecio flaccidus* var. *douglasii*	Douglas' threadleaf ragwort		N			0	0	0	1	0	0	2	0	0	0	0	0	2	2	0	0
Asteraceae	*Senecio vulgaris*	Common groundsel		E			0	2	0	2	0	0	2	0	0	0	0	0	2	0	0	0
Asteraceae	*Sonchus asper*	Prickly sow thistle		E			1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Asteraceae	*Stephanomeria exigua* ssp. *coronaria*	Milk aster		N			2	0	0	0	0	0	0	0	0	0	0	2	2	2	2	0
Asteraceae	*Stephanomeria pauciflora*	Wire lettuce		N			1	0	0	4	0	2	0	0	2	0	0	2	1	4	5	0
Asteraceae	*Stephanomeria virgata ssp pleurocarpa*	Tall stephanomeria		N			0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0
Asteraceae	*Stylocline gnaphaloides*	Everlasting nest straw		N			0	0	0	2	0	0	0	0	0	0	0	0	2	2	0	0
Asteraceae	*Tragopogon porrifolius*	Salsify		E			1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Asteraceae	*Uropappus lindleyi*	Silver puffs		N			5	5	1	5	5	4	2	0	0	0	0	5	5	5	1	0
Asteraceae	*Xanthium spinosum*	Spiny cocklebur		N			1	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0
Asteraceae	*Xanthium strumarium*	Cocklebur		N			0	0	0	0	0	0	5	5	0	0	0	0	5	5	0	0
Boraginaceae	*Amsinckia intermedia*	Common fiddleneck		N			5	0	0	0	0	0	0	0	0	0	0	5	5	5	0	0
Boraginaceae	*Amsinckia lycopsoides*	Tarweed fiddleneck		N			4	1	0	1	0	0	0	0	0	0	0	4	4	1	0	0
Boraginaceae	*Amsinckia menziesii*	Small-flowered fiddleneck		N			5	5	4	5	4	2	5	0	0	5	0	5	5	5	2	0
Boraginaceae	*Amsinckia tessellata* var. *gloriosa*	Carrizo fiddleneck		N			4	0	0	4	0	0	0	0	0	0	0	0	4	1	0	0
Boraginaceae	*Amsinckia tessellata* var. *tessellata*	Desert fiddleneck		N			5	5	5	5	2	5	2	0	0	0	0	5	5	5	5	5
Boraginaceae	*Amsinckia vernicosa*	Waxy fiddleneck		N			3	1	0	0	0	1	0	0	0	1	0	0	1	3	0	0
Boraginaceae	*Cryptantha circumscissa*	Cushion cryptantha		N			0	0	1	0	0	0	0	0	0	0	0	0	1	1	0	0
Boraginaceae	*Cryptantha clevelandii*	Coastal cryptantha		N			0	0	1	0	1	0	0	0	0	0	0	0	1	1	0	0
Boraginaceae	*Cryptantha decipiens*	Gravel cryptantha		N			0	0	1	5	0	0	0	0	0	0	0	0	0	5	0	0
Boraginaceae	*Cryptantha intermedia*	Common cryptantha		N			0	0	5	5	0	1	1	0	0	0	0	0	5	5	0	0

Table C-1: Plant Species of the CPER (Butterworth 2016)

Family	Scientific Name	Common Name	Status[1]	Native (N)/Exotic (E)	CA Endemic	Cal IPC[2]	Relative Abundance in Habitat Elements[3]											Abundance in CPER Units[3]				
							Grassland	Oak W.	Juniper W.	Coastal Scrub	Chaparral	Desert Scrub	Riparian	Pond	Rocks	Wayside	Alkali	American	N. Chimineas	S. Chimineas	Elkhorn	Panorama
Boraginaceae	*Cryptantha microstachys*	Tejon cryptanthaa		N			1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Boraginaceae	*Cryptantha muricata*	Prickly cryptantha		N			0	0	1	5	4	1	0	0	0	0	0	0	4	5	0	0
Boraginaceae	*Cryptantha nemaclada*	Colusa cryptantha		N			0	0	3	0	0	0	0	0	0	0	0	0	1	3	0	0
Boraginaceae	*Cryptantha nevadensis*	Nevada cryptantha		N			1	1	0	5	1	1	0	0	0	0	0	2	2	4	0	0
Boraginaceae	*Cryptantha oxygona*	Sharp-nut cryptantha		N			0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0
Boraginaceae	*Emmenanthe penduliflora*	Whispering bells		N			0	0	3	5	3	3	0	0	0	0	0	1	3	5	0	0
Boraginaceae	*Eriodictyon crassifolium* var. *nigrescens*	Bi-colored yerba santa		N			1	0	0	2	0	0	1	0	0	0	0	0	1	2	0	0
Boraginaceae	*Eriodictyon tomentosum*	Woolly yerba santa		N			0	0	0	4	4	0	4	0	0	0	0	0	4	4	0	0
Boraginaceae	*Eucrypta chrysanthemifolia* var. *chrysanthemifolia*	Common eucrypta		N			0	1	1	0	2	0	0	0	2	0	0	0	2	2	0	0
Boraginaceae	*Heliotropium curassavicum*	Alkali heliotrope		N			0	0	0	0	0	0	5	5	0	0	3	5	5	5	0	0
Boraginaceae	*Nemophila menziesii*	Baby blue eyes		N			2	0	2	0	0	0	0	0	0	0	0	2	2	2	0	0
Boraginaceae	*Pectocarya linearis* ssp. *ferocula*	Narrow-toothed pectocarya		N			0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0
Boraginaceae	*Pectocarya penicillata*	Northern pectocarya		N			5	0	5	5	0	5	1	0	0	0	0	5	5	5	4	5
Boraginaceae	*Pectocarya setosa*	Round-nut pectocarya		N			0	0	5	0	0	1	0	0	0	0	0	0	4	4	0	0
Boraginaceae	*Phacelia ciliata*	Valley phacelia		N			3	0	0	0	0	1	0	0	0	0	0	3	3	1	0	1
Boraginaceae	*Phacelia distans*	Common phacelia		N			1	2	2	0	4	0	0	0	0	2	0	0	4	4	1	0
Boraginaceae	*Phacelia douglasii*	Douglas phacelia		N			3	0	0	1	1	2	0	0	0	0	0	0	3	3	1	0
Boraginaceae	*Phacelia egena*	Rock phacelia		N			1	0	0	0	0	0	0	0	1	0	0	0	2	0	0	0
Boraginaceae	*Phacelia fremontii*	Fremont's phacelia		N			1	0	3	3	0	3	0	0	0	3	0	1	0	3	1	0
Boraginaceae	*Phacelia imbricata* ssp. *imbricata*	Imbricate phacelia		N			0	0	0	2	0	0	0	0	2	0	0	1	2	0	0	0
Boraginaceae	*Phacelia tanacetifolia*	Tansy-leaf phacelia		N			5	0	2	4	0	5	0	0	0	0	0	4	5	5	0	0
Boraginaceae	*Phacelia viscida v viscida*	Sticky phacelia		N			0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0
Boraginaceae	*PhoCRPRoma membranaceum*	White fiesta flower		N			0	1	2	2	4	4	0	0	0	0	0	2	2	5	2	0
Boraginaceae	*Plagiobothrys acanthocarpus*	Adobe popcorn flower		N			1	0	0	0	0	0	0	1	0	1	0	1	0	1	0	0

Table C-1: Plant Species of the CPER (Butterworth 2016)

							Relative Abundance in Habitat Elements[3]											Abundance in CPER Units[3]				
Family	**Scientific Name**	**Common Name**	**Status[1]**	**Native (N)/Exotic (E)**	**CA Endemic**	**Cal IPC[2]**	**Grassland**	**Oak W.**	**Juniper W.**	**Coastal Scrub**	**Chaparral**	**Desert Scrub**	**Riparian**	**Pond**	**Rocks**	**Wayside**	**Alkali**	**American**	**N. Chimineas**	**S. Chimineas**	**Elkhorn**	**Panorama**
Boraginaceae	*Plagiobothrys arizonicus*	Arizona popcorn flower		N			0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0
Boraginaceae	*Plagiobothrys canescens*	Valley popcorn flower		N			5	4	0	4	0	0	4	0	0	0	0	5	5	5	0	0
Boraginaceae	*Plagiobothrys infectivus*	Dye popcorn flower		N			1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Boraginaceae	*Plagiobothrys leptocladus*	Alkali plagiobothrys		N			0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0
Boraginaceae	*Plagiobothrys nothofulvus*	Rusty popcorn flower		N			5	2	0	4	0	0	1	0	0	0	0	0	5	5	0	0
Boraginaceae	*Plagiobothrys shastensis/tenellus*	Popcorn flower		N			1	0	0	0	2	0	0	0	0	0	0	0	2	0	0	0
Brassicaceae	*Athysanus pusillus*	Dwarf athysanus		N			0	0	0	2	2	0	2	0	0	0	0	0	2	2	0	0
Brassicaceae	*Athysanus unilateralis*	Ladiestongue mustard		N			1	0	2	0	0	0	0	0	0	0	0	1	0	2	0	0
Brassicaceae	*Boechera pulchra*	Beautiful rock cress		N			0	0	1	0	1	1	0	0	0	0	0	0	0	1	0	0
Brassicaceae	*Capsella bursa-pastoris*	Shepherd's purse		E			2	0	0	0	0	0	2	0	0	0	0	0	2	2	0	0
Brassicaceae	*Caulanthus anceps*	Lemmon's mustard		N			1	0	1	0	0	0	0	0	0	0	0	1	0	1	0	0
Brassicaceae	*Caulanthus inflatus*	Desert candle		N			1	0	0	0	0	4	0	0	0	0	0	0	0	4	0	0
Brassicaceae	*Caulanthus lasiophyllus*	California mustard		N			5	0	2	5	1	5	0	0	0	0	0	5	5	5	0	1
Brassicaceae	*Caulanthus lemmonii*	Lemmon's jewelflower	CRPR 1B.2	N	✓		0	0	4	5	0	0	0	0	5	0	0	0	0	5	0	0
Brassicaceae	*Descurainia pinnata*	Western tansymustard		N			0	0	0	0	0	0	0	0	0	1	0	2	0	1	0	0
Brassicaceae	*Descurainia sophia*	Flix weed		E		L	4	0	1	1	0	0	0	0	0	1	0	4	0	2	0	1
Brassicaceae	*Erysimum capitatum*	Western wallflower		N			0	0	2	1	0	0	0	0	0	0	0	0	0	2	0	0
Brassicaceae	*Hirschfeldia incana*	Summer mustard		E		M	5	4	4	4	0	0	1	0	0	0	0	5	5	5	0	0
Brassicaceae	*Hornungia procumbens*	Hornungia		N			0	0	0	0	0	0	0	0	0	0	3	3	0	0	0	0
Brassicaceae	*Lepidium dictyotum*	Alkali peppergrasss		N			0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0
Brassicaceae	*Lepidium nitidum*	Shining peppergrass		N			5	0	0	5	0	2	0	0	0	0	0	5	5	5	2	4
Brassicaceae	*Nasturtium officinale*	Water cress		N			0	0	0	0	0	0	4	3	0	0	0	1	5	4	0	0
Brassicaceae	*Sinapis arvensis*	Charlock		E			5	0	0	0	0	0	1	0	0	4	0	5	5	1	0	0
Brassicaceae	*Sisymbrium altissimum*	Tumble mustard		E			0	0	0	0	0	1	0	0	0	1	0	0	0	0	1	0
Brassicaceae	*Sisymbrium irio*	London rocket		E			0	0	0	0	0	0	1	0	0	1	0	1	0	1	0	1
Brassicaceae	*Sisymbrium orientale*	Oriental hedge mustard		E			2	1	0	0	0	1	0	1	0	4	0	1	2	4	1	0
Brassicaceae	*Stanleya pinnata* var. *pinnata*	Prince's plume		N			0	0	3	0	0	4	1	0	0	0	0	0	0	4	0	0

Table C-1: Plant Species of the CPER (Butterworth 2016)

Family	Scientific Name	Common Name	Status[1]	Native (N)/Exotic (E)	CA Endemic	Cal IPC[2]	Relative Abundance in Habitat Elements[3]: Grassland	Oak W.	Juniper W.	Coastal Scrub	Chaparral	Desert Scrub	Riparian	Pond	Rocks	Wayside	Alkali	Abundance in CPER Units[3]: American	N. Chimineas	S. Chimineas	Elkhorn	Panorama
Brassicaceae	*Thysanocarpus curvipes*	Fringepod		N			5	5	0	5	4	1	1	0	0	0	0	4	5	5	0	0
Brassicaceae	*Thysanocarpus laciniatus*	Narrow-leaved fringepod		N			1	1	0	2	2	0	0	0	0	0	0	1	2	2	0	0
Brassicaceae	*Tropidocarpum gracile*	Slender tropidocarpum		N			5	1	1	1	0	1	0	0	0	0	0	0	1	5	0	5
Cactaceae	*Cylindropuntia californica* var. *parkeri*	Cane cholla		N			1	0	0	0	0	0	0	0	0	1	0	1	0	1	0	0
Cactaceae	*Opuntia basilaris* var. *basilaris*	Beavertail cactus.		N			0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0
Cactaceae	*Opuntia* cf. *phaeacantha*	Brown-spined prickly pear		N			0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0
Cactaceae	*Opuntia xvaseyi*	Vasey's prickly pear		N			0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0
Campanulaceae	*Nemacladus gracilis*	Slender nemacladus	CRPR 4.3	N	✓		0	1	1	0	0	0	0	0	1	0	0	0	0	1	0	0
Caprifoliaceae	*Lonicera interrupta*	Chaparral honeysuckle		N			0	4	0	0	4	0	0	0	0	0	0	0	4	2	0	0
Caprifoliaceae	*Lonicera subspicata* var. *denudata*	Southern honeysuckle		N			0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Caryophyllaceae	*Cerastium glomeratum*	Sticky mouse-ear chickweed		E			0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0
Caryophyllaceae	*Herniaria hirsuta var. cinerea*	Rupturewort		E			0	0	2	2	0	2	1	0	0	0	0	0	2	2	0	0
Caryophyllaceae	*Minuartia douglasii*	Douglas' stitchwort		N			0	2	2	2	2	0	0	0	0	0	0	0	2	2	0	0
Caryophyllaceae	*Spergularia atrosperma*	Black-seed sand-spurrey		N			1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Caryophyllaceae	*Spergularia marina*	Saltmarsh sand-spurrey		N			0	0	0	0	0	0	4	0	0	0	0	2	0	4	0	0
Caryophyllaceae	*Spergularia rubra*	Red sand-spurrey		E			0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0
Caryophyllaceae	*Stellaria media*	Common chickweed		E			0	1	0	0	0	0	1	0	0	0	0	0	1	1	0	0
Caryophyllaceae	*Stellaria nitens*	Shining chickweed		N			2	0	0	0	0	0	0	0	0	0	0	2	1	1	0	0
Caryophyllaceae	*Stellaria pallida*	Lesser chickweed		E			0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Chenopodiaceae	*Allenrolfea occidentalis*	Iodine bush		N			0	0	0	0	0	0	0	0	0	0	4	4	0	1	0	0
Chenopodiaceae	*Atriplex argentea var expansa*	Silver scale		N			0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0
Chenopodiaceae	*Atriplex canescens* ssp. *canescens*	4-wing saltbush		N			1	0	0	2	0	5	4	0	0	0	0	0	0	5	0	2
Chenopodiaceae	*Atriplex coronata var vallicola*	Lost Hills crownscale	CRPR 1B.2	N	✓		1	0	0	0	0	0	0	0	0	0	5	4	0	0	0	0
Chenopodiaceae	*Atriplex fruticulosa*	Ballscale		N			1	0	0	0	0	1	0	0	0	1	0	4	0	0	0	0

Table C-1: Plant Species of the CPER (Butterworth 2016)

Family	Scientific Name	Common Name	Status[1]	Native (N)/Exotic (E)	CA Endemic	Cal IPC[2]	Relative Abundance in Habitat Elements[3]											Abundance in CPER Units[3]				
							Grassland	Oak W.	Juniper W.	Coastal Scrub	Chaparral	Desert Scrub	Riparian	Pond	Rocks	Wayside	Alkali	American	N. Chimineas	S. Chimineas	Elkhorn	Panorama
Chenopodiaceae	*Atriplex lentiformis*	Big saltbush		N			0	0	0	1	0	1	1	1	0	1	0	0	0	2	0	0
Chenopodiaceae	*Atriplex polycarpa*	Allscale saltbush		N			5	0	0	0	0	5	4	0	0	0	0	0	2	5	0	5
Chenopodiaceae	*Atriplex rosea*	Tumbling orach		E			0	0	0	0	0	0	1	0	0	1	0	0	1	1	0	0
Chenopodiaceae	*Atriplex serenana* var. *serenana*	Bractscale		N			0	0	0	0	0	0	0	0	0	5	0	0	0	5	0	0
Chenopodiaceae	*Atriplex spinifera*	Spiny saltbush		N			0	0	0	0	0	4	0	0	0	0	0	4	0	0	0	4
Chenopodiaceae	*Chenopodium (album?)*	Lamb's quarters		E			1	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0
Chenopodiaceae	*Chenopodium californicum*	Calif. goosefoot		N			2	2	2	0	0	2	0	0	0	0	0	1	2	2	0	0
Chenopodiaceae	*Krascheninnikovia lanata*	Winterfat		N			0	0	0	0	0	4	0	0	0	0	0	0	0	4	4	4
Chenopodiaceae	*Monolepis nuttalliana*	Nuttall's poverty weed		N			0	0	0	0	0	0	0	0	0	0	3	3	0	0	0	0
Chenopodiaceae	*Salsola tragus*	Tumbleweed		E		L	5	2	2	2	0	2	0	0	0	5	0	4	5	5	0	5
Cleomaceae	*Peritoma arborea var. globosa*	Bladderpod		N			1	1	2	1	0	5	1	0	0	0	0	1	5	5	0	0
Convolvulaceae	*Calystegia malacophylla*	Wooly morning glory		N			0	0	0	1	0	0	1	0	1	0	0	0	1	1	0	0
Convolvulaceae	*Convolvulus arvensis*	Orchard morning glory		E		NR	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Convolvulaceae	*Cressa truxillensis*	Alkali weed		N			1	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0
Convolvulaceae	*Cuscuta californica*	Chaparral dodder		N			2	0	2	5	0	4	0	0	0	0	0	0	2	5	0	0
Crassulaceae	*Crassula connata*	Pygmy-weed		N			4	0	0	1	0	1	0	0	0	0	0	4	0	2	0	0
Crassulaceae	*Dudleya lanceolata*	Lance-leaf dudleya		N			0	1	0	3	0	1	0	0	3	0	0	0	3	3	0	0
Crassulaceae	*Sedella pentandra*	Mt Hamilton mock stonecrop		N			0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0
Cucurbitaceae	*Cucurbita palmata*	Coyote melon		N			3	0	0	0	0	0	0	0	0	0	0	3	0	1	0	0
Cucurbitaceae	*Marah fabacea*	Calif. manroot		N			4	2	4	4	4	2	0	0	0	0	0	4	4	4	0	0
Ericaceae	*Arctostaphylos glauca*	Big-berry manzanita		N			0	5	4	0	5	1	0	0	0	0	0	0	5	5	0	0
Eurphorbiaceae	*Chamaesyce ocellata* ssp. *ocellata*	Contura Creek sand mat		N			4	0	0	0	0	0	0	0	0	4	0	0	4	4	3	0
Eurphorbiaceae	*Croton setigerus*	Turkey mullein		N			4	4	0	0	0	0	0	0	0	4	0	2	4	4	3	3
Eurphorbiaceae	*Euphorbia spathulata*	Warty spurge		N			1	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
Fabaceae	*Acmispon americanus* var. *americanus*	Spanish clover		N			0	2	0	0	0	0	4	0	0	0	0	0	4	0	0	0

Table C-1: Plant Species of the CPER (Butterworth 2016)

Family	Scientific Name	Common Name	Status[1]	Native (N)/Exotic (E)	CA Endemic	Cal IPC[2]	Relative Abundance in Habitat Elements[3]: Grassland	Oak W.	Juniper W.	Coastal Scrub	Chaparral	Desert Scrub	Riparian	Pond	Rocks	Wayside	Alkali	Abundance in CPER Units[3]: American	N. Chimineas	S. Chimineas	Elkhorn	Panorama
Fabaceae	*Acmispon brachycarpus*	Hill lotus		N			5	0	1	4	1	1	0	0	0	0	0	1	2	5	0	1
Fabaceae	*Acmispon glaber*	Deerweed		N			0	0	0	2	4	0	1	0	0	4	0	0	4	2	0	0
Fabaceae	*Acmispon maritimus*	Coastal lotus		N			0	0	1	2	0	1	0	0	0	0	0	0	0	4	0	0
Fabaceae	*Acmispon strigosus*	Bishop's lotus		N			1	0	0	4	0	1	0	0	0	0	0	0	1	4	0	0
Fabaceae	*Acmispon wrangelianus*	Calf lotus		N			5	0	5	5	5	5	2	0	0	0	0	5	5	5	2	0
Fabaceae	*Astragalus didymocarpus*	Two-seeded milkvetch		N			5	0	4	5	0	5	0	0	0	0	0	5	5	5	0	4
Fabaceae	*Astragalus douglasii* var. *douglasii*	Douglas milkvetch		N			1	0	0	0	0	1	0	0	0	1	0	1	0	1	0	0
Fabaceae	*Astragalus gambelianus*	Gambel milkvetch		N			0	0	1	1	1	0	0	0	0	0	0	0	1	1	0	0
Fabaceae	*Astragalus lentiginosus* var. *nigricalycis*	Freckled milkvetch		N			2	0	0	0	0	2	2	0	0	2	0	0	2	2	4	0
Fabaceae	*Astragalus macrodon*	Salinas milkvetch	CRPR 4.3	N	✓		3	0	1	0	0	0	1	0	0	3	0	3	3	1	0	0
Fabaceae	*Astragalus oxyphysus*	Stanislaus milkvetch		N			2	0	2	0	0	0	0	0	0	1	0	1	3	3	0	3
Fabaceae	*Astragalus trichopodus* var. *phoxus*	Antisell milkvetch		N			2	4	0	4	0	0	4	0	0	0	0	0	4	4	0	0
Fabaceae	*Glycyrrhiza lepidota*	Wild licorice		N			0	0	0	0	0	0	1	1	0	0	0	0	1	0	0	0
Fabaceae	*Hoita macrostachya*	Leather root		N			0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0
Fabaceae	*Lupinus albifrons*	Silver bush lupine		N			5	0	2	5	0	0	0	0	0	0	0	5	5	5	0	0
Fabaceae	*Lupinus benthamii*	Spider lupine		N			0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0
Fabaceae	*Lupinus bicolor*	Miniature lupine		N			5	4	0	4	4	4	1	0	0	0	0	5	5	5	0	0
Fabaceae	*Lupinus concinnus*	Bajada lupine		N			0	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0
Fabaceae	*Lupinus microcarpus*	Chick lupine		N			5	2	0	5	2	2	2	0	0	0	0	2	5	5	2	2
Fabaceae	*Lupinus nanus*	Sky lupine		N			0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0
Fabaceae	*Lupinus sparsiflorus*	Coulter's lupine		N			0	0	0	2	0	0	2	0	0	0	0	0	0	2	0	0
Fabaceae	*Lupinus succulentus*	Arroyo lupine		N			5	1	0	5	0	4	1	0	0	0	0	0	5	5	0	0
Fabaceae	*Medicago polymorpha*	CA burclover		E		L	5	0	0	2	0	0	4	0	0	0	0	2	5	5	0	0
Fabaceae	*Medicago truncatula* var. *longeaculeata*	Barrel clover		E			2	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
Fabaceae	*Melilotus albus*	White sweetclover		E			0	0	0	0	0	0	1	0	0	0	0	0	1	1	0	0

Table C-1: Plant Species of the CPER (Butterworth 2016)

							Relative Abundance in Habitat Elements[3]											Abundance in CPER Units[3]				
Family	Scientific Name	Common Name	Status[1]	Native (N)/Exotic (E)	CA Endemic	Cal IPC[2]	Grassland	Oak W.	Juniper W.	Coastal Scrub	Chaparral	Desert Scrub	Riparian	Pond	Rocks	Wayside	Alkali	American	N. Chimineas	S. Chimineas	Elkhorn	Panorama
Fabaceae	*Melilotus indicus*	Sourclover		E			5	0	0	0	0	0	5	0	0	0	0	0	5	5	0	0
Fabaceae	*Robinia pseudoacacia*	Black locust		E		L	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0
Fabaceae	*Trifolium albopurpureum*	Rancheria clover		N			5	2	1	5	0	1	1	0	0	0	0	5	5	5	0	0
Fabaceae	*Trifolium arvense*	Rabbitfoot clover		E			0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0
Fabaceae	*Trifolium depauperatum*	Cowbag clover		N			5	0	0	0	0	0	0	0	0	0	0	4	4	1	0	0
Fabaceae	*Trifolium depauperatum* var. *depauperatum*	Dwarf sack clover		N			3	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0
Fabaceae	*Trifolium depauperatum* var. *truncatum*	Truncate sack clover		N			1	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
Fabaceae	*Trifolium dichotomum*	Branched Indian clover		N			2	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
Fabaceae	*Trifolium fragiferum*	Strawberry clover		E			1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Fabaceae	*Trifolium gracilentum*	Pinpoint clover		N			5	0	0	4	0	1	0	0	0	0	0	2	5	5	0	4
Fabaceae	*Trifolium hirtum*	Rose clover		E			2	0	0	0	0	0	0	0	0	1	0	0	2	0	0	0
Fabaceae	*Trifolium microcephalum*	Small-head clover		N			1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Fabaceae	*Trifolium variegatum v variegatum*	Variegated clover		N			0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0
Fabaceae	*Trifolium willdenovii*	Tomcat clover		N			2	0	0	1	0	1	0	0	0	0	0	2	2	2	0	0
Fabaceae	*Vicia benghalensis*	Purple vetch		E			5	0	0	0	0	0	0	0	0	0	0	4	5	0	0	0
Fabaceae	*Vicia hassei*	Slender vetch		N			2	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
Fabaceae	*Vicia lathyroides*	Pea vetch		E			1	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0
Fabaceae	*Vicia sativa*	Spring vetch		E			1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Fabaceae	*Vicia villosa*	Hairy vetch		E		NR	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0
Fagaceae	*Quercus agrifolia*	Coast live oak		N			0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Fagaceae	*Quercus berberidifolia*	Scrub oak		N			0	3	0	0	1	0	0	0	0	0	0	0	3	0	0	0
Fagaceae	*Quercus douglasii*	Blue oak		N			0	5	0	1	5	0	1	0	0	0	0	0	5	5	0	0
Fagaceae	*Quercus john-tuckeri*	Tucker's oak		N			0	5	0	0	5	1	0	0	0	0	0	0	5	5	0	0
Fagaceae	*Quercus lobata*	Valley oak		N			0	1	0	0	0	0	1	0	0	0	0	0	0	1	0	0
Fagaceae	*Quercus xalvordiana*	Blue/Tucker oak		N			0	2	0	0	2	0	0	0	0	0	0	0	2	0	0	0

Table C-1: Plant Species of the CPER (Butterworth 2016)

							Relative Abundance in Habitat Elements[3]											Abundance in CPER Units[3]				
Family	**Scientific Name**	**Common Name**	**Status[1]**	**Native (N)/Exotic (E)**	**CA Endemic**	**Cal IPC[2]**	**Grassland**	**Oak W.**	**Juniper W.**	**Coastal Scrub**	**Chaparral**	**Desert Scrub**	**Riparian**	**Pond**	**Rocks**	**Wayside**	**Alkali**	**American**	**N. Chimineas**	**S. Chimineas**	**Elkhorn**	**Panorama**
Frankeniaceae	*Frankenia salina*	Alkali heath		N			0	0	0	0	0	0	2	2	0	0	2	3	3	4	0	0
Gentianaceae	*Zeltnera davyi*	Davy's centaury		N			1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Geraniaceae	*California macrophylla*	Round-leaved filaree	CRPR 1B.1	N			4	0	1	0	0	0	0	0	0	0	0	2	1	4	0	0
Geraniaceae	*Erodium botrys*	Long-beaked filaree		E		NR	5	0	0	2	0	1	0	0	0	0	0	0	5	4	0	0
Geraniaceae	*Erodium brachycarpum*	Short-fruited filaree		E		NR	4	0	0	1	0	0	1	0	0	0	0	0	4	2	0	0
Geraniaceae	*Erodium cicutarium*	Red-stem filaree		E		L	5	5	5	5	5	5	5	0	0	5	0	5	5	5	4	5
Geraniaceae	*Erodium moschatum*	Greenstem filaree		E		NR	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Grossulariaceae	*Ribes californicum* var. *californicum*	Hillside gooseberry		N			0	1	0	0	0	0	0	0	1	0	0	0	1	0	0	0
Grossulariaceae	*Ribes malvaceum*	Chaparral currant		N			0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0
Grossulariaceae	*Ribes quercetorum*	Oakwoods gooseberry		N			0	4	4	0	1	0	0	0	4	0	0	3	4	1	0	0
Juglandaceae	*Juglans hindsii*	N. California black walnut	CRPR 1B.1	N	✓		1	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0
Lamiaceae	*Acanthomintha obovata*	Thornmint	CRPR 4.2	N	✓		1	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0
Lamiaceae	*Lamium amplexicaule*	Henbit		E			1	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
Lamiaceae	*Marrubium vulgare*	Horehound		E			2	2	2	2	2	2	2	0	0	4	0	2	2	4	0	0
Lamiaceae	*Monardella breweri* ssp. *lanceolata*	Mustang mint		N			0	4	0	0	1	0	0	0	0	0	0	0	4	1	0	0
Lamiaceae	*Monardella villosa ssp obispoensis*	Coyote mint		N			0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Lamiaceae	*Salvia apiana*	White sage		N			0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0
Lamiaceae	*Salvia carduacea*	Thistle sage		N			3	0	3	1	0	3	0	0	0	0	0	0	0	3	3	3
Lamiaceae	*Salvia columbariae*	Chia		N			4	1	4	5	4	3	0	0	0	0	0	0	4	5	3	0
Lamiaceae	*Salvia leucophylla*	Purple sage		N			1	5	5	5	5	2	2	0	0	0	0	0	5	5	0	0
Lamiaceae	*Salvia mellifera*	Black sage		N			0	0	0	5	5	0	1	0	0	0	0	0	4	5	0	0
Lamiaceae	*Stachys albens*	White hedge nettle		N			0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0
Lamiaceae	*Trichostema lanceolatum*	Vinegar weed		N			2	2	0	0	0	0	0	0	0	0	0	5	2	4	0	0
Loasaceae	*Mentzelia affinis*	Yellow blazing star		N			3	0	3	0	0	3	0	0	0	3	0	3	0	3	3	3
Loasaceae	*Mentzelia pectinata*	San Joaquin blazing star		N			3	0	0	0	0	3	0	0	0	0	0	0	0	3	0	0

Table C-1: Plant Species of the CPER (Butterworth 2016)

							Relative Abundance in Habitat Elements[3]											Abundance in CPER Units[3]				
Family	**Scientific Name**	**Common Name**	**Status[1]**	**Native (N)/Exotic (E)**	**CA Endemic**	**Cal IPC[2]**	**Grassland**	**Oak W.**	**Juniper W.**	**Coastal Scrub**	**Chaparral**	**Desert Scrub**	**Riparian**	**Pond**	**Rocks**	**Wayside**	**Alkali**	**American**	**N. Chimineas**	**S. Chimineas**	**Elkhorn**	**Panorama**
Malvaceae	*Eremalche parryi* ssp. *kernensis*	Kern mallow	FE, CRPR 1B.1	N	✓		4	0	4	0	0	4	0	0	0	0	4	0	2	4	1	4
Malvaceae	*Malacothamnus jonesii*	Jones' bush mallow	CRPR 4.3	N	✓		0	1	1	5	3	0	2	0	0	0	0	0	1	5	0	0
Malvaceae	*Malva parviflora*	Cheeseweed		E			1	0	0	0	0	0	2	0	0	1	0	1	0	2	0	0
Malvaceae	*Malvella leprosa*	Alkali mallow		N			1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0
Montiaceae	*Calandrinia ciliata*	Red maids		N			5	0	1	2	1	1	0	0	0	0	0	2	4	5	2	2
Montiaceae	*Calyptridium monandrum*	Pussy paws		N			0	0	1	1	0	1	0	0	0	0	0	0	0	1	0	0
Montiaceae	*Claytonia parviflora* ssp. *viridis*	Green miner's lettuce		N			1	5	5	2	1	1	0	0	0	0	0	1	5	5	0	0
Montiaceae	*Claytonia perfoliata*	Miner's lettuce		N			1	4	5	5	5	1	0	0	0	0	0	2	5	5	0	0
Nyctaginaceae	*Abronia pogonantha*	Mojave sand verbena		N			0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0
Nyctaginaceae	*Mirabilis laevis* var. *crassifolia*	Wishbone bush		N			0	0	1	4	0	0	0	0	4	0	0	0	0	4	0	0
Oleaceae	*Forestiera pubescens*	Desert olive		N			0	0	0	0	0	0	4	0	0	0	0	1	0	4	0	0
Oleaceae	*Olea europaea*	Olive		E		L	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0
Onagraceae	*Camissonia campestris*	Mojave sun cup		N			3	0	3	3	0	1	1	0	0	0	0	3	1	3	4	3
Onagraceae	*Camissonia contorta*	Contorted sun cup		N			1	0	0	0	0	0	2	0	0	0	0	1	1	2	0	0
Onagraceae	*Camissoniopsis hirtella*	Hairy sun cup		N			0	0	0	0	1	1	0	0	0	0	0	0	1	1	0	0
Onagraceae	*Camissoniopsis ignota*	Jurupa Hills sun cup		N			0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0
Onagraceae	*Camissoniopsis intermedia*	Intermediate sun cup		N			0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0
Onagraceae	*Camissoniopsis micrantha*	Miniature sun cup		N			0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0
Onagraceae	*Clarkia cylindrica*	Speckled clarkia		N			2	4	2	2	2	2	0	0	0	0	0	0	4	5	0	0
Onagraceae	*Clarkia epilobioides*	Canyon clarkia		N			0	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0
Onagraceae	*Clarkia purpurea* ssp. *quadrivulnera*	Four-spot		N			5	4	0	4	2	1	0	0	0	0	0	2	5	5	0	0
Onagraceae	*Clarkia speciosa* ssp. *speciosa*	Redspot clarkia		N			0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0
Onagraceae	*Clarkia tembloriensis* ssp. *tembloriensis*	Temblor Range clarkia		N			1	0	0	0	0	1	0	0	1	0	0	1	0	2	0	0
Onagraceae	*Clarkia unguiculata*	Elegant clarkia		N			0	2	0	0	0	0	0	0	1	0	0	0	2	1	0	0
Onagraceae	*Epilobium canum* ssp. *canum*	California fuschia		N			0	2	0	2	0	0	2	0	2	0	0	0	2	2	0	0

Table C-1: Plant Species of the CPER (Butterworth 2016)

Family	Scientific Name	Common Name	Status[1]	Native (N)/Exotic (E)	CA Endemic	Cal IPC[2]	Relative Abundance in Habitat Elements[3]											Abundance in CPER Units[3]				
							Grassland	Oak W.	Juniper W.	Coastal Scrub	Chaparral	Desert Scrub	Riparian	Pond	Rocks	Wayside	Alkali	American	N. Chimineas	S. Chimineas	Elkhorn	Panorama
Onagraceae	*Eremothera boothii* ssp. *decorticans*	Shredding evening primrose		N			4	0	0	2	0	2	0	0	0	0	0	0	1	5	0	0
Onagraceae	*Eulobus californicus*	California sun cup		N			1	0	0	1	0	3	1	0	0	0	0	1	1	3	0	0
Onagraceae	*Oenothera californica*	California primrose		N			0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0
Onagraceae	*Tetrapteron graciliflorum*	Hill sun cup		N			0	1	1	0	0	0	0	1	0	1	0	0	1	1	0	0
Onagraceae	*Tetrapteron palmeri*	Palmer's sun cup		N			0	0	1	0	0	1	0	0	0	0	0	0	0	1	0	3
Orobanchaceae	*Castilleja attenuata*	Valley tassels		N			1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0
Orobanchaceae	*Castilleja brevistyla*	Short-style owl's clover		N			1	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
Orobanchaceae	*Castilleja densiflora*	Dense-flower owl's clover		N			1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Orobanchaceae	*Castilleja densiflora* ssp. *densiflora*	Dense-flower owl's clover		N			1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Orobanchaceae	*Castilleja exserta* ssp. *exserta*	Purple owl's clover		N			5	1	5	5	1	5	1	0	0	0	0	5	5	5	0	2
Orobanchaceae	*Castilleja foliolosa*	Woolly paintbrush		N			0	0	0	4	0	0	0	0	0	0	0	0	0	4	0	0
Orobanchaceae	*Castilleja minor* ssp. *spiralis*	Lesser paintbrush		N			0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0
Orobanchaceae	*Castilleja plagiotoma*	Mojave paintbrush	CRPR 4.3	N	✓		0	0	0	0	0	1	0	0	0	0	0	0	0	3	0	0
Orobanchaceae	*Castilleja subinclusa* ssp. *subinclusa*	Long-leaf paintbrush		N			0	1	1	4	0	0	0	0	0	0	0	2	4	4	0	0
Orobanchaceae	*Cordylanthus rigidus* ssp. *rigidus*	Rigid bird's beak		N			0	1	1	1	0	0	0	0	0	1	0	0	1	2	0	0
Orobanchaceae	*Orobanche sp.*	Broomrape		N			0	0	0	1	0	0	0	0	0	1	0	1	0	1	0	0
Orobanchaceae	*Triphysaria micrantha*	Purple-beak owl's clover		N			1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Papaveraceae	*Argemone munita*	Chicalote		N			0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Papaveraceae	*Eschscholzia californica*	California poppy		N			5	0	0	4	0	2	0	0	0	0	0	5	5	5	0	0
Papaveraceae	*Eschscholzia lemmonii*	Lemmon's poppy		N			4	0	0	4	0	4	0	0	0	0	0	0	0	5	0	0
Papaveraceae	*Papaver heterophyllum*	Wind poppy		N			2	0	0	2	1	1	0	0	0	0	0	1	1	2	0	0
Papaveraceae	*Platystemon californicus*	Cream cups		N			2	0	2	2	0	2	0	0	0	0	0	2	2	2	0	0
Phrymaceae	*Mimulus aurantiacus*	Sticky monkey flower		N			0	1	0	0	0	0	0	0	1	0	0	0	1	0	0	0
Phrymaceae	*Mimulus fremontii*	Fremont's monkeyflower		N			0	0	1	0	1	0	0	0	0	0	0	0	0	1	0	0
Phrymaceae	*Mimulus guttatus*	Seep monkey flower		N			0	0	0	0	0	0	5	0	0	0	0	0	5	1	0	0
Plantaginaceae	*Antirrhinum ovatum*	Oval-leaved snapdragon	CRPR 4.2	N	✓		1	0	1	0	0	0	0	0	0	0	0	1	1	1	0	0

Table C-1: Plant Species of the CPER (Butterworth 2016)

							Relative Abundance in Habitat Elements[3]											Abundance in CPER Units[3]				
Family	Scientific Name	Common Name	Status[1]	Native (N)/Exotic (E)	CA Endemic	Cal IPC[2]	Grassland	Oak W.	Juniper W.	Coastal Scrub	Chaparral	Desert Scrub	Riparian	Pond	Rocks	Wayside	Alkali	American	N. Chimineas	S. Chimineas	Elkhorn	Panorama
Plantaginaceae	*Collinsia bartsiifolia*	White blue-eyed Mary		N			0	0	1	0	1	2	0	0	0	0	0	0	0	2	0	0
Plantaginaceae	*Collinsia heterophylla*	Chinese houses		N			0	4	4	0	4	0	0	0	0	0	0	0	4	4	0	0
Plantaginaceae	*Collinsia sparsiflora* var. *collina*	Hillside collinsia		N			3	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0
Plantaginaceae	*Keckiella breviflora* var. *breviflora*	Gaping keckiella		N			0	1	1	0	0	0	0	0	1	0	0	0	1	1	0	0
Plantaginaceae	*Keckiella cordifolia*	Heart-leaf keckiella		N			0	1	1	0	0	0	0	0	1	0	0	0	1	1	0	0
Plantaginaceae	*Penstemon centranthifolius*	Scarlet bugler		N			0	3	3	0	0	0	1	0	0	0	0	0	0	3	0	0
Plantaginaceae	*Penstemon heterophyllus var heterophyllus*	Foothill penstemon		N			0	2	2	0	0	0	0	0	0	0	0	0	2	2	0	0
Plantaginaceae	*Plantago elongata*	Long-leaf plantain		N			0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0
Plantaginaceae	*Plantago erecta*	California plantain		N			5	0	1	5	1	5	1	0	0	0	0	5	5	5	0	0
Plantaginaceae	*Plantago lanceolata*	English plantain		E		L	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0
Plantaginaceae	*Plantago ovata*	Desert plantain		N			0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0
Plantaginaceae	*Veronica anagallis-aquatica*	Water speedwell		E			0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0
Plantaginaceae	*Veronica persica*	Persian speedwell		E			1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Polemoniaceae	*Allophyllum gilioides* ssp. *violaceum*	Dense false gilia		N			0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0
Polemoniaceae	*Eriastrum densifolium*	Giant woolly star		N			0	0	1	0	0	3	3	0	0	0	0	0	0	3	0	0
Polemoniaceae	*Eriastrum hooveri*	Hoover's eriastrum	CRPR 4.2, delisted	N	✓		0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0
Polemoniaceae	*Eriastrum pluriflorum*	Many-flowered eriastrum		N			0	0	2	0	0	2	0	0	0	0	0	0	1	2	2	0
Polemoniaceae	*Eriastrum wilcoxii*	Wilcox's eriastrum		N			0	0	0	0	1	0	0	0	0	1	0	0	1	1	0	0
Polemoniaceae	*Gilia achilleifolia* ssp. *achilleifolia*	Calif. gilia		N			1	0	0	2	0	0	0	0	0	1	0	0	0	2	0	0
Polemoniaceae	*Gilia clivorum*	Purple-spot gilia		N			5	4	2	4	0	0	1	0	0	0	0	2	4	5	0	0
Polemoniaceae	*Gilia jacens*	Nevada gilia		N			0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0
Polemoniaceae	*Gilia latiflora* ssp. *cuyamensis*	Cuyama gilia	CRPR 4.3	N	✓		0	0	3	0	0	3	0	0	0	0	0	0	0	3	0	0
Polemoniaceae	*Gilia malior*	Scrub gilia		N			0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0
Polemoniaceae	*Gilia minor*	Little gilia		N			0	0	0	2	0	2	0	0	0	0	0	1	1	2	1	0

Table C-1: Plant Species of the CPER (Butterworth 2016)

							Relative Abundance in Habitat Elements[3]											Abundance in CPER Units[3]				
Family	Scientific Name	Common Name	Status[1]	Native (N)/Exotic (E)	CA Endemic	Cal IPC[2]	Grassland	Oak W.	Juniper W.	Coastal Scrub	Chaparral	Desert Scrub	Riparian	Pond	Rocks	Wayside	Alkali	American	N. Chimineas	S. Chimineas	Elkhorn	Panorama
Polemoniaceae	*Gilia tenuiflora* ssp. *tenuiflora*	Slender-flowered gilia		N			0	0	1	0	1	0	0	0	0	0	0	0	1	1	0	0
Polemoniaceae	*Gilia tricolor* ssp. *diffusa*	Bird's-eye gilia		N			1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Polemoniaceae	*Leptosiphon ciliatus*	Whisker brush		N			0	4	0	0	0	0	0	0	0	0	0	0	4	0	0	0
Polemoniaceae	*Leptosiphon liniflorus*	Narrow flax flower		N			4	4	0	0	0	0	2	0	0	0	0	2	4	4	2	4
Polemoniaceae	*Leptosiphon parviflorus*	Variable linanthus		N			0	4	4	2	2	0	0	0	0	0	0	0	2	5	0	0
Polemoniaceae	*Linanthus dichotomus*	Evening snow		N			1	2	0	0	0	2	0	0	0	0	0	0	1	2	1	0
Polemoniaceae	*Loeseliastrum schottii*	Schott's calico		N			0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0
Polemoniaceae	*Microsteris gracilis*	Slender phlox		N			2	4	1	2	0	1	1	0	0	0	0	4	4	5	1	0
Polemoniaceae	*Navarretia atractyloides*	Holly-leaf navarretia		N			0	0	0	0	2	0	0	0	0	0	0	0	2	2	0	0
Polemoniaceae	*Navarretia mitracarpa*	Paso Robles navarretia	CRPR 4.3	N	✓		5	5	1	5	0	0	0	0	0	0	0	0	5	2	0	0
Polygonaceae	*Chorizanthe membranacea*	Pink spineflower		N			2	1	0	0	0	0	0	0	0	0	0	0	0	2	0	0
Polygonaceae	*Chorizanthe obovata*	Spoon-sepal spineflower		N			0	2	0	1	0	0	0	0	0	0	0	0	2	1	0	0
Polygonaceae	*Chorizanthe uniaristata*	One-awn spineflower		N			0	1	3	0	0	1	1	0	0	0	0	0	1	3	5	1
Polygonaceae	*Chorizanthe xanti* var. *xanti*	Pinyon spineflower		N			1	1	4	4	1	4	0	0	0	0	0	1	4	4	4	0
Polygonaceae	*Eriogonum angulosum*	Angle-stem buckwheat		N			2	0	2	0	0	2	0	0	0	2	0	0	0	2	0	0
Polygonaceae	*Eriogonum baileyi*	Bailey's wild buckwheat		N			0	1	0	0	0	3	0	0	0	0	0	0	1	3	0	0
Polygonaceae	*Eriogonum cithariforme* var. *cithariforme*	Cithara wild buckwheat		N			0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0
Polygonaceae	*Eriogonum clavatum*	Hoover's desert trumpet		N			4	0	0	0	0	1	0	0	0	0	0	4	1	3	0	0
Polygonaceae	*Eriogonum covilleanum*	Coville's wild buckwheat		N			0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0
Polygonaceae	*Eriogonum elongatum* var. *elongatum*	Long-stem wild buckwheat		N			5	5	5	5	0	4	1	0	0	0	0	5	5	5	0	0
Polygonaceae	*Eriogonum fasciculatum* var. *polifolium*	Mojave Desert California buckwheat		N			4	5	5	5	5	5	5	0	5	0	0	4	5	5	4	4
Polygonaceae	*Eriogonum gossypinum*	Cottony buckwheat	CRPR 4.2	N	✓		0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	3
Polygonaceae	*Eriogonum gracillimum*	Rose-and-white wild buckwheat		N			1	0	1	0	0	1	1	0	0	0	0	1	0	2	5	2

Table C-1: Plant Species of the CPER (Butterworth 2016)

							Relative Abundance in Habitat Elements[3]											Abundance in CPER Units[3]				
Family	Scientific Name	Common Name	Status[1]	Native (N)/Exotic (E)	CA Endemic	Cal IPC[2]	Grassland	Oak W.	Juniper W.	Coastal Scrub	Chaparral	Desert Scrub	Riparian	Pond	Rocks	Wayside	Alkali	American	N. Chimineas	S. Chimineas	Elkhorn	Panorama
Polygonaceae	*Eriogonum maculatum*	Spotted wild buckwheat		N			0	0	0	0	0	1	0	0	0	0	0	1	0	2	0	0
Polygonaceae	*Eriogonum nudum*	Naked buckwheat		N			5	5	4	4	0	0	0	0	0	0	0	4	5	4	0	0
Polygonaceae	*Eriogonum roseum*	Wand wild buckwheat		N			0	4	0	0	0	0	4	0	0	0	0	0	4	1	0	0
Polygonaceae	*Eriogonum viridescens*	Two-toothed wild buckwheat		N			0	0	1	0	0	4	0	0	0	1	0	0	0	1	5	3
Polygonaceae	*HolCRPReria lanata*	False spikeflower		N			2	0	2	1	0	2	0	0	0	0	0	1	2	2	5	0
Polygonaceae	*Lastarriaea coriacea*	Leather spineflower		N			3	0	0	3	0	3	0	0	0	0	0	1	0	3	4	0
Polygonaceae	*Mucronea perfoliata*	Perfoliate spineflower		N			0	0	4	1	1	2	0	0	0	0	0	0	0	4	4	0
Polygonaceae	*Polygonum aviculare* ssp. *depressum*	Prostrate knotweed		E			0	0	0	0	0	0	0	1	0	1	0	0	1	0	0	0
Polygonaceae	*Pterostegia drymarioides*	Woodland threadstem		N			0	1	4	4	2	1	0	0	4	0	0	1	4	4	0	0
Polygonaceae	*Rumex crispus*	Curly dock		E			0	0	0	0	0	0	4	0	0	0	0	0	4	0	0	0
Polygonaceae	*Rumex hymenosepalus*	Wild rhubarb		N			0	0	1	0	0	1	0	0	0	0	0	0	0	1	0	0
Polygonaceae	*Rumex salicifolius*	Willow dock		N			0	1	0	0	0	0	4	0	0	0	0	0	4	2	0	0
Primulaceae	*Androsace elongata ssp acuta*	California androsace	CRPR 4.2	N			0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Primulaceae	*Dodecatheon clevelandii*	Padre's shooting star		N			5	5	5	5	1	0	0	0	0	0	0	0	5	5	0	0
Ranunculaceae	*Clematis lasiantha*	Chaparral clematis		N			0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Ranunculaceae	*Clematis ligusticifolia*	Western virgin's bower		N			1	0	0	0	0	0	1	1	0	0	0	0	1	0	0	0
Ranunculaceae	*Delphinium gypsophilum*	Gypsum-loving larkspur	CRPR 4.2	N	✓		1	0	3	1	0	4	0	0	0	0	0	1	1	3	0	0
Ranunculaceae	*Delphinium hesperium ssp pallescens*	Pale-flowered western larkspur		N	✓		4	0	4	4	0	0	0	0	0	0	0	0	0	4	0	0
Ranunculaceae	*Delphinium parryi*	Parry's larkspur		N			2	2	0	1	0	0	0	0	0	0	0	0	2	2	0	0
Ranunculaceae	*Delphinium parryi* ssp. *parryi*	Parry's larkspur		N			2	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
Ranunculaceae	*Delphinium recurvatum*	Recurved larkspur	CRPR 1B.2	N	✓		0	0	0	0	0	4	0	0	0	0	0	4	0	0	0	0
Ranunculaceae	*Delphinium umbraculorum*	Umbrella larkspur	CRPR 1B.3	N	✓		0	3	0	1	3	0	0	0	3	0	0	0	3	3	0	0
Ranunculaceae	*Delphinium umbraculorum/parryi*	Larkspur		N			0	1	0	0	0	0	0	0	1	0	0	0	0	1	0	0
Ranunculaceae	*Myosurus minimus*	Little mousetail		N			1	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0
Ranunculaceae	*Ranunculus hebecarpus*	Delicate buttercup		N			0	1	1	0	1	0	0	0	0	0	0	0	1	0	0	0

Table C-1: Plant Species of the CPER (Butterworth 2016)

Family	Scientific Name	Common Name	Status[1]	Native (N)/Exotic (E)	CA Endemic	Cal IPC[2]	Relative Abundance in Habitat Elements[3]											Abundance in CPER Units[3]				
							Grassland	Oak W.	Juniper W.	Coastal Scrub	Chaparral	Desert Scrub	Riparian	Pond	Rocks	Wayside	Alkali	American	N. Chimineas	S. Chimineas	Elkhorn	Panorama
Rhamnaceae	*Ceanothus cuneatus* var. *cuneatus*	Buck brush		N			0	4	0	0	5	0	0	0	0	0	0	0	5	4	0	0
Rhamnaceae	*Rhamnus ilicifolia*	Holly-leaf redberry		N			0	4	4	1	4	0	2	0	0	0	0	0	4	4	0	0
Rosaceae	*Adenostoma fasciculatum*	Chamise		N			0	5	0	1	5	1	0	0	0	0	0	0	5	5	0	0
Rosaceae	*Adenostoma sparsifolium*	Red shank		N			0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0
Rosaceae	*Aphanes occidentalis*	Lady's mantle		N			0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0
Rosaceae	*Cercocarpus betuloides* var. *betuloides*	Birch-leaf mountain mahogany		N			0	5	0	1	5	0	0	0	0	0	0	0	5	1	0	0
Rosaceae	*Heteromeles arbutifolia*	Toyon		N			0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0
Rosaceae	*Prunus fasciculata* var. *fasciculata*	Desert almond		N			0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0
Rosaceae	*Prunus ilicifolia* ssp. *ilicifolia*	Holly-leaf cherry		N			0	4	0	0	1	0	0	0	1	0	0	0	4	1	0	0
Rosaceae	*Rosa californica*	California rose		N			0	1	0	0	0	0	1	0	0	0	0	0	1	0	0	0
Rubiaceae	*Galium andrewsii*	Phlox-leaved bedstraw		N			0	4	4	0	4	0	0	0	0	0	0	0	4	4	0	0
Rubiaceae	*Galium angustifolium*	Narrow-leaf bedstraw		N			0	1	1	0	1	0	0	0	0	0	0	0	1	1	0	0
Rubiaceae	*Galium aparine*	Goose grass		N			0	3	1	1	1	0	0	0	0	0	0	1	3	1	0	0
Salicaceae	*Populus fremontii* ssp. *fremontii*	Fremont cottonwood		N			0	0	0	0	0	0	4	0	0	0	0	1	3	4	0	0
Salicaceae	*Salix exigua*	Narrow-leaf willow		N			0	0	0	0	0	0	5	1	0	0	0	0	0	5	0	0
Salicaceae	*Salix gooddingii*	Gooding's black willow		N			1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Salicaceae	*Salix laevigata*	Red willow		N			0	0	0	0	0	0	3	1	0	0	0	0	3	0	0	0
Salicaceae	*Salix lasiolepis*	Arroyo willow		N			0	0	0	0	0	0	4	3	0	0	0	0	4	4	0	0
Saxifragaceae	*Lithophragma cymbalaria*	Mission woodland star		N			0	1	1	0	0	1	0	0	0	0	0	0	0	1	0	0
Saxifragaceae	*Lithophragma parviflorum* var. *parviflorum*	Small-flower woodland star		N			0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Saxifragaceae	*Micranthes californica*	California saxifrage		N			0	2	0	0	0	0	0	0	0	0	0	0	2	2	0	0
Simaroubaceae	*Ailanthus altissima*	Tree of heaven		E			0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0
Solanaceae	*Datura wrightii*	Jimson weed		N			4	1	0	0	0	0	0	0	0	4	0	1	4	4	0	0
Solanaceae	*Lycium andersonii*	Anderson's desert thorn		N			0	0	0	0	0	2	0	0	0	0	0	0	0	0	3	1
Solanaceae	*Nicotiana glauca*	Tree tobacco		E		M	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0

Table C-1: Plant Species of the CPER (Butterworth 2016)

Family	Scientific Name	Common Name	Status[1]	Native (N)/Exotic (E)	CA Endemic	Cal IPC[2]	Relative Abundance in Habitat Elements[3]											Abundance in CPER Units[3]				
							Grassland	Oak W.	Juniper W.	Coastal Scrub	Chaparral	Desert Scrub	Riparian	Pond	Rocks	Wayside	Alkali	American	N. Chimineas	S. Chimineas	Elkhorn	Panorama
Solanaceae	*Nicotiana quadrivalvis*	Indian tobacco		N			3	0	1	0	0	0	0	1	0	0	0	3	3	3	0	0
Solanaceae	*Solanum umbelliferum*	Blue-witch nightshade		N			1	0	0	2	0	0	1	0	0	0	0	1	0	2	0	0
Solanaceae	*Solanum xanti*	Nightshade		N			1	0	0	1	1	0	0	0	0	0	0	0	0	1	0	0
Tamaricaceae	*Tamarix aphylla*	Athel		E		L	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Tamaricaceae	*Tamarix ramosissima*	Saltcedar		E		H	0	0	0	0	0	0	5	2	0	0	0	0	1	5	0	0
Urticaceae	*Hesperocnide tenella*	Western nettle		N			0	3	3	0	0	0	0	0	3	1	0	0	3	3	0	0
Urticaceae	*Urtica dioica* ssp. *holosericea*	Hoary nettle		N			0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0
Valerianaceae	*Plectritis ciliosa*	Long-spurred plectritis		N			0	2	0	0	1	1	1	0	0	0	0	0	2	2	0	0
Verbenaceae	*Verbena bracteata*	Big-bract verbena		N			0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0
Verbenaceae	*Verbena lasiostachys* var. *lasiostachys*	Western vervain		N			0	1	0	0	0	0	2	2	0	0	0	0	2	2	0	0
Violaceae	*Viola douglasii*	Douglas violet		N			2	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
Violaceae	*Viola purpurea*	Mountain violet		N			0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0
Viscaceae	*Phoradendron bolleanum*	Bollean mistletoe		N			0	0	4	0	0	0	0	0	0	0	0	0	4	4	0	0
Viscaceae	*Phoradendron serotinum* ssp. *macrophyllum*	Big-leaf mistletoe		N			0	0	0	0	0	0	1	0	0	1	0	0	1	1	0	0
Viscaceae	*Phoradendron serotinum* ssp. *tomentosum*	Pacific mistletoe		N			0	4	0	0	0	0	0	0	0	0	0	0	4	4	0	0
																	0					
Monocots																	0					
Agavaceae	*Chlorogalum pomeridianum* var. *pomeridianum*	Wavy-leaf soap plant		N			0	2	0	2	2	0	0	0	0	1	0	0	2	1	0	0
Agavaceae	*Hesperoyucca whipplei*	Chaparral yucca		N			1	4	4	5	2	4	0	0	0	0	0	0	5	5	0	0
Alliaceae	*Allium peninsulare*	Mexicali onion		N			1	2	0	4	0	2	0	0	0	0	0	2	0	4	0	0
Araceae	*Lemna gibba*	Gibbous duckweed		N			0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0
Cyperaceae	*Bolboschoenus maritimus* ssp. *paludosus*	Alkali bulrush		N			0	0	0	0	0	0	2	1	0	0	0	0	0	2	0	0

Table C-1: Plant Species of the CPER (Butterworth 2016)

							Relative Abundance in Habitat Elements[3]											Abundance in CPER Units[3]				
Family	**Scientific Name**	**Common Name**	**Status[1]**	**Native (N)/Exotic (E)**	**CA Endemic**	**Cal IPC[2]**	**Grassland**	**Oak W.**	**Juniper W.**	**Coastal Scrub**	**Chaparral**	**Desert Scrub**	**Riparian**	**Pond**	**Rocks**	**Wayside**	**Alkali**	**American**	**N. Chimineas**	**S. Chimineas**	**Elkhorn**	**Panorama**
Cyperaceae	*Eleocharis macrostachya*	Common spike rush		N			0	0	0	0	0	0	5	1	0	0	0	0	5	4	0	0
Cyperaceae	*Eleocharis parishii*	Parish's spike rush		N			0	0	0	0	0	0	5	0	0	0	0	0	5	4	0	0
Cyperaceae	*Schoenoplectus americanus*	Olney's 3-square bulrush		N			0	0	0	0	0	0	5	0	0	0	0	0	0	5	0	0
Cyperaceae	*Schoenoplectus pungens* ssp. *longspicatus*	Common 3-square bulrush		N			0	0	0	0	0	0	5	0	0	0	0	0	1	5	0	0
Juncaceae	*Juncus balticus* ssp. *ater*	Baltic rush		N			0	0	0	0	0	0	5	0	0	0	0	0	5	0	0	0
Juncaceae	*Juncus bufonius*	Toad rush		N			0	0	0	0	0	0	5	0	0	0	0	0	5	4	0	0
Juncaceae	*Juncus mexicanus*	Mexican rush		N			0	0	0	0	0	0	4	1	0	0	0	1	4	4	0	0
Juncaceae	*Juncus textilis*	Basket rush		N			0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0
Juncaceae	*Juncus xiphioides*	Iris-leaf rush		N			0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0
Liliaceae	*Calochortus clavatus*	Club-haired mariposa		N			0	0	1	1	0	0	0	0	0	0	0	0	0	1	0	0
Liliaceae	*Calochortus simulans*	La Panza mariposa lily	CRPR 1B.3	N	✓		0	1	0	4	1	0	0	0	3	0	0	0	4	4	0	0
Liliaceae	*Calochortus splendens*	Splendid mariposa		N			0	0	3	3	0	1	0	0	0	1	0	3	3	3	0	0
Liliaceae	*Calochortus venustus*	Butterfly mariposa		N			0	1	1	1	0	1	0	0	1	0	0	4	1	1	0	0
Liliaceae	*Fritillaria agrestis*	stinkbells		N			0	0	1	0	1	0	0	0	0	0	0	1	0	1	0	0
Melanthiaceae	*Toxicoscordion sp.*	Death camas		N			0	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0
Poaceae	*Agrostis exarata*	Spike bent grass		N			0	0	0	0	0	0	1	1	0	0	0	0	0	1	0	0
Poaceae	*Avena barbata*	Slender wild oat		E		M	5	0	1	5	1	1	1	0	0	0	0	5	5	5	0	0
Poaceae	*Avena fatua*	Wild oat		E		M	5	1	0	5	0	1	1	0	0	0	0	5	5	5	0	0
Poaceae	*Bromus arenarius*	Australian chess		E			0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0
Poaceae	*Bromus berteroanus*	Chilean chess		E			0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Poaceae	*Bromus diandrus*	Ripgut grass		E		M	5	5	2	2	0	0	4	0	0	0	0	4	5	5	1	0
Poaceae	*Bromus hordeaceus*	Soft chess		E			5	5	5	5	5	2	5	0	0	0	0	5	5	5	0	0
Poaceae	*Bromus madritensis* ssp. *rubens*	Red brome		E		H	5	5	5	5	5	5	5	0	0	5	0	5	5	5	2	5
Poaceae	*Bromus tectorum*	Cheat grass		E			2	4	0	0	0	0	0	0	0	0	0	2	4	2	0	0
Poaceae	*Crypsis schoenoides*	Swamp prickle grass		E			0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0
Poaceae	*Deschampsia danthonioides*	Annual hairgrass		N			0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0

Table C-1: Plant Species of the CPER (Butterworth 2016)

Family	Scientific Name	Common Name	Status[1]	Native (N)/Exotic (E)	CA Endemic	Cal IPC[2]	Relative Abundance in Habitat Elements[3]											Abundance in CPER Units[3]				
							Grassland	Oak W.	Juniper W.	Coastal Scrub	Chaparral	Desert Scrub	Riparian	Pond	Rocks	Wayside	Alkali	American	N. Chimineas	S. Chimineas	Elkhorn	Panorama
Poaceae	*Distichlis spicata*	Salt grass		N			2	1	0	0	0	2	5	5	0	0	0	2	2	5	0	0
Poaceae	*Elymus condensatus*	Giant wildrye		N			0	1	1	2	0	0	0	0	0	0	0	0	0	2	0	0
Poaceae	*Elymus multisetus*	Big squirreltail		N			3	0	0	1	0	0	0	0	0	0	0	1	3	0	0	0
Poaceae	*Elymus triticoides*	Beardless wildrye		N			0	1	0	0	0	0	5	0	0	0	0	2	5	2	0	0
Poaceae	*Festuca bromoides*	Brome fescue		E		NR	1	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0
Poaceae	*Festuca microstachys*	Small fescue		N			5	5	2	4	0	5	0	0	0	0	0	5	5	5	2	5
Poaceae	*Festuca myuros*	Rattail sixweeks grass		E			5	5	5	5	2	0	5	0	0	0	0	5	5	5	0	0
Poaceae	*Hordeum brachyantherum* ssp. *californicum*	Calif. barley		N			0	0	0	0	0	0	1	0	0	0	0	1	1	1	0	0
Poaceae	*Hordeum marinum* ssp. *gussoneanum*	Mediterranean barley		E			0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
Poaceae	*Hordeum murinum*	Wall barley		E			5	5	0	2	0	5	4	0	0	5	0	2	5	5	2	4
Poaceae	*Koeleria gerardii*	Annual June grass		E			0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0
Poaceae	*Lamarckia aurea*	Goldentop		E			0	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0
Poaceae	*Melica californica*	California melic		N			0	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0
Poaceae	*Melica imperfecta*	Little Calif. melic		N			0	2	1	0	2	0	0	0	0	0	0	0	2	2	0	0
Poaceae	*Melica torreyana*	Torrey's melic		N			1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Poaceae	*Muhlenbergia rigens*	Deer grass		N			0	1	0	0	0	0	2	0	0	0	0	0	2	1	0	0
Poaceae	*Phalaris aquatica*	Harding grass		E		M	1	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0
Poaceae	*Phragmites australis*	Common reed		N			0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0
Poaceae	*Poa bulbosa*	Bulbous bluegrass		E			5	0	0	1	0	0	0	0	0	0	0	5	1	0	0	0
Poaceae	*Poa secunda* ssp. *secunda*	One-sided bluegrass		N			5	5	5	5	5	5	1	0	0	0	0	5	5	5	4	5
Poaceae	*Polypogon monspeliensis*	Rabbitfoot grass		E			0	0	0	0	0	0	5	5	0	0	0	2	5	5	0	0
Poaceae	*Schismus arabicus*	Mediterranean grass		E			5	0	2	4	0	2	1	0	0	0	0	0	2	5	2	5
Poaceae	*Schismus barbatus*	Common Mediterranean grass		E			2	0	0	1	1	1	0	0	0	0	0	2	1	2	0	4
Poaceae	*Sporobolus airoides*	Alkali sacaton		N			0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0

Table C-1: Plant Species of the CPER (Butterworth 2016)

							Relative Abundance in Habitat Elements[3]											Abundance in CPER Units[3]				
Family	**Scientific Name**	**Common Name**	**Status[1]**	**Native (N)/Exotic (E)**	**CA Endemic**	**Cal IPC[2]**	**Grassland**	**Oak W.**	**Juniper W.**	**Coastal Scrub**	**Chaparral**	**Desert Scrub**	**Riparian**	**Pond**	**Rocks**	**Wayside**	**Alkali**	**American**	**N. Chimineas**	**S. Chimineas**	**Elkhorn**	**Panorama**
Poaceae	*Stipa cernua*	Nodding needle grass		N			5	5	0	5	1	1	0	0	0	0	0	5	5	5	0	0
Poaceae	*Stipa speciosa*	Desert needle grass		N			0	0	4	3	0	4	0	0	0	0	0	0	3	4	1	0
Themidaceae	*Bloomeria crocea*	Common goldenstar		N			2	0	0	2	0	0	0	0	0	0	0	0	2	2	0	0
Themidaceae	*Brodiaea terrestris*ssp. *terrestris*	Dwarf brodiaea		N			1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Themidaceae	*Dichelostemma capitatum*	Blue dicks		N			5	5	2	5	2	5	0	0	0	0	0	5	5	5	1	1
Themidaceae	*Muilla maritima*	Common muilla		N			2	0	1	1	0	1	0	0	0	0	0	2	1	2	0	0
Typhaceae	*Typha domingensis*	Southern cattail		N			0	0	0	0	0	0	5	1	0	0	0	2	5	5	0	0

[1] California Rare Plant Rank Designations:

CRPR 1A = Plants presumed extinct in California

CRPR 1B = Most plants in this category are endemic to California and have experienced significant declines over several decades; these plants are rare, threatened, or endangered throughout California and elsewhere.

CRPR 2 = Species that are common outside of California, but rare, threatened, or endangered within California.

CRPR 3 = A review CRPR of species for which necessary information is not available to either categorize in one of the other rankings or to reject outright.

List 4 = "Watch List" plants with limited distribution or infrequent presence throughout California. Populations of these species may exist along the perimeter of the species' range, may have declined significantly in specific locations within its range, may exhibit unique morphology, or occur on uncommon substrates.

Decimals after any of the "Status" categories represent a "Threat Rank" (e.g., "CRPR 1B.1"):

0.1 = Seriously threatened populations in California, where over 80% of occurrences are threatened

0.2 = Marginally threatened populations in California, where between 20% and 80% of occurrences are threatened

0.3 = Populations with limited threats, where fewer than 20% of occurrences are threatened or with no known current threats

Federal Status Designations:

FE = Federally Endangered. Species in danger of extinction throughout all or significant portions of its range.

FT = Federally Threatened. Species likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

State Status Designations:

SE = State Endangered. Species whose continued existence in California is jeopardized.
ST = State Threatened. Species, although not presently threatened with extinction, may become endangered in the foreseeable future.

[2] "Cal IPC Ranking" refers to plant species invasiveness. Cal IPC Ranking categories include:

H = High. Species that tend to be widely distributed and are adapted to disperse and establish at relatively moderate or high rates. These species can severely affect vegetation structure, plant and animal communities, as well as physical processes within the environments in which they occur. These species are wide distributed across a variety of ecosystems.

M = Moderate. Species whose establishment within an ecosystem is generally dependent on ecological disturbance, although they disperse at moderate or high rates. Impacts are not as severe as those caused by species in the "High" ranking, but impacts can still be substantial and apparent on the physical processes, vegetation structure, and plant and animal communities within an ecosystem. Distribution of these species can vary between limited and widespread.

L = Limited. Species with low to moderate rates of dispersal and establishment. Although invasive, their impacts on ecological processes tend to be limited, or there may not be enough information to recharacterize these species within a higher ranking. Ecological distribution tends to be limited, but can be persistent and problematic locally.

NR = No Rank. The Cal IPC evaluation for plant species within this category either lacked sufficient information to assign a rating or the available information indicated that the species does not have significant impacts at the time of evaluation. This rank is equivalent to "Eval No List".

NNR = Nominated Not Reviewed. Species that were nominated for review by the Cal IPC, but were not evaluated either due to insufficient information to conduct an evaluation or to nominated species not being known to escape into the wild.

[3] Relative Abundance (from Butteworth 2012):

5 = Nearly always occurs in appropriate habitats in moderate to large numbers
4 = Usually occurs in appropriate habitats in small numbers
3 = Expected in appropriate habitats, but in very small numbers
2 = Occasional and/or patchy presence
1 = Rare, often with one or two occurrences
0 = Not present (or not expected to be present)
U = Unknown or insufficient data
N/A = Not applicable

Appendix D
Animal Species

Appendix D Animal Species

Table D-1 lists vertebrate species known or likely to occur within the Carrizo Plains Ecological Reserve. It was developed based upon surveys conducted by the Department independently and in coordination with other agencies and organizations, including surveys conducted as part of the Department's Resource Assessment Program since 2007, and educational field trips and workshops conducted by the Wildlife Society among other groups. The list will be updated by the Department, as resources allow, to reflect new species observed within the property, and address changes in taxonomy or nomenclature.

The following briefly summarizes some of the main techniques that the Department has used to inventory and monitor vertebrate species, which have been supplemented by incidental observations made by Department biologists and others while on the Reserve. All observations of special-status species have been recorded in a spatial database.

D.1 General Surveys

D.1.1 Wildlife Visual Encounter Surveys

The Department conducted visual encounter surveys (VES) in grazed and ungrazed grasslands of the Chimineas units from May 27 to July 4, 2005. Forty-three north-south transects, each of which was 0.5 miles in length, were walked throughout the grasslands, and observations of birds, reptiles, and mammals and their sign including dens, scats, tracks, and roost signs were recorded. Surveys were conducted in the morning, and were concluded when ambient temperature reached 90° F, per protocol.

D.1.2 Avian Point Counts

The Department conducted avian point counts on portions of the CPER between 2005 and 2016 using protocols developed by Point Reyes Bird Observatory (PRBO; Ballard et al. 2003). In 2005, point counts were conducted on grasslands of the Chimineas units between April 20 and May 24 where 33 points were randomly located in ungrazed (CRP) grassland and an additional 31 points were randomly located in grazed grassland. Surveys were conducted for 20 minutes at each point. Between May 4 and June 2, 2006, point counts were conducted in juniper woodland (n=50) and riparian (n=28) communities along the Cuyama River within the South Chimineas Unit. Each point was surveyed for 5 minutes.

Between March 24 and June 22, 2007, point count surveys were conducted at 244 points located throughout the Chimineas and American units. Points were placed at 500 m intervals along internal, unpaved roads, with the sampling point at the edge of the road. Points were placed 250-300 m apart along the Cuyama River to more intensively sample riparian communities. Each point was permanently marked with a metal stake and numbered tag to enable re-sampling. Each point was surveyed once, 133 points were surveyed a second time, and 14 were surveyed three times. Survey duration at each point was 10 minutes, with species recorded at 5 minute intervals. (The time code for birds detected in the first five minutes was 5, and the time code for birds detected between minutes 5 and 10 was 10). In 2008, 2010, 2011, 2014, 2015, and 2016, at least 100 of these points were surveyed in representative habitats between April 1 and June 1.

D.1.3 Winter Bird Area Searches

During winter 2010-2011, over 50 constrained areas searches were conducted in grazed and nongrazed grasslands. Each survey location was a 200 m x 200 m square and all birds seen and heard during the walked transects were recorded.

D.1.4 Cover Boards

In November 2010, the Department deployed cover boards to survey for amphibians and reptiles the following spring. The sheets of plywood (four feet by four feet), were placed within 50 meters of the avian point count locations throughout the Reserve, except along the along the Cuyama River. All vertebrate species found beneath the cover boards were recorded.

D.1.5 Small Mammal Trapping

The Department conducted small mammal trapping within the Chimineas units between 2006 and 2010. The objectives were to survey for special-status mammal species and to sample all species across the representative areas within each of the main community types (habitat elements) of the CPER. The total trap effort exceeded 3,000 trap-nights.

In 2005 and 2006, trap lines were set in areas expected to support special-status species. Beginning in 2007, the Department established a 100m transect line with 10-meter spacing on a subset of 52 of the avian point count stations, across all habitat types. Five small mammal trap points, spaced 10 m apart, were set up on either side of the road at the avian point count station. Two Sherman live traps were placed at each point on the transect and baited with a commercially available wild bird seed mix. Traps on each transect were operated for one night. Department biologists recorded the species, sex, age (juvenile or adult), weight, and location of each animal captured.

D.1.6 Giant Kangaroo Rat Aerial Surveys

The Department conducted aerial surveys of occupied giant kangaroo rat habitat on the Carrizo Plain and portions of the Cuyama Valley in 2001, 2006, 2008, 2010, 2011, and 2016. Two observers flew straight-line transects separated by 0.5 miles in a small plane at 90-100 mph at approximately 500 feet above ground level. Flight path and location points were recorded whenever the plane entered or exited an area of GKR activity. Global positioning system points were connected along the flight paths using ArcGIS 9.3, and buffered by 0.25 miles on each side to represent the estimated range extent from the surveys (Bean et al. 2012).

D.1.7 Camera Stations

To determine the distribution and relative abundance of mesocarnivores within the Chimineas units, Department biologists used a Geographic Information System (GIS) to develop a property-wide grid system consisting of 100-hectare (ha) sample units. The 100-ha sample unit size was chosen because it encompasses the minimum home range size of two of the target species: ringtail (*Bassariscus astutus*) and Western spotted skunk (*Spilogale gracilis*).

Within each sample unit, one passive infrared camera trap was placed in an area that had the best chance of being visited by the target species, including game trails, rock outcroppings, and stream sides. If habitat was equal across the sample unit, the camera was placed in the middle. The type of cameras used included a mix of commercially available scouting cameras as well as some high quality "homemade" models. Each camera trap was baited with scent lure and canned mackerel and monitored weekly until a minimum of 28 camera-nights had been achieved. Cameras were programmed to run for 24 hours/day

Habitat was characterized across the study area using a combination of GIS and manual habitat sampling. Each camera trap location was marked using a GPS unit and those points were plotted on existing digital vegetation maps of the area. Landscape features such as the distance to nearest water source, distance to nearest road, and distance to nearest camera trap were assessed using GIS. Habitat components such as elevation, slope, aspect, canopy cover, and distance to rock outcroppings were assessed from the ground. Vegetation within an appropriate radius of each camera trap was sampled from the ground. Since August of 2009, over 4,000 trap nights have been sampled using camera traps in all representative habitat types, including grazed and ungrazed grasslands.

D.1.8 Vernal Pool Surveys

The Department surveyed the vernal pools to evaluate presence of fairy shrimp. Samples were randomly collected to adequately represent the pond. A standard 0.5-micron mesh net was used for sampling a one-meter net swipe through the pool at each selected site. A floating wood perimeter was placed in the water to help guide the length of the net swipe.

D.1.9 Bat Surveys

The Department used acoustical monitors (e.g., Anabat) set up at several locations associated with water in 2005, 2006, 2008, and 2010 to survey bats. In addition, the Wildlife Society held bat ecology workshops on the CPER in 2008 and 2009, which involved mist netting as well as acoustical monitoring. Beginning in 2010, the Department started using full spectrum acoustical monitors with auto classifying software (Sonobat), which have enabled the Department to survey far more extensively.

D.1.10 Spotlighting Surveys

Beginning in 1970, two spotlight survey routes, which cross the Elkhorn and American units, were surveyed quarterly (March, June, September, and December) on 67.8 miles on both Elkhorn and Soda Lake roads. Two observers (including the driver) spotlighted on their prospective side of the vehicle which was driven at approximately 15 mph. Spotlights with a minimum of one million candle power were used and vehicle mileage was recorded for all carnivores. Beginning in 2000, a GPS location was recorded and a hand-held range finder was used to determine the perpendicular distance from the road to the original location where the kit fox was first observed. The total number of lagomorphs observed on the survey routes as well as a rough estimate of the number of small mammals was also recorded.

D.2 Focal Species Surveys

D.2.1 California Red-legged Frog

Surveys for California red-legged frogs were conducted on the Chimineas units in 2007 and 2008 to evaluate whether the species occupies the ponds and wetland areas. All suitable ponds, streams and rivers located on the Chimineas units were surveyed following the United States Fish and Wildlife Service Protocol (USFWS 2005b). Nocturnal visual encounter surveys involved spotlighting, while diurnal surveys included visual encounter surveys and dip-netting for larvae.

In 2010, US Geological Survey biologists sampled CRLF on the Cuyama River for genetic diversity and chytrid fungus (Richmond et al. 2011).

D.2.2 Western Pond Turtle

The Department collaborated with Dr. David Pilliod, professor at California Polytechnic State University, and others to conduct radio-telemetry studies on western pond turtle within Gillam and Taylor ponds on the North Chimineas Unit (Pilliod et al. 2013). Nine turtles were fitted with a small transmitter and antenna, attached to the carapace with epoxy. Each was selected based on its good apparent health and weight of at least 300 grams, which allows the turtle to adapt to the extra weight of the transmitter and antenna. Telemetry was used to track turtle movement over the approximately 1.5-year life of the transmitter. The tracking data provided information about terrestrial and aquatic habitat utilization, seasonal movements for migration and dispersal, and nesting sites.

The following information was also recorded about all turtles observed during the study: weight (grams), sex (male, female, unknown), age class (years in terms of annuli), carapace length (millimeters), carapace width (millimeters), height of shell (millimeters), plastron length (millimeters), and median plastron length (millimeters). All captured turtles were tagged by placing a PIT (Passive Inducer Transmitter) tag in the body cavity of each turtle with a PIT tagging syringe. PIT tagging is an inexpensive, effective long term tagging tool, with minimal impact on the species. Each tag has a specific bar code which is identified by scanning the individual with a PIT tag reader.

In addition to the telemetry study, Professor David Germano, California State University, Bakersfield has collected size and demographic data for western pond turtles within occupied ponds of the North Chimineas Unit since 2005, providing long term monitoring data. Beginning in 2015, timed visual surveys were conducted at each of the ponds.

D.2.3 Mule Deer

The Department has conducted annual deer population counts on the Chimineas units since 2004. In conjunction with those counts, large and medium-sized mammals (ungulates, carnivores, and other species of management interest) were also counted. A 25.6 mile transect was driven on three days within one week in the fall of each year. Survey conditions were standardized as much as possible, including weather conditions, observer, vehicle height, and moon phase. Counts took approximately 2.75 hours, and were timed to end near dusk, though the survey timing depended on the number of animals counted.
For each animal seen, a location (waypoint and/or mileage) was recorded, as well as perpendicular distance from the road (transect), time observed, and when possible, age class (juvenile, sub-adult, adult), and gender.

D.2.4 Tule Elk

Tule elk (*Cervus elaphus nannodes*) were reintroduced into the Carrizo Plain in the 1980s. To determine movement patterns, home range sizes, and habitat use in the established population, the Department captured and affixed GPS radio collars to 18 (4 male and 14 female) tule elk between 2005 and 2008. Collars were set to record locations every 1 to 13 hours and to remain on the elk for approximately 2 years. In 2015, an additional 24 tule elk (9 male and 15 female) were affixed with newer versions of the GPS radio collars that allowed for realtime, remote monitoring of movements every 13 hours. These studies have yielded over 45,000 locations from elk in 4 separate subherds.

Tule Elk at Sunset in the Carrizo Plains Ecological Reserve
(Photograph by Mike Post)

Table D-1: Vertebrate Species Known or Likely to Occur in the CPER (Stafford 2016)

					Relative Abundance in Habitat Elements [2]								Relative Abundance in Units [2]					Distribution			
Common Name	**Scientific Name**	**Family**	**Status[1]**	**Exotic**	**Grassland**	**Oak W.**	**Juniper W.**	**Coastal Scrub**	**Chaparral**	**Desert Scrub**	**Riparian**	**Pond**	**American**	**N. Chimineas**	**S. Chimineas**	**Elkhorn**	**Panorama**	**Breeding**	**Winter**	**Migration**	**Year-round**
Fish																					
Arroyo Chub	*Gila orcutti*	Cyprinidae	CSSC		0	0	0	0	0	0	5	0	0	0	5	0	0				
Bluegill	*Lepomis macrochirus*	Centrarchidae		✓	0	0	0	0	0	0	U	5	0	5	U	0	0				
Brown Bullhead	*Ameiurus nebulosus*	Ictaluridae		✓	0	0	0	0	0	0	U	5	0	5	U	0	0				
California Roach	*Lavinia symmetricus*	Cyprinidae	CSSC		0	0	0	0	0	0	5	0	0	0	5	0	0				
Largemouth Bass	*Micropterus salmoides*	Centrarchidae		✓	0	0	0	0	0	0	U	5	0	5	U	0	0				
Redear Sunfish	*Lepomis microlophus*	Centrarchidae		✓	0	0	0	0	0	0	U	5	0	5	U	0	0				
Western Mosquitofish	*Gambusia afinis*	Poecliidae		✓	0	0	0	0	0	0	U	5	0	U	U	0	0				
Amphibians																					
<u>*Lungless Salamanders*</u>																					
Black-Bellied Slender Salamander	*Batrachoseps nigriventris*	Plethodontidae			0	5	3	3	3	0	4	0	3	5	5	0	0	✓			✓
Ensatina	*Ensatina eschscholtzii*	Plethodontidae			0	4	3	4	4	0	4	0	0	4	4	0	0	✓			✓
<u>*Spadefoot Toads*</u>																					
Western Spadefoot Toad	*Spea hammondii*	Pelobatidae	CSSC		4	3	3	3	0	3	3	4	3	4	4	0	0	✓			✓
<u>*True Toads*</u>																					
California Toad[3]	*Anaxyrus boreas halophilus*	Bufonidae			4	5	4	4	4	3	5	5	4	5	5	0	0	✓			✓
<u>*Tree Frogs and Relatives*</u>																					
Baja California Treefrog[3]	*Pseudacris hypocondriaca*	Hylidae			4	5	4	4	5	1	5	5	5	5	5	0	0	✓			✓
<u>*True Frogs*</u>																					
California Red-Legged Frog	*Rana draytonii*	Ranidae	FT, CSSC		0	1	0	0	1	0	3	3	0	0	3	0	0	✓			✓

Table D-1: Vertebrate Species Known or Likely to Occur in the CPER (Stafford 2016)

Common Name	Scientific Name	Family	Status[1]	Exotic	Relative Abundance in Habitat Elements [2] Grassland	Oak W.	Juniper W.	Coastal Scrub	Chaparral	Desert Scrub	Riparian	Pond	Relative Abundance in Units [2] American	N. Chimineas	S. Chimineas	Elkhorn	Panorama	Distribution Breeding	Winter	Migration	Year-round
Reptiles																					
Box and Water Turtles																					
Western Pond Turtle†	*Emys marmorata*	Emydidae	CSSC		1	1	0	1	1	0	5	5	0	5	5	0	0	✓			✓
Collared and Leopard Lizards																					
Blunt-nosed Leopard Lizard	*Gambelia sila*	Phrynosomatidae	FE, SE		4	0	0	0	0	4	0	0	0	0	0	4	4	✓			✓
Horned Lizards and Relatives																					
Blainville's horned lizard[3]	*Phrynosoma blainvillii*	Phrynosomatidae	CSSC		1	4	4	4	4	4	1	0	3	4	4	4	4	✓			✓
Side-Blotched Lizard	*Uta stansburiana*	Phrynosomatidae			4	5	5	5	5	5	5	0	5	5	5	5	5	✓			✓
Western Fence Lizard	*Sceloporus occidentalis*	Phrynosomatidae			1	5	5	5	5	4	5	0	4	5	5	0	0	✓			✓
Night Lizards																					
Desert Night Lizard	*Xantusia vigilis*	Xantusiidae			0	3	3	4	4	4	0	0	U	4	4	0	0	✓			✓
Skinks																					
Gilbert's Skink	*Plestiodon gilberti*[3]	Scincidae			4	4	4	4	4	4	4	0	4	4	4	0	0	✓			✓
Western Skink	*Plestiodon skiltonianus*	Scincidae			0	4	0	1	3	0	3	0	0	3	3	0	0	✓			✓
Whiptails and Relatives																					
Tiger Whiptail Lizard[3]	*Aspidoscelis tigris*	Teiidae			3	1	4	3	3	4	3	0	3	3	4	3	4	✓			✓
Alligator Lizards and Relatives																					
Southern Alligator Lizard	*Elgaria multicarinata*	Anguidaee			1	4	4	4	4	4	4	0	3	4	4	0	0	✓			✓
California Legless Lizards																					
California Legless Lizard	*Anniella pulchra pulchra*	Anniellidae	CSSC	3	5	4	4	4	3	4	0		3	5	5	U	U	✓			✓
Egg-laying Snakes																					
California Glossy Snake	*Arizona elegans occidentalis*	Colubridae	CSSC		2	2	2	2	2	2	0	0	2	2	2	2	2	✓			✓
Coachwhip	*Masticophis flagellum ruddocki*	Colubridae	CSSC		3	0	3	3	1	3	1	0	3	3	3	3	3	✓			✓

Table D-1: Vertebrate Species Known or Likely to Occur in the CPER (Stafford 2016)

					Relative Abundance in Habitat Elements [2]								Relative Abundance in Units [2]					Distribution			
Common Name	Scientific Name	Family	Status[1]	Exotic	Grassland	Oak W.	Juniper W.	Coastal Scrub	Chaparral	Desert Scrub	Riparian	Pond	American	N. Chimineas	S. Chimineas	Elkhorn	Panorama	Breeding	Winter	Migration	Year-round
Coast patch-nosed Snake	*Salvadora hexalepis virgultea*	Colubridae	CSSC		0	1	3	3	3	3	0	0	U	3	3	0	0	✓			✓
Common Kingsnake	*Lampropeltis getula*	Colubridae			3	3	3	3	3	3	4	4	3	3	3	3	3	✓			✓
Gopher Snake	*Pituophis catenifer*	Colubridae			5	4	4	5	5	4	4	4	4	5	5	4	4	✓			✓
Long-Nosed Snake	*Rhinocheilus lecontei*	Colubridae			2	U	2	2	2	2	0	0	2	2	2	2	2	✓			✓
Night Snake	*Hypsiglena torquata*	Colubridae			0	3	3	3	3	3	0	0	3	3	3	3	3	✓			✓
Racer	*Coluber constrictor*	Colubridae			3	3	3	3	3	1	3	0	3	3	3	0	0	✓			✓
Ringneck Snake	*Diadophis punctatus*	Colubridae			3	4	1	1	3	U	3	0	3	3	3	0	0	✓			✓
Striped Racer	*Masticophis lateralis*	Colubridae			3	4	3	3	4	0	4	0	U	4	4	0	0	✓			✓
<u>*Live-bearing Snakes*</u>																					
Aquatic Garter Snake	*Thamnophis atratus*	Colubridae			0	1	0	1	1	0	3	3	0	3	3	0	0	✓			✓
Common Garter Snake	*Thamnophis sirtalis*	Colubridae			1	4	3	4	4	0	4	4	0	4	4	0	0	✓			✓
Two-Striped Garter Snake	*Thamnophis hammondii*	Colubridae	CSSC		0	1	0	1	1	0	3	3	0	3	3	0	0	✓			✓
<u>*Vipers*</u>																					
Western Rattlesnake	*Crotalus oreganus*[3]	Viperidae			5	5	5	5	5	5	5	1	5	5	5	4	5	✓			✓
Birds																					
<u>*Grebes*</u>																					
Eared Grebe	*Podiceps nigricollis*	Podicipedidae			0	0	0	0	0	0	0	3	0	3	0	0	0		✓	✓	
Pied-billed Grebe	*Podilymbus podiceps*	Podicipedidae			0	0	0	0	0	0	0	4	0	4	0	0	0	✓	✓	✓	
Western Grebe	*Aechmophorus occidentalis*	Podicipedidae			0	0	0	0	0	0	0	3	0	3	0	0	0		✓	✓	
<u>*Cormorants*</u>																					
Double-crested Cormorant	*Phalacrocorax auritus*	Phalacrocoracidae	DFG-WL		0	0	0	0	0	0	0	4	0	4	0	0	0				✓

Table D-1: Vertebrate Species Known or Likely to Occur in the CPER (Stafford 2016)

				Relative Abundance in Habitat Elements [2]									Relative Abundance in Units [2]					Distribution			
Common Name	**Scientific Name**	**Family**	**Status**[1]	**Exotic**	**Grassland**	**Oak W.**	**Juniper W.**	**Coastal Scrub**	**Chaparral**	**Desert Scrub**	**Riparian**	**Pond**	**American**	**N. Chimineas**	**S. Chimineas**	**Elkhorn**	**Panorama**	**Breeding**	**Winter**	**Migration**	**Year-round**
<u>*Herons and Bitterns*</u>																					
Black-crowned Night Heron	*Nycticorax nycticorax*	Ardeidae			0	0	0	0	0	0	1	1	0	1	1	0	0			✓	
Great Blue Heron	*Ardea herodias*	Ardeidae			0	0	0	0	0	0	3	3	0	3	3	0	0	✓			✓
Great Egret	*Casmerodius albus*	Ardeidae			3	0	0	0	0	0	3	3	0	3	3	0	0				
Green Heron	*Butorides virescens*	Ardeidae			0	0	0	0	0	0	3	3	0	3	3	0	0				
Snowy Egret	*Egretta thula*	Ardeidae			1	0	0	0	0	0	1	1	0	1	1	0	0				
<u>*Ibises and Spoonbills*</u>																					
White-faced Ibis	*Plegadis chihi*	Threskiornithidae			1	0	0	0	0	0	1	3	1	3	3	0	0			✓	
<u>*New World Vultures*</u>																					
California Condor	*Gymnogyps californianus*	Cathartidae	FE, SE		1	1	1	1	1	1	1	1	0	1	1	0	0				✓
Turkey Vulture	*Cathartes aura*	Cathartidae			4	4	4	4	4	4	4	4	4	4	4	3	3				✓
<u>*Swans, Geese, and Ducks*</u>																					
American Wigeon	*Anas americana*	Anatidae			0	0	0	0	0	0	0	4	0	4	3	0	0		✓	✓	
Bufflehead	*Bucephala albeola*	Anatidae			0	0	0	0	0	0	0	4	0	4	0	0	0		✓	✓	
Cackling Goose	*Branta hutchinsii*	Anatidae			0	0	0	0	0	0	0	1	0	1	1	0	0		✓	✓	
Canada Goose	*Branta canadensis*	Anatidae			0	0	0	0	0	0	0	1	0	1	0	0	0		✓	✓	
Cinnamon Teal	*Anas cyanoptera*	Anatidae			0	0	0	0	0	0	0	4	3	4	3	0	0	✓	✓	✓	
Common Merganser	*Mergus merganser*	Anatidae			0	0	0	0	0	0	0	3	0	3	0	0	0		✓	✓	
Gadwall	*Anas strepera*	Anatidae			0	0	0	0	0	0	0	4	0	4	0	0	0	✓	✓	✓	
Green-winged Teal	*Anas crecca*	Anatidae			0	0	0	0	0	0	0	4	3	4	3	0	0		✓	✓	
Mallard	*Anas platyrhyncos*	Anatidae			0	0	0	0	0	0	0	5	3	5	4	0	0	✓	✓	✓	
Northern Pintail	*Anas acuta*	Anatidae			0	0	0	0	0	0	0	4	0	4	0	0	0		✓	✓	
Ring-necked Duck	*Aythya collaris*	Anatidae			0	0	0	0	0	0	0	5	0	5	0	0	0		✓	✓	

Table D-1: Vertebrate Species Known or Likely to Occur in the CPER (Stafford 2016)

					Relative Abundance in Habitat Elements [2]								Relative Abundance in Units [2]					Distribution			
Common Name	Scientific Name	Family	Status[1]	Exotic	Grassland	Oak W.	Juniper W.	Coastal Scrub	Chaparral	Desert Scrub	Riparian	Pond	American	N. Chimineas	S. Chimineas	Elkhorn	Panorama	Breeding	Winter	Migration	Year-round
Ruddy Duck	*Oxyura jamaicensis*	Anatidae			0	0	0	0	0	0	0	4	0	4	3	0	0	✓	✓	✓	
Wood Duck	*Aix sponsa*	Anatidae			0	1	0	0	0	0	3	3	0	3	0	0	0	✓			✓
<u>*Hawks, Old World Vultures, and Harriers*</u>																					
Bald Eagle	*Haliaeetus leucocephalus*	Accipteridae	SE		1	1	0	0	0	0	1	1	1	1	1	0	0		✓	✓	
Cooper's Hawk	*Accipiter cooperii*	Accipteridae	DFG-WL		0	4	4	4	4	4	4	4	4	4	4	4	4	✓	✓	✓	
Ferruginous Hawk	*Buteo regalis*	Accipteridae	DFG-WL		4	0	0	0	0	1	0	0	4	4	4	4	4		✓		
Golden Eagle	*Aquila chrysaetos*	Accipteridae	DFG-FP		4	4	4	4	4	3	4	4	4	4	4	1	3	✓			✓
Northern Harrier	*Circus cyaneus*	Accipteridae	CSSC		3	0	0	0	0	0	0	3	3	3	3	0	3	✓			✓
Osprey	*Pandion haliaetus*	Accipteridae	DFG-WL		1	1	1	1	1	1	1	1	1	1	1	0	1			✓	
Rough-legged Hawk	*Buteo lagopus*	Accipteridae			3	2	1	1	1	1	1	1	2	2	2	0	0		✓	✓	
Red-tailed Hawk	*Buteo jamaicensis*	Accipteridae			5	5	5	5	5	4	4	4	4	5	5	4	4	✓			✓
Sharp-shinned Hawk	*Accipiter striatus*	Accipteridae	DFG-WL		0	4	4	4	4	4	4	4	4	4	4	4	4		✓	✓	
Swainson's Hawk	*Buteo swainsoni*	Accipteridae	ST		1	1	1	0	0	0	1	0	1	1	1	0	0			✓	
White-tailed Kite	*Elanus leucurus*	Accipteridae	DFG-FP		1	1	0	1	1		1	1	1	1	1	0	0				
<u>*Caracaras and Falcons*</u>																					
American Kestrel	*Falco sparverius*	Falconidae			5	5	5	5	5	5	5	5	5	5	5	3	3	✓			✓
Merlin	*Falco columbarius*	Falconidae	DFG-WL		3	3	3	3	3	3	3	3	3	3	3	1	3		✓	✓	
Peregrine Falcon	*Falco peregrinus*	Falconidae	SE-PD		0	0	0	0	0	0	0	1	0	1	1	0	0				
Prairie Falcon	*Falco mexicanus*	Falconidae	DFG-WL		4	0	4	4	4	4	0	0	4	4	4	4	4	✓			✓
<u>*Quails, Pheasants, and Relatives*</u>																					
Chukar	*Alectoris chukar*	Phaisianidae		✓	3	0	3	0	0	3	0	0	0	3	3	1	0				✓
Wild Turkey	*Maleagris gallopavo*	Phaisianidae		✓	0	3	1	0	3	0	3	0	0	3	1	0	0				✓

Table D-1: Vertebrate Species Known or Likely to Occur in the CPER (Stafford 2016)

				Relative Abundance in Habitat Elements [2]									Relative Abundance in Units [2]					Distribution			
Common Name	Scientific Name	Family	Status[1]	Exotic	Grassland	Oak W.	Juniper W.	Coastal Scrub	Chaparral	Desert Scrub	Riparian	Pond	American	N. Chimineas	S. Chimineas	Elkhorn	Panorama	Breeding	Winter	Migration	Year-round
<u>*New World Quails*</u>																					
California Quail	*Callipepla californica*	Odontophoridae			5	5	5	5	5	5	5	0	4	5	5	5	4	✓			✓
Mountain Quail	*Oreortyx pictus*	Odontophoridae			0	3	3	3	4	0	4	0	0	4	4	0	0	✓			✓
<u>*Rails, Gallinules, and Coots*</u>																					
American Coot	*Fulica americana*	Rallidae			0	0	0	0	0	0	4	5	3	5	4	0	0	✓	✓		
Sora	*Porzana carolina*	Rallidae			0	0	0	0	0	0	3	3	0	3	3	0	0		✓	✓	
Virginia Rail	*Rallus limicola*	Rallidae			0	0	0	0	0	0	3	3	0	3	3	0	0	✓			
<u>*Cranes*</u>																					
Sandhill Crane	*Grus canadensis*	Gruidae	CSSC		1	0	0	0	0	0	0	1	1	1	0	0	0		✓	✓	
<u>*Plovers and Relatives*</u>																					
Killdeer	*Charadrius vociferous*	Charadriidae			4	0	0	0	0	0	4	4	4	4	4	0	0		✓		✓
Mountain Plover	*Charadrius montanus*	Charadriidae	CSSC		4	0	0	0	0	0	0	0	0	3	0	0	4		✓		
Semipalmated Plover	*Charadrius semiplamatus*	Charadriidae			0	0	0	0	0	0	1	1	0	1	1	0	0		✓	✓	
<u>*Avocets and Stilts*</u>																					
American Avocet	*Recurvirostra americana*	Recurvirostridae			0	0	0	0	0	0	3	3	3	3	3	0	0		✓	✓	
Black-necked Stilt	*Himantopus mexicanus*	Recurvirostridae			0	0	0	0	0	0	3	3	3	3	3	0	0		✓	✓	
<u>*Sandpipers and Relatives*</u>																					
Baird's Sandpiper	*Calidris bairdii*	Scolopacidae			0	0	0	0	0	0	0	1	1	1	1	0	0			✓	
Greater Yellowlegs	*Tringa melanoleuca*	Scolopacidae			0	0	0	0	0	0	3	3	3	3	3	0	0		✓	✓	
Least Sandpiper	*Calidris minutilla*	Scolopacidae			0	0	0	0	0	0	3	3	1	1	1	0	0		✓	✓	
Long-billed Curlew	*Numenius americanus*	Scolopacidae	DFG-WL		5	0	0	0	0	0	0	0	5	3	3	1	1		✓	✓	
Long-billed Dowitcher	*Limnodromus scolapaceus*	Scolopacidae			0	0	0	0	0	0	3	3	3	3	3	0	0		✓	✓	
Red-necked Phalarope	*Phalaropus lobatus*	Scolopacidae			0	0	0	0	0	0	3	3	1	3	3	0	0			✓	

Table D-1: Vertebrate Species Known or Likely to Occur in the CPER (Stafford 2016)

					Relative Abundance in Habitat Elements [2]								Relative Abundance in Units [2]					Distribution			
Common Name	Scientific Name	Family	Status[1]	Exotic	Grassland	Oak W.	Juniper W.	Coastal Scrub	Chaparral	Desert Scrub	Riparian	Pond	American	N. Chimineas	S. Chimineas	Elkhorn	Panorama	Breeding	Winter	Migration	Year-round
Solitary Sandpiper	*Tringa solitaria*	Scolopacidae			0	0	0	0	0	0	0	1	0	1	0	0	0			✓	
Spotted Sandpiper	*Actitis macularia*	Scolopacidae			0	0	0	0	0	0	3	3	1	3	3	0	0		✓	✓	
Western Sandpiper	*Calidris mauri*	Scolopacidae			0	0	0	0	0	0	1	1	1	1	1	0	0		✓	✓	
Wilson's Snipe	*Gallinago delicata*	Scolopacidae			0	0	0	0	0	0	3	3	3	3	3	0	0		✓	✓	
<u>Skuas, Gulls, Terns, and Skimmers</u>																					
Bonaparte's Gull	*Larus philidelphia*	Laridae			0	0	0	0	0	0	0	1	1	1	1	0	0			✓	
California Gull	*Larus californicus*	Laridae			0	0	0	0	0	0	3	3	1	1	3	0	0				
<u>Pigeons and Doves</u>																					
Eurasian Collared-Dove	*Streptopelia chinensis*	Columbidae		✓	0	1	0	0	0	0	1	1	0	0	3	0	0				
Mourning Dove	*Zenaida macroura*	Columbidae			5	5	5	5	5	4	5	5	5	5	5	3	3	✓			✓
Rock Dove	*Columba livia*	Columbidae		✓	3	3	3	3	3	3	3	3	3	3	3	0	3				✓
<u>Typical Cuckoos</u>																					
Greater Roadrunner	*Geococcyx californianus*	Cuculidae			3	3	4	4	4	4	3	1	3	4	4	3	3	✓			✓
<u>Barn Owls</u>																					
Barn Owl	*Tyto alba*	Tytonidae			5	5	5	5	5	5	5	4	5	5	5	4	5	✓			✓
<u>Typical Owls</u>																					
Burrowing Owl	*Athene cunicularia*	Strigidae	CSSC		4	1	1	0	0	0	0	0	4	4	4	4	4	✓	✓	✓	✓
Great Horned Owl	*Bubo virginianus*	Strigidae			4	5	5	4	4	4	5	4	4	5	5	3	3	✓			✓
Long-eared Owl	*Asio otus*	Strigidae	CSSC		1	3	3	1	1	1	3	1	1	3	3	1	1	✓	✓	✓	✓
Northern Pygmy-Owl	*Claucidium gnoma*	Strigidae			0	3	1	1	1	1	3	1	1	3	3	0	0				✓
Short-eared Owl	*Asio flammeus*	Strigidae	CSSC		3	0	0	0	0	1	0	0	3	3	1	1	1	✓	✓	✓	
Western Screech Owl	*Otus kennicottii*	Strigidae			1	5	4	3	3	1	5	1	1	5	4	0	0	✓			✓

Table D-1: Vertebrate Species Known or Likely to Occur in the CPER (Stafford 2016)

				Relative Abundance in Habitat Elements [2]									Relative Abundance in Units [2]					Distribution			
Common Name	Scientific Name	Family	Status[1]	Exotic	Grassland	Oak W.	Juniper W.	Coastal Scrub	Chaparral	Desert Scrub	Riparian	Pond	American	N. Chimineas	S. Chimineas	Elkhorn	Panorama	Breeding	Winter	Migration	Year-round
Goatsuckers																					
Common Poorwill	*Phalaenoptilus nuttallii*	Caprimulgidae			3	4	4	4	4	3	3	3	1	4	4	0	0	✓			✓
Lesser Nighthawk	*Chordeiles acutipennis*	Caprimulgidae			3	1	1	1	1	3	0	0	1	1	1	3	3	✓			
Swifts																					
Vaux's Swift	*Chaetura vauxi*	Apodidae	CSSC		1	1	1	1	1	1	1	3	1	3	1	1	1			✓	
White-throated Swift	*Aeronautes saxatalis*	Apodidae			1	4	4	4	4	4	1	3	1	4	4	1	1	✓			
Hummingbirds																					
Anna's Hummingbird	*Calypte anna*	Trochilidae			3	5	5	4	5	4	5	1	4	5	5	1	1	✓			✓
Black-chinned Hummingbird	*Archilochus colubris*	Trochilidae			0	3	1	1	1	0	3	1	0	3	3	0	0			✓	
Calliope Hummingbird	*Stellula calliope*	Trochilidae			1	1	1	1	1	1	1	1	1	1	1	1	1			✓	
Costa's Hummingbird	*Calypte costae*	Trochilidae	AUD-WL		3	3	4	5	5	4	3	1	3	5	5	3	3	✓			
Rufous Hummingbird	*Selasphorus rufus*	Trochilidae	AUD-WL		1	3	3	3	3	1	3	1	1	3	3	0	0			✓	
Kingfishers																					
Belted Kingfisher	*Ceryle alcyon*	Alcedinidae			0	0	0	0	0	0	3	3	0	3	3	0	0				
Woodpeckers and Allies																					
Acorn Woodpecker	*Melanerpes formicivorus*	Picidae			0	4	1	1	1	0	1	0	0	4	4	0	0	✓			✓
Downy Woodpecker	*Picoides pubescens*	Picidae			0	3	3	1	1	0	3	1	1	3	3	0	0				✓
Hairy Woodpecker	*Picoides villosus*	Picidae			0	3	3	1	1	0	3	1	1	3	3	0	0				✓
Lewis' Woodpecker	*Melanerpes lewis*	Picidae	AUD-WL		0	3	1	1	1	0	1	0	0	3	3	0	0		✓		
Northern Flicker	*Colaptes auratus*	Picidae			0	5	5	4	4	3	5	1	4	5	5	1	1	✓			✓
Nuttall's Woodpecker	*Picoides nuttallii*	Picidae	AUD-WL		0	4	4	3	3	0	5	1	4	5	5	0	0	✓			✓
Red-breasted Sapsucker	*Sphyrapicus ruber*	Picidae			0	4	4	1	1	0	4	0	3	4	4	0	0		✓		
Red-naped Sapsucker	*Sphyrapicus nuchalis*	Picidae			0	1	1	1	1	0	1	0	0	1	1	0	0		✓	✓	

Table D-1: Vertebrate Species Known or Likely to Occur in the CPER (Stafford 2016)

					Relative Abundance in Habitat Elements [2]								Relative Abundance in Units [2]					Distribution			
Common Name	Scientific Name	Family	Status[1]	Exotic	Grassland	Oak W.	Juniper W.	Coastal Scrub	Chaparral	Desert Scrub	Riparian	Pond	American	N. Chimineas	S. Chimineas	Elkhorn	Panorama	Breeding	Winter	Migration	Year-round
Tyrant Flycatchers																					
Ash-throated Flycatcher	*Myiarchus cinerascens*	Tyrannidae			0	5	5	4	4	4	4	1	5	5	5	3	3	✓			
Black Phoebe	*Sayornis nigricans*	Tyrannidae			2	3	3	3	3	3	4	4	4	4	4	2	2	✓			✓
Cassin's Kingbird	*Tyrannus vociferans*	Tyrannidae			1	1	1	1	1	0	1	1	1	1	1	0	0			✓	
Gray Flycatcher	*Empidonax wrightii*	Tyrannidae	CSSC		0	1	3	3	1	3	1	1	1	3	3	1	1			✓	
Hammond's Flycatcher	*Empidonax hammondii*	Tyrannidae			0	3	3	1	1	0	3	1	1	3	3	0	0			✓	
Olive-sided Flycatcher	*Contopus borealis*	Tyrannidae	CSSC		0	1	1	0	0	0	1	1	0	1	1	0	0			✓	
Pacific-slope Flycatcher	*Empidonax difficilis*	Tyrannidae			0	1	1	1	1	0	3	3	1	3	3	0	0			✓	
Say's Phoebe	*Sayornis saya*	Tyrannidae			0	4	4	4	4	4	4	4	4	4	4	3	3	✓			✓
Western Kingbird	*Tyrannus verticalis*	Tyrannidae			3	5	5	4	4	3	5	4	5	5	5	3	3	✓			
Western Wood Pewee	*Contopus sordidulus*	Tyrannidae			0	3	1	1	1	0	1	1	1	3	3	0	0	✓			
Willow Flycatcher	*Empidonax traillii*	Tyrannidae	SE		0	1	1	0	0	0	3	3	0	3	3	0	0			✓	
Shrikes																					
Loggerhead Shrike	*Lanius ludovicianus*	Laniidae	CSSC		5	4	5	5	4	5	4	3	5	5	5	5	5	✓			✓
Typical Vireos																					
Cassin's Vireo	*Vireo cassinii*	Vireonidae			0	3	3	1	1	0	3	1	1	3	3	0	0			✓	
Hutton's Vireo	*Vireo huttoni*	Vireonidae			0	4	4	3	3	0	3	1	1	4	4	0	0	✓			✓
Warbling Vireo	*Vireo solitarius*	Vireonidae			0	1	1	1	1	0	4	4	1	4	4	0	0	✓			
Jays, Magpies, and Crows																					
American Crow	*Corvus brachyrhynchos*	Corvidae			1	1	1	1	0	0	1	1	0	1	1	0	0				
Common Raven	*Corvus corax*	Corvidae			5	5	5	5	5	5	3	3	5	5	5	4	5	✓			✓
Western Scrub Jay	*Aphelocoma californica*	Corvidae			1	5	5	5	5	3	5	3	1	5	5	0	0	✓			✓
Yellow-billed Magpie	*Pica nuttalli*	Corvidae	USBC-WL		4	4	1	1	1	0	1	1	0	4	4	0	0	✓			✓

Table D-1: Vertebrate Species Known or Likely to Occur in the CPER (Stafford 2016)

					Relative Abundance in Habitat Elements [2]								Relative Abundance in Units [2]					Distribution			
Common Name	Scientific Name	Family	Status[1]	Exotic	Grassland	Oak W.	Juniper W.	Coastal Scrub	Chaparral	Desert Scrub	Riparian	Pond	American	N. Chimineas	S. Chimineas	Elkhorn	Panorama	Breeding	Winter	Migration	Year-round
Larks																					
Horned Lark	*Eremophila alpestris*	Aluadidae	DFG-WL		5	4	4	4	3	4	1	1	5	5	5	5	5	✓			✓
Swallows																					
Barn Swallow	*Hirundo rustica*	Hirundinidae			1	1	1	1	1	1	1	1	1	1	1	0	0				
Cliff Swallow	*Petrochelidon pyrrhonota*	Hirundinidae			4	4	5	5	5	4	5	5	4	5	5	3	3	✓			
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	Hirundinidae			5	5	5	5	5	5	5	5	4	5	5	3	3	✓			
Tree Swallow	*Tachycineta bicolor*	Hirundinidae			1	5	3	1	1	1	5	5	1	5	5	0	1				
Violet-green Swallow	*Tachycineta thalassina*	Hirundinidae			3	5	4	4	4	3	5	5	1	5	5	1	1	✓			
Titmice and Relatives																					
Mountain Chickadee	*Parus gambeli*	Paridae			0	1	1	1	1	0	1	0	0	0	1	0	0				
Oak Titmouse	*Baeolophus inornatus*	Paridae	AUD-WL		0	5	4	1	1	0	3	1	3	5	5	0	0	✓			✓
Bushtit																					
Bushtit	*Psaltriparus minimus*	Aegithalidae			0	4	4	5	5	5	5	4	3	5	5	3	3	✓			✓
Nuthatches																					
White-breasted Nuthatch	*Sitta carolinensis*	Sittidae			0	4	3	1	3	1	4	0	1	4	4	0	0	✓			✓
Wrens																					
Bewick's Wren	*Thryomanes bewickii*	Troglodytidae			0	4	5	5	5	5	4	0	3	5	5	3	3	✓			✓
Canyon Wren	*Catherpes mexicanus*	Troglodytidae			0	3	2	3	3	0	3	0	0	3	2	0	0	✓			✓
House Wren	*Thryomanes aedoni*	Troglodytidae			0	5	3	3	4	1	3	0	1	5	5	0	0	✓			✓
Rock Wren	*Sulpinctes obsoletus*	Troglodytidae			4	4	4	4	4	4	3	0	4	4	4	3	3	✓			✓
Kinglets																					
Ruby-crowned Kinglet	*Regula calendula*	Regulidae			0	5	5	5	5	3	5	1	4	5	5	3	3		✓		

Table D-1: Vertebrate Species Known or Likely to Occur in the CPER (Stafford 2016)

					Relative Abundance in Habitat Elements [2]								Relative Abundance in Units [2]					Distribution			
Common Name	Scientific Name	Family	Status[1]	Exotic	Grassland	Oak W.	Juniper W.	Coastal Scrub	Chaparral	Desert Scrub	Riparian	Pond	American	N. Chimineas	S. Chimineas	Elkhorn	Panorama	Breeding	Winter	Migration	Year-round
<u>*Old World Warblers and Gnatcatchers*</u>																					
Blue-gray Gnatcatcher	*Polioptila caerulea*	Sylviidae			0	4	4	4	4	4	4	1	3	5	5	1	3	✓			✓
<u>*Thrushes*</u>																					
American Robin	*Turdus migratorius*	Turdidae			3	4	4	3	3	3	4	1	4	4	4	3	3		✓	✓	
Hermit Thrush	*Catharus guttatus*	Turdidae			1	4	4	3	3	3	4	0	3	4	4	1	1		✓	✓	
Mountain Bluebird	*Sialia curroides*	Turdidae			4	3	4	3	1	3	1	1	4	4	4	3	4		✓		
Swainson's Thrush	*Catharus ustulatus*	Turdidae			1	1	1	1	1	0	1	0	1	1	1	0	0			✓	
Varied Thrush	*Ixoreus naevius*	Turdidae			0	1	1	1	1	1	1	1	0	1	1	0	0			✓	
Western Bluebird	*Sialia mexicana*	Turdidae			2	5	3	2	2	1	3	2	1	5	5	1	1	✓			✓
<u>*Babblers*</u>																					
Wrentit	*Chamaea fasciata*	Timaliidae			0	3	3	4	4	1	1	0	0	4	4	0	0	✓			✓
<u>*Mockingbirds and Thrashers*</u>																					
California Thrasher	*Toxostoma redivivum*	Mimidae			1	4	5	5	5	4	4	1	3	5	5	1	1	✓	✓		✓
LeConte's Thrasher	*Toxostoma lecontei*	Mimidae	CSSC		1	0	0	0	0	3	0	0	1	0	0	3	3	✓	✓		✓
Northern Mockingbird	*Mimus polyglottos*	Mimidae			1	1	1	1	1	3	1	1	1	1	3	3	3	✓			✓
Sage Thrasher	*Oreoscoptes montanus*	Mimidae			1	0	3	3	1	4	1	1	3	1	3	4	4		✓	✓	
<u>*Starlings and Allies*</u>																					
European Starling	*Sturnus vulgaris*	Sturnidae		✓	4	5	3	3	3	3	5	3	5	5	5	1	1	✓			✓
<u>*Wagtails and Pipits*</u>																					
American Pipit	*Anthus rubescens*	Motacillidae			4	3	3	3	3	3	1	4	4	4	4	3	3		✓	✓	
<u>*Waxwings*</u>																					
Cedar Waxwing	*Bombycilla cedrorum*	Bombycillidae			1	4	5	3	3	1	4	1	4	5	5	1	1		✓	✓	
<u>*Silky Flycatchers*</u>																					

Table D-1: Vertebrate Species Known or Likely to Occur in the CPER (Stafford 2016)

					Relative Abundance in Habitat Elements [2]								Relative Abundance in Units [2]					Distribution			
Common Name	Scientific Name	Family	Status[1]	Exotic	Grassland	Oak W.	Juniper W.	Coastal Scrub	Chaparral	Desert Scrub	Riparian	Pond	American	N. Chimineas	S. Chimineas	Elkhorn	Panorama	Breeding	Winter	Migration	Year-round
Phainopepla	*Phainopepla nitens*	Ptilogonatidae			0	4	4	1	3	1	3	1	3	4	4	0	0	✓	✓		✓
Wood Warblers and Relatives																					
Black-throated Gray Warbler	*Setophaga nigrescens*	Parulidae			0	1	1	1	1	0	1	1	1	1	1	0	0			✓	
Common Yellowthroat	*Geothylpis trichas*	Parulidae			0	1	1	1	1	0	4	4	1	4	4	0	0	✓			
MacGillvray's Warbler	*Geothlypis tolmiei*	Parulidae			0	3	3	3	3	0	3	3	1	3	3	0	0			✓	
Nashville Warbler	*Vermivora ruficapilla*	Parulidae			0	3	3	1	3	1	3	3	1	3	3	0	1			✓	
Orange-crowned Warbler	*Vermivora celata*	Parulidae			1	4	4	3	3	3	4	1	3	4	4	1	1		✓	✓	
Townsend's Warbler	*Setophaga townsendi*	Parulidae			0	1	1	1	1	0	3	1	1	1	1	0	0		✓	✓	
Wilson's Warbler	*Cardellina pusilla*	Parulidae			0	5	5	4	4	1	5	5	4	5	5	1	1			✓	
Yellow Warbler	*Setophaga petechia*	Parulidae	CSSC		0	1	1	1	1	0	3	3	3	3	3	0	0	✓		✓	
Yellow-rumped Warbler	*Setophaga coronata*	Parulidae			0	5	5	4	4	1	5	4	4	5	5	1	1		✓	✓	
Tanagers																					
Western Tanager	*Piranga ludoviciana*	Cardinalidae			0	4	4	1	1	1	4	3	3	4	4	0	0			✓	
Emberizines																					
Black-chinned Sparrow	*Spizella atrogularis*	Emberizidae	AUD-WL		1	1	3	3	3	1	1	1	0	3	3	0	0	✓			✓
Brewer's Sparrow	*Spizella breweri*	Emberizidae			1	0	1	1	0	1	0	0	1	1	1	1	1			✓	
California Towhee	*Pipilo crissalis*	Emberizidae			0	5	5	5	5	5	4	3	4	5	5	0	0	✓			✓
Chipping Sparrow	*Spizella passerina*	Emberizidae	SAL		0	4	3	3	3	0	3	1	1	4	4	0	0			✓	
Dark-eyed Junco	*Junco hyemalis*	Emberizidae			1	5	5	5	5	3	5	4	4	5	5	1	1		✓	✓	
Golden-crowned Sparrow	*Zonotrichia atricapilla*	Emberizidae			3	4	4	4	4	4	4	4	4	4	4	4	4		✓	✓	
Grasshopper Sparrow	*Ammodramus savannarum*	Emberizidae	CSSC		5	1	1	1	1	1	0	0	5	5	3	1	1	✓			
Lark Sparrow	*Chondestes grammacus*	Emberizidae	SAL		5	5	5	5	5	4	4	5	5	5	5	4	4	✓			✓
Lincoln's Sparrow	*Melospiza lincolnii*	Emberizidae			1	1	1	3	3	3	4	4	1	4	4	1	1		✓	✓	

Table D-1: Vertebrate Species Known or Likely to Occur in the CPER (Stafford 2016)

					Relative Abundance in Habitat Elements [2]								Relative Abundance in Units [2]					Distribution			
Common Name	**Scientific Name**	**Family**	**Status[1]**	**Exotic**	**Grassland**	**Oak W.**	**Juniper W.**	**Coastal Scrub**	**Chaparral**	**Desert Scrub**	**Riparian**	**Pond**	**American**	**N. Chimineas**	**S. Chimineas**	**Elkhorn**	**Panorama**	**Breeding**	**Winter**	**Migration**	**Year-round**
Rufous-crowned Sparrow	*Aimophila ruficeps*	Emberizidae	DFG-WL		0	1	1	4	4	1	1	1	1	4	4	0	0	✓			✓
Sage Sparrow	*Amphispiza belli*	Emberizidae			1	1	3	5	3	5	3	3	3	5	5	5	5	✓			✓
Savannah Sparrow	*Passerculus sandwichensis*	Emberizidae			5	4	4	4	3	4	4	4	5	5	5	3	4		✓	✓	
Song Sparrow	*Melospiza melodia*	Emberizidae			0	1	1	1	1	0	3	3	1	3	3	0	0	✓			
Spotted Towhee	*Pipilo maculates*	Emberizidae			0	5	5	5	5	4	5	3	3	5	5	0	0	✓			✓
Vesper Sparrow	*Pooecetes gramineus affinis*	Emberizidae	CSSC		4	3	3	3	3	3	1	1	4	4	4	4	4		✓		
White-crowned Sparrow	*Zonotrichia albicollis*	Emberizidae			3	5	5	5	5	5	5	5	5	5	5	5	5		✓	✓	
Cardinals, Grosbeaks, and Allies																					
Black-headed Grosbeak	*Pheucticus melanocephalus*	Cardinalidae			0	5	5	4	4	3	5	4	4	5	5	0	0	✓			
Blue Grosbeak	*Guiraca caerulea*	Cardinalidae			0	3	1	1	1	0	3	3	1	3	3	0	0	✓			
Lazuli Bunting	*Passerina amoena*	Cardinalidae			0	3	3	5	5	1	4	4	3	5	5	0	0	✓			
Blackbirds, Orioles, and Allies																					
Brewer's Blackbird	*Euphagus cyanocephalus*	Ictiridae			5	5	5	5	5	5	5	4	5	5	5	4	4	✓			✓
Brown-headed Cowbird	*Molothrus ater*	Ictiridae			4	4	4	4	4	3	4	4	4	4	4	3	3				✓
Bullock's Oriole	*Icterus bullockii*	Ictiridae			1	4	4	3	3	1	5	3	5	5	5	1	1	✓			
Great-tailed Grackle	*Quiscalus mexicanus*	Ictiridae			0	1	0	0	0	0	1	1	0	1	1	0	0				
Hooded Oriole	*Icterus cucullatus*	Ictiridae			1	1	1	1	1	1	1	1	1	1	1	0	0	□		✓	□
Red-winged Blackbird	*Agelaius phoeniceus*	Ictiridae			5	4	4	3	0	4	4	5	5	5	5	1	1	✓			✓
Tricolored Blackbird	*Agelaius tricolor*	Ictiridae	CSSC		5	4	1	1	0	0	4	5	1	5	5	0	0	✓			✓
Western Meadowlark	*Sturnella neglecta*	Ictiridae			5	4	4	4	3	4	3	3	5	5	5	4	5	✓			✓
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*	Ictiridae	CSSC		1	1	1	0	0	0	1	3	1	1	1	0	0			✓	

Table D-1: Vertebrate Species Known or Likely to Occur in the CPER (Stafford 2016)

					Relative Abundance in Habitat Elements [2]								Relative Abundance in Units [2]					Distribution			
Common Name	Scientific Name	Family	Status[1]	Exotic	Grassland	Oak W.	Juniper W.	Coastal Scrub	Chaparral	Desert Scrub	Riparian	Pond	American	N. Chimineas	S. Chimineas	Elkhorn	Panorama	Breeding	Winter	Migration	Year-round
Finches																					
American Goldfinch	*Carduelis tristis*	Fringillidae			0	1	1	1	1	1	1	1	1	1	1	0	0			✓	
House Finch	*Carpodacus mexicanus*	Fringillidae			4	5	5	4	4	4	5	3	5	5	5	3	5	✓			✓
Lawrence's Goldfinch	*Carduelis lawrencei*	Fringillidae	AUD-WL		4	5	5	4	4	4	4	4	4	5	5	1	1	✓			✓
Lesser Goldfinch	*Carduelis psaltria*	Fringillidae			1	4	4	4	4	4	4	4	4	4	4	1	1	✓			✓
Pine Siskin	*Carduelis pinus*	Fringillidae			1	1	1	1	1	1	1	1	1	1	1	0	0		✓	✓	
Old World Sparrows																					
House Sparrow	*Passer domesticus*	Passeridae		✓	1	3	1	1	1	0	1	1	3	3	3	1	3	✓			✓
Mammals																					
Shrews																					
Ornate Shrew	*Sorex ornatus*	Soricidae			4	4	3	4	4	0	4	0	4	4	4	0	0	✓			✓
Moles																					
Broad-footed Mole	*Scapanus latimanus*	Talpidae			3	3	1	1	3	0	3	3	3	3	3	0	0	✓			✓
Evening Bats																					
Big Brown Bat	*Eptesicus fuscus*	Vespertilionidae			1	5	2	1	1	1	5	5	1	5	5	1	1	✓			✓
California Myotis	*Myotis californicus*	Vespertilionidae			5	5	4	3	3	3	5	4	5	5	5	4	4	✓			✓
Canyon Bat	*Pipistrellus hesperus*	Vespertilionidae			4	4	4	4	4	4	4	5	4	5	5	4	4	✓			✓
Fringed Myotis	*Myotis thysanodes*	Vespertilionidae	WBWG-H		1	1	1	1	1	1	3	2	1	3	3	0	0	✓			✓
Hoary Bat	*Lasiurus cinereus*	Vespertilionidae	WBWG-M		2	4	3	3	3	2	4	4	1	4	4	1	1			✓	✓
Little Brown Myotis	*Myotis lucifugus*	Vespertilionidae											1	1	1	0	0			✓	
Long-eared Myotis	*Myotis evotis*	Vespertilionidae	WBWG-M		0	2	1	0	1	0	2	3	0	3	3	0	0	✓			✓

Table D-1: Vertebrate Species Known or Likely to Occur in the CPER (Stafford 2016)

				Relative Abundance in Habitat Elements [2]									Relative Abundance in Units [2]					Distribution			
Common Name	Scientific Name	Family	Status[1]	Exotic	Grassland	Oak W.	Juniper W.	Coastal Scrub	Chaparral	Desert Scrub	Riparian	Pond	American	N. Chimineas	S. Chimineas	Elkhorn	Panorama	Breeding	Winter	Migration	Year-round
Long-legged Myotis	*Myotis volans*	Vespertilionidae	WBWG-H										0	1	1	0	0			✓	
Pallid Bat	*Anrtozous pallidus*	Vespertilionidae	CSSC		4	4	3	2	2	3	4	3	4	4	4	2	2	✓			✓
Silver-haired Bat	*Lasionycteris noctivagans*	Vespertilionidae	WBWG-M										0	2	2	0	0			✓	
Spotted Bat	*Euderma maculatum*	Vespertilionidae	CSSC, WBWG-H		1	1	1	1	1	1	1	1	1	1	1	1	1	✓		✓	✓
Townsend's Big-eared Bat	*Corynorhinus towsendii*	Vespertilionidae	CSSC		1	3	1	1	1	1	3	2	1	3	3	0	0				✓
Western Red Bat	*Lasiurus blossevillii*	Vespertilionidae	CSSC		1	1	1	1	1	1	5	3	2	4	4	0	0	✓		✓	✓
Western Small-footed Myotis	*Myotis ciliolabrum*	Vespertilionidae	WBWG-M		3	4	3	3	3	3	4	4	4	4	4	1	1	✓			✓
Yuma Myotis	*Myotis yumanensis*	Vespertilionidae	WBWG-LM		1	1	1	1	1	1	5	5	3	5	5	0	0	✓			✓
Free-tailed Bats																					
Big Free-tailed Bat	*Nyctinomops mactrotis*	Molossidae	CSSC		1	1	1	1	1	1	1	1	1	1	1	1	1			✓	✓
Mexican Free-tailed Bat	*Tadarida brasiliensis*	Molossidae			4	4	4	4	4	4	5	5	3	5	5	3	3	✓		✓	✓
Western Mastiff Bat	*Eumops perotis californicus*	Molossidae	CSSC		3	3	3	3	3	3	3	5	2	4	3	2	2				✓
Rabbits and Hares																					
Black-tailed Jackrabbit	*Lepus californicus*	Leporidae			5	4	5	5	5	5	3	1	4	5	5	5	5	✓			✓
Desert Cottontail	*Sylvilagus audubonii*	Leporidae			1	3	3	5	5	5	5	1	4	5	5	3	4	✓			✓
Squirrels, Chipmunks, and Marmots																					
California Ground Squirrel	*Spermophilus beechyi*	Scuridae			5	5	3	3	4	4	4	0	5	5	5	0	1	✓			✓
Merriam's Chipmunk	*Tamias merriami*	Scuridae			0	3	3	3	3	0	1	0	0	3	3	0	0	✓			✓
San Joaquin Antelope Squirrel	*Ammospermophilus nelsoni*	Scuridae	ST		4	0	1	0	0	4	0	0	3	0	0	5	5	✓			✓

Table D-1: Vertebrate Species Known or Likely to Occur in the CPER (Stafford 2016)

					Relative Abundance in Habitat Elements [2]								Relative Abundance in Units [2]					Distribution			
Common Name	Scientific Name	Family	Status[1]	Exotic	Grassland	Oak W.	Juniper W.	Coastal Scrub	Chaparral	Desert Scrub	Riparian	Pond	American	N. Chimineas	S. Chimineas	Elkhorn	Panorama	Breeding	Winter	Migration	Year-round
<u>*Pocket Gophers*</u>																					
Botta's Pocket Gopher	*Thomomys bottae*	Geomyidae			5	5	4	4	5	4	5	5	5	5	5	4	4	✓			✓
<u>*Pocket Mice and Kangaroo Rats*</u>																					
California Pocket Mouse	*Chaetodipus californicus*	Heteromyidae			1	4	4	4	4	4	4	3	1	4	4	0	0	✓			✓
Giant Kangaroo Rat	*Dipodomys ingens*	Heteromyidae	FE,SE		4	0	3	0	0	4	0	0	4	0	3	5	5	✓			✓
Heermann's Kangaroo Rat	*Dipodomys heermannii*	Heteromyidae			5	4	5	5	3	4	4	3	4	5	5	3	3	✓			✓
San Joaquin Pocket Mouse	*Perognathus inornatus*	Heteromyidae	CSSC		3	1	3	1	0	3	0	0	3	1	3	3	3	✓			✓
Short-nosed Kangaroo Rat	*Dipodomys nitratoides*	Heteromyidae	CSSC		3	0	1	0	0	3	0	0	1	1	1	3	3	✓			✓
<u>*Mice, Rats, and Voles*</u>																					
Big-eared woodrat[3]	*Neotoma macrotis*	Muridae			1	5	5	4	5	0	5	5	3	5	5	0	0	✓			✓
Brush Mouse	*Peromyscus boylii*	Muridae			1	4	4	4	4	3	3	3	1	4	4	0	0	✓			✓
California Vole	*Microtis californicus*	Muridae			4	3	3	3	3	1	4	4	3	4	4	0	0	✓			✓
Deer Mouse	*Peromyscus maniculatus*	Muridae			5	5	5	5	5	5	5	5	5	5	5	3	4	✓			✓
House Mouse	*Mus musculus*	Muridae			1	1	1	1	1	1	3	3	1	1	1	0	1	✓			✓
Pinyon Mouse	*Peromyscus truei*	Muridae			1	1	3	3	3	1	1	1	0	3	3	0	0	✓			✓
San Diego Desert Woodrat[3]	*Neotoma bryanti*	Muridae	CSSC		1	1	3	4	1	1	0	0	0	3	3	0	0	✓			✓
Southern Grasshopper Mouse	*Onychomys torridus tularensis*	Muridae	CSSC		3	0	3	3	0	3	0	0	3	3	3	3	3	✓			✓
Western Harvest Mouse	*Reithrodontomys megalotis*	Muridae			3	3	3	3	3	1	4	4	4	4	4	1	1	✓			✓
<u>*Foxes, Wolves, and Relatives*</u>																					
Coyote	*Canis latrans*	Canidae			5	5	5	5	5	4	5	5	5	5	5	4	4	✓			✓
Gray Fox	*Urocyon cinereoargenteus*	Canidae			1	4	4	4	4	4	4	4	1	5	5	0	0	✓			✓
Kit Fox	*Vulpes macrotis mutica*	Canidae	FE,ST		4	0	1	1	0	4	0	0	4	1	1	5	5	✓			✓

Table D-1: Vertebrate Species Known or Likely to Occur in the CPER (Stafford 2016)

					Relative Abundance in Habitat Elements [2]								Relative Abundance in Units [2]					Distribution			
Common Name	Scientific Name	Family	Status[1]	Exotic	Grassland	Oak W.	Juniper W.	Coastal Scrub	Chaparral	Desert Scrub	Riparian	Pond	American	N. Chimineas	S. Chimineas	Elkhorn	Panorama	Breeding	Winter	Migration	Year-round
<u>*Bears*</u>																					
Black Bear	*Ursus americanus*	Ursidae			1	3	3	3	3	1	3	3	1	3	3	0	0	✓			✓
<u>*Racoons and Relatives*</u>																					
Raccoon	*Procyon lotor*	Procyonidae			0	4	1	3	3	1	5	4	1	4	5	0	0	✓			✓
Ringtail	*Bassariscus astutus*	Procyonidae	DFG-FP		0	3	3	3	3	1	3	1	1	3	3	0	0	✓			✓
<u>*Weasels and Relatives*</u>																					
American Badger	*Taxidea taxus*	Mustelidae	CSSC		4	3	3	2	2	3	1	1	3	3	3	3	3	✓			✓
Long-tailed Weasel	*Mustela frenata*	Mustelidae			3	3	3	3	3	3	3	3	3	3	3	3	3	✓			✓
<u>*Skunks*</u>																					
Striped Skunk	*Mephitis mephitis*	Mustelidae			1	3	1	3	3	1	3	3	1	3	3	1	1	✓			✓
Western Spotted skunk	*Spilogale gracilis*	Mustelidae			1	1	3	3	3	3	1	1	1	3	3	1	1	✓			✓
<u>*Cats*</u>																					
Bobcat	*Felis rufus*	Felidae			1	4	4	4	4	4	4	4	3	4	4	3	3	✓			✓
Mountain Lion	*Felis concolor*	Felidae			1	3	3	3	3	3	3	3	1	3	3	1	1	✓			✓
<u>*Pigs*</u>																					
Wild Pig	*Sus scrofa*	Suidae		✓	4	4	3	3	4	1	4	4	3	4	3	0	0	✓			✓
<u>*Deer, Elk, and Relatives*</u>																					
Elk	*Cervus elaphus nannodes*	Cervidae			5	3	4	4	1	3	3	3	5	5	5	0	0	✓			✓
Mule Deer	*Odocoileus hemionus*	Cervidae			4	5	3	3	3	1	5	5	3	5	4	0	0	✓			✓
<u>*Pronghorn*</u>																					
Pronghorn	*Antilocapra americana*	Antilocapridae			4	1	1	0	0	4	3	3	4	3	0	1	1	✓			✓

Table D-1 Notes

[1] Federal Status Designations:

FE = Federally Endangered. Species in danger of extinction throughout all or significant portions of its range.

FT = Federally Threatened. Species likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

State Status Designations:

CSSC = California Species of Special Concern. Animal species with California breeding populations that may face extinction in the near future.
DFW-WL = California Department of Fish and Wildlife Watch List
DFW-FP = Fully protected by the State of California under Sections 3511 and 4700 of the Fish and Game Code.
SAL = Special Animals List
SE = State Endangered. Species whose continued existence in California is jeopardized.
SE-PD = State Endangered, proposed for delisting
ST = State Threatened. Species, although not presently threatened with extinction, may become endangered in the foreseeable future.
CE = Candidate for State listing as an Endangered Species

Other Status Designations:

AUD-WL = Audubon Watch List

INT = Introduced or non-native

SSC = Species of Special Concern. Animal species with breeding populations that may face extinction in the near future.

USBC-WL = United States Watch List of Birds of Conservation Concern

WBWG = Western Bat Working Group

LM = Low-Medium Priority

M = Medium Priority

MH = Medium-High Priority

H = High Priority

[2] Relative abundance:

5 = Nearly always occurs in appropriate habitats in moderate to large numbers
4 = Usually occurs in appropriate habitats in small numbers
3 = Expected in appropriate habitats, but in very small numbers
2 = Occasional and/or patchy presence
1 = Rare, often with one or two occurrences
0 = Not present (or not expected to be present)
U = Unknown or insufficient data
N/A = Not applicable

[3] Prior nomenclature:

Western Toad (*Bufo boreas*)

Pacific Treefrog (*Hyla regilla*)

Coast Horned Lizard (*Phrynosoma coronatum*)

Gilbert's Skink (*Eumeces gilberti*)
Western Whiptail (*Aspidoscelis tigris*)
Western Rattlesnake (*Crotalus viridis*)
Dusky-footed Woodrat (*Neotoma fuscipes*)
Desert Woodrat (*Neotoma lepida*)

† Taxonomy is currently under review

Appendix E
Special-Status Species Profile

Appendix E Special-Status Species Profiles

The Carrizo Plains Ecological Reserve supports occurrences of numerous rare plant and animal species. These include several species that have been listed as threatened, endangered, or of other special status under one or more of the following:

- **Federal Endangered Species Act**: listed or proposed for listing as threatened or endangered;
- **California Endangered Species Act**: listed or candidates for listing;
- **Fully Protected Species**: listed under California Fish and Game Code;
- **Species of Special Concern**: species of special concern on the special animals list (CDFW 2016b);
- **CRPR**: plants that are rare, threatened or endangered in California (Ranks 1B and 2);
- **Western Bat Working Group**: species ranked as 'high' or 'medium' on the Regional Priority Matrix; and
- **CEQA**: other species that meet the definition of rare or endangered under CEQA, including those not listed but known to be very rare or declining.

For each species, the following provides a brief summary of their distribution, life history, and threats, focusing on information that is relevant for management within the CPER. More detailed information can be found in the sources referenced.

E.1 Plants

E.1.1 Lost Hills Crownscale (*Atriplex coronata* var. *vallicola*): CRPR 1B.2

Lost Hills crownscale is a diminutive annual herb (<8 inches) in the Goosefoot family (Chenopodiaceae). Endemic to California, its historical range within the San Joaquin Valley spanned parts of Fresno, Kings, Kern, Merced, and San Luis Obispo counties (CNPS 2012). The current known distribution includes populations on the Kerman Ecological Reserve (Fresno County), in the Lokern-McKittrick area (Kern County), in southwestern Merced County, near Lost Hills (Kings County), and in the Soda Lake region of the Carrizo Plain (San Luis Obispo County; ESRP 2010). In 1993, large metapopulations (over 10,000 plants) occurred in the Lost Hills and Carrizo Plain locations with other sites represented by small populations of a few hundred plants or less. The taxonomy of the species has not been conclusively resolved and it has been speculated both that plants within the Carrizo Plain may represent an undescribed subspecies of Lost Hills crownscale (Hickman 1993, Skinner et al. 1994).

Lost Hills crownscale tends to grow in the dried beds of saline/alkaline pools including Soda Lake and associated playas on the Carrizo Plain and has also been found on soils rich in gypsum (BLM 2010b, ESRP 2010). Elevations of extant populations range from 160 to 280 feet for San Joaquin Valley occurrences to 1,300 to 2,000 feet for those on the Carrizo Plain and south of McKittrick (ESRP 2010).

Lost Hills crownscale is threatened primarily by land modification associated with agricultural conversation (CNPS 2012). The addition of gypsum or other substances to leached out salts from the alkali soil through irrigation alters soil chemistry. Restoring natural alkaline conditions of these modified soils can be difficult and impractical. Destruction of habitat as part of energy infrastructure development presents additional threats to the species (CNPS 2012).

Within the CPER, Lost Hills crownscale occurs only in the American Unit, where it is known from three locations (Figure 21): one near the south shore of Soda Lake, and two in ephemeral drainages near the historic American Ranch. The Soda Lake population occurs on Chicote complex alluvial soils within the *Allenrolfea occidentalis* shrubland alliance of the desert scrub vegetation element. The more southerly populations occur on Panoza-Beam complex soils of the Painted Rock sandstone and Vaqueros formations in California annual and perennial grassland macrogroup of the grassland vegetation element (G. Butterworth, unpublished data).

E.1.2 Round-leaf Filaree (*California macrophylla*) (formerly *Erodium macrophyllum)*: CRPR 1B.1

Round-leaf filaree is an annual herb in the Cranesbill family (Geraniaceae). Within California it is known from Lassen County in the north to San Diego County in the south and from the coast to the eastern edge of the inner coast ranges and Sacramento/San Joaquin valleys (including southern Sierra foothills) (Hickman 1993). The species grows in grasslands on friable clay soils but it may historically have been common on other soil types. Populations generally occur in foothill locations at elevations between 200 and 2,000 feet. Most populations are small (<1,000 plants) making them vulnerable to natural and anthropogenic disturbances (Gillespie and Allen 2004)

The rarity of the species, which was thought to be more widespread historically in California, may be largely a result of habitat loss due to cultivation, given its primary occurrence in grasslands (Gillespie and Allen 2008). Within remaining grasslands, round-leaf filaree is threated by exotic species (Gillespie 2003), which have reduced seedling emergence, survival, and fecundity (Gillespie and Allen 2004). Round-leaf filaree grows primarily on loamy soils and in soils inoculated with arbuscular mycorrhizal fungi from invaded grasslands (Gillespie and Allen 2006). Experimental fires set in June after seed set but before dispersal of exotic grass seeds reduced round-leaf filaree recruitment but increased fecundity (Gillespie and Allen 2004).

Within the CPER, round-leaf filaree occurs in grasslands and occasionally desert scrub, often on Panoza-Beam complex and Aido clay soils, mostly associated with Monterey Shale Saltos Shale Member formation. Presently it is known from three main locations within the American Unit and southern portions of the Chimineas Unit (Figure 21):

1. In the American Unit, there are three occurrences near the American Ranch in California annual and perennial grassland on Aido clay and Panoza-Beam complex soils associated with the Monterey Shale Saltos Shale formation. Another population exists just beyond the unit's western boundary, approximately 1.5 miles northeast of Turkey camp.
2. In the North Chimineas Unit, there is an occurrence approximately 1.5 miles southwest of the Saucito Ranch in the Little Garcia Management Unit. This population occurs in California annual and perennial grassland on Seaback-Panoza-Jenks soils associated with the Monterey Shale Saltos Shale formation. Additional occurrences are present in the Garcia Management Unit.
3. In the South Chimineas Unit, round-leaf filaree has been observed within Saltos, Taylor, and West Grantline management units, mostly within 2 miles of Taylor Spring. It grows in California annual and perennial grassland, where it occurs on Aido Clay and Beam-Panoza-Hillbrick and Padres-Wasioja complex soils. It is also found in desert scrub associated with the *Isomeris arborea* provisional community and *Ericameria linearifolia* provisional shrubland alliance on Aido clay and Beam-Panoza-Hillbrick soils. All of these soils are associated with the Monterey Shale Saltos Shale formation.

E.1.3 La Panza mariposa lily (*Calochortus simulans*): CRPR 1B.3

La Panza mariposa lily is a bulbiferous herb in the Lily family (Liliaceae) that is endemic to California where it is known only from Santa Barbara and San Luis Obispo counties (CNPS 2012). It grows on sand or sandy soil, often granitic and rarely ultramafic in origin, and tends to be associated with grasslands and pine forest communities (NatureServe 2006, eFloras 2008). It can be common in disturbed areas such as along roadsides and following fires (NatureServe 2006). Typical population elevations range from sea level to 3,600 feet (NatureServe 2006). The species is threatened by land development and possibly by recreational activities such as off-highway vehicle use (CNPS 2012).

Within the CPER, La Panza mariposa lily occurs primarily in coastal scrub and oak woodland communities with scattered occurrences in grassland and riparian areas. It is associated with Tajea-Saltos complex soils in the north and Bellyspring-Saltos and Saucito-Akad rock outcrop soils in the south. Populations are associated with geologic formations consisting of marine clastic sedimentary rocks, sandstone, clay shale and minor conglomerates.

The species has been observed in two general areas within the Chimineas units (Figure 21):

1. In the northwestern corner of North Chimineas Unit between San Juan Creek and Deadman Flat within the Gillam and Barrett management units. Here, plants occur primarily in association with coastal scrub in the *Eriogonum fasciculatum* and *Salvia leucophylla* shrubland associations and the *E. elongatum* provisional herbaceous alliance, the Blue Oak (*Quercus douglasii*) oak woodland alliance, and to a lesser extent in areas associated with California annual and perennial grassland. They grow almost exclusively on Tajea Saltos complex soils.
2. In Carrizo Canyon near the confluence with Saltos Canyon, east of Sycamore Ridge, within the Taylor and Saltos management units of the South Chimineas Unit. Here it is found in coastal scrub of the *Eriogonum fasciculatum* and *Salvia leucophylla* shrubland associations, in blue oak (*Quercus douglasii*) woodlands, and in *Baccharis salicifolia* shrublands in riparian/riverine areas. Plants grow primarily on Bellyspring-Saltos and Saucito-Akad rock outcrop soils and almost entirely in association with geologic formations associated with marine clastic sedimentary rocks, sandstone, clay shale and minor conglomerates.

E.1.4 Lemmon's Jewelflower (*Caulanthus lemmonii*): CRPR 1B.2

An annual herb, Lemmon's jewelflower is a member of the mustard family (Brassicaceae) that is endemic to California. It is known from the San Francisco Bay Area, San Joaquin Valley, and south coast ranges (Hickman 1993). The species grows in grasslands, scrub, woodlands, and chaparral (eFloras 2008). Some extant populations are threatened by land development. The species may be susceptible to impacts from cattle grazing, particularly when it occurs during the species flowering period.

Within the CPER, Lemmon's jewelflower has been observed primarily in the South Chimineas Unit within Carrizo and Saltos canyons, especially at and north of their confluence within the Saltos Management Unit (Figure 21). The species occurs primarily on steep slopes including the walls of canyons, drainages, and road cuts (G. Butterworth, pers. comm. 2009). Known occurrences are primarily located within vegetation mapped as part of the coastal scrub and riparian habitat elements, on Bellyspring-Saltos and Saucito-Akad rock outcrop soils associated with the Simmler and marine clastic sedimentary rock/sandstone/clay shale formations.

E.1.5 Valley Larkspur (*Delphinium recurvatum*): CRPR 1B.2

A member of the family Ranunculaceae, valley larkspur is a perennial herb endemic to California. Historically found within the state's Central Valley and adjacent foothills, the species' range has narrowed considerably due to widespread habitat conversion. Many historical occurrences have been extirpated due to land modification associated with agricultural development (CNPS 2012) and the species is now very rare outside the southern San Joaquin Valley although it is also known to occur in parts of the Sacramento Valley, Inner South Coast Range Mountains, and mountains and deserts within the Mojave Bioregion (CNPS 2012, Consortium of California Herbaria 2010).

Valley larkspur grows in poorly drained, sandy or clay alkaline soils on valley floors, often in association with grasslands and *Atriplex* scrub at elevations between 100 and 2,000 feet (eFloras 2008, Consortium of California Herbaria 2010). Treatment of alkali soils with substances such as gypsum to leach salts alters the soil chemistry, rendering it inhospitable for valley larkspur and making restoration to alkaline conditions impractical. Although all larkspur (*Delphinium* spp.) are poisonous to cattle, cattle will consume them (USDA 2011). While early season grazing may reduce competition of this species with non-native annual grasses and forbs, grazing during the flowering period may limit reproduction.

Within the CPER, valley larkspur is expected to be present (but in very small numbers) in desert scrub in the American Unit (Appendix C). It also occurs near Soda Lake on saline/alkaline soils associated with surrounding playas (BLM 2010b).

E.1.6 Umbrella Larkspur (Delphinium umbraculorum): CRPR 1B.3

Umbrella Larkspur
(Photograph by Ken Hickman)

Umbrella larkspur, a member of the family Ranunculaceae, is a perennial herb endemic to central coastal California where it grows on slopes in oak forests within the outer south coast and western transverse range mountains, within Monterey, Santa Barbara, San Luis Obispo, and Ventura counties (CNPS 2012, eFloras 2008, and Consortium of California Herbaria 2010). Although poisonous to cattle, cattle will consume larkspurs (*Delphinium* spp.; USDA 2011). While early season grazing may reduce competition of this species with non-native annual grasses and forbs, grazing during the flowering period may limit reproduction.

Within the CPER, umbrella larkspur has been observed in the northwestern corner of the North Chimineas Unit (Barrett Management Unit), where it occurs in oak woodlands and adjacent chaparral, often in association with rocks. The species has also been observed along Carrizo Canyon (Figure 21).

E.1.7 Kern mallow (Eremalche parryi cf. ssp. kernensis): FE, CRPR 1B.1

A member of the mallow family (Malvaceae), Kern mallow is an annual plant endemic to western Kern County and eastern San Luis Obispo County where it is found on eroded hillsides and alkali flats between 300 and 3,000 feet elevation (Hickman 1993). Within the Carrizo Plain National Monument, the species is associated with California ephedra (*Ephedra californica),* and herb-dominated areas between saltbush shrubs (*Atriplex* sp.). Kern mallow occurs on terrain that ranges from flat to gently sloping to extremely steep within the Temblor Range and is found preferentially on south-facing slopes. It has been observed on variable soils from gravel on soft loam to white clay in the Temblor Range or a red clay soil observed in the south part of the Caliente Range (DeVries 2011).

The taxonomy of Kern mallow has been in debate and has changed over time; the taxon was formerly known as *E. kernensis* but is presently thought to be a subspecies of the more widespread *E. parryi* (Baldwin et al. 2012). Differentiating the two conspecifics requires examination of calyx length, calyx lobe length, calyx width, bractlet length, and petal length, and whether there are pistillate flowers within the population (DeVries 2011, Baldwin et al. 2012). Molecular phylogenetic analyses did not resolve *E. parryi* ssp. *kernensis* as an evolutionarily distinct lineage from *E. parryi* ssp. *parryi,* though it may be a very recently divergent lineage (Andreasen 2005). The USFWS has identified populations of Kern mallow that are primarily white-flowered as the primary conservation concern (USFWS 1998).

Kern Mallow
(Photograph by Ken Hickman)

The endangered species is threatened by habitat conversion and degradation due to agriculture, petroleum production, and other development. Within protected habitat, populations are threatened by both uncontrolled grazing and competition with nonnative plants, which can be intense in the absence of grazing (USFWS 1998). Specifically, intensive sheep grazing was found to reduce reproductive output (Mazer et al. 1993). Meanwhile, demographic studies showing that Kern mallow seedling survival is lower in areas of dense exotic plant cover, and experiments yielding greater flower production when exotic plants were clipped to simulate grazing, suggest that light to moderate grazing in areas or years of high annual exotic plant productivity may promote the endangered species (Cypher 1994b).

Until 2010, Kern mallow was not known to occur west of the Temblor Range. This, combined with the uncertain taxonomy and difficulty differentiating it from *E. parryi ssp. parryi,* caused *E. parryi* plants observed within the CPER to be attributed as such. Recent observations in the CPNM (DeVries 2011) suggest perhaps some of the *E. parryi* populations within the CPER may be the endangered subspecies. Within the CPER, Kern mallow is found throughout the Elkhorn, Panorama, and South Chimineas units, with several smaller populations are found on the North Chimineas Unit. Occurrences are most commonly observed within the desert scrub and juniper woodlands, though are also found within more xeric grasslands.

E.1.8 Pale-yellow Layia (Layia heterotricha): CRPR 1B.1, USFWS FSC

Pale Yellow Layia
(Photograph by George Butterworth)

Pale-yellow layia is an annual herb in the sunflower family (Asteraceae) that is endemic to California and is known from the South Coast Range Mountains, San Joaquin valley, Southern Sierra Foothills, and the Tehachapi Mountains (CNPS 2012, Consortium of California Herbaria 2010). It grows in grasslands, meadows, and woodland openings on clayey, sandy, or alkaline soils (eFloras 2008). Pale-yellow layia is threatened by agricultural conversion of habitat, disturbance associated with grazing and OHV use, and by competition with exotic plant species (CNPS 2012).

Within the CPER, the species is known only from the eastern portion of the South Chimineas Unit where it occurs in grassland, desert scrub, and juniper woodland; in some cases, it co-occurs with showy madia (*Madia radiata*) and round-leaf filaree (*California macrophyllum*) (Appendix C).

E.1.9 Munz's layia (*Layia munzii*): CRPR 1B.2

Munz's layia is an annual herb in the sunflower family (Asteraceae) that is endemic to California, where it is found in the San Joaquin Valley and adjacent Carrizo Plain. The species occurs in wetlands as well as alkali scrub and valley and foothill grasslands on alkaline clay soils between 350 and 2,200 feet in elevation (CNPS 2012).

Historically, Munz's layia was widespread in the western San Joaquin Valley and inner Coast Ranges from Fresno south, and in San Luis Obispo County in the Carrizo Plain and Cholame Valley. Habitat loss primarily due to agricultural conversion has caused declines in the species populations in the San Joaquin Valley (USFWS 1998). Currently, the most extensive colonies of the rare plant occur within the Carrizo Plain, between the area southeast of Soda Lake to California Valley (Lewis 1997). The impacts of cattle grazing on this early-spring annual species are unknown but no detrimental effects have been observed (Lewis 1997).

Within the CPER, Munz's layia has been observed along the margin of Soda Lake in the northeastern portion of the American Unit. The species is anticipated to occur in alkaline wetlands and desert scrub elsewhere in the reserve at low abundance.

E.1.10 Showy Madia (*Madia radiata*): CRPR 1B.1, USFWS FSC

Showy madia, a member of the sunflower family (Asteraceae), is an annual herb endemic to California where it is known from occurrences scattered across the Inner South Coast Range Mountains (Consortium of California Herbaria 2010). The species commonly grows on heavy, clayey soils, often derived from decomposed shale, and occurs in grasslands, oak woodlands, chaparral, and disturbed sites between 80 and 3,700 feet (eFloras 2008).

Within the CPER, showy madia occurs in grassland and open areas within desert scrub and juniper woodland. Occurrences for this species have been documented within the Taylor and West Grantline management units of the South Chimineas Unit and on the western border of the American Unit (Figure 21).

E.1.11 San Joaquin Woolly Threads (*Monolopia congdonii*): FE, CRPR 1B.2, (formerly *Lembertia congdonii*)

A member of the sunflower family (Asteraceae), San Joaquin woolly threads is an annual herb endemic to California. Historically known from Fresno, Kings, Kern, Santa Barbara, San Benito, San Luis Obispo, and Tulare counties, half of its known occurrences have been extirpated and extant populations are seriously threatened by agricultural conversion, energy development, urbanization, grazing, trampling, and vehicles (CNPS 2012). Relatively recent surveys indicate that the species now exists primarily in four metapopulations: on the Carrizo Plain (San Luis Obispo County, the largest occurrence), near Lost Hills (Kern County), Kettleman Hills (Fresno and Kings counties), and Jacalitos Hills (Fresno County; USFWS 1998). Smaller populations occur in the Panoche Hills (Fresno and San Benito counties) and in Bakersfield as well as in Cuyama Valley.

The species grows on sand, sandy loam, or silt soils often derived from Saltos Shale and Santa Margarita and Temblor geological formations in grasslands or associated with alkali sinks (USFWS 1998, BLM 2010b). It frequently occurs on sandy dunes and ridges and along the high-water line of washes and terraces (USFWS 1998). Typical population elevations range from 200 to 850 feet at floor and foothills sites in the San Joaquin Valley to 2,000-2,600 feet in and around the Carrizo Plain (USFWS 1998). Within the CPER, San Joaquin woolly threads is anticipated to occur in small numbers in grasslands of the Elkhorn Unit, (Appendix C), where it has been mapped in three locations along the ephemeral drainages (Figure 20).

San Joaquin Woolly Threads
(Photograph by Bill Bouton)

Population sizes can fluctuate considerably and may be correlated to precipitation levels as few seeds germinate in low rainfall years (BLM 2010b). The species' occurrence in previously plowed or disked lands within the CPNM that have been fallow for at least five years have suggested the potential for a seed bank (BLM 2010b). The species does not appear to be highly sensitive to or impacted by grazing and it has been proposed that a regimen of moderate grazing, especially early in the season, can reduce competition from non-native annual grasses and forbs and benefit the species (BLM 2010b), though a study of four populations at Lost Hills, Elkhorn Plain, and two locations on the Carrizo Plain between 1992 and 1993 found no effect of weeding on plant size or fecundity (Mazer and Hendrickson 1993). Populations subjected to grazing should be monitored, stocking levels should be moderate to prevent excessive trampling and soil compaction, and cattle should be removed prior to flowering.

Populations studied on the Carrizo and Elkhorn plains, and in the Kettleman Hills northeast of the CPER, showed that plants were often heavily grazed by cattle, giant kangaroo rats, or other herbivores but typically recovered via compensatory growth (Cypher 1994a). Maximum stem length, number of stems, and flower head production were generally greater in grazed areas in the Carrizo Plain and Kettleman Hills populations and equal to or slightly lower in grazed areas at the Elkhorn Plain site. Herbivory and damage by giant kangaroo rats (*Dipodomys ingens*) rarely causes mortality yet can reduce the reproductive capacity of plants by up to 30%. In contrast, plants growing on giant kangaroo rat precincts on the Elkhorn Plain were larger, had more stems, and produced more seed heads than those growing between precincts (no difference at the Carrizo site), but the power of this comparison was compromised by the study's small sample size. Flowers produce abundant seed even when pollinators are excluded and seedling survivorship is between 50 and 70% (Cypher 1994a).

San Joaquin woolly threads may be threatened by frequent fire promoted by the presence of exotic grasses (USFWS 1990).

E.2 Invertebrates

E.2.1 Vernal Pool Fairy Shrimp (*Branchinecta lynchi*): Federal Threatened Species

The vernal pool fairy shrimp is a small aquatic crustacean that occurs primarily in California's Central Valley but also in the Coast Range Mountains and in two isolated areas within the Agate Desert in southern Oregon. The species inhabits a wide range of vernal pool habitats, from small, clear, rock pools to large, turbid, mud-bottom grassland pools. Though they have been observed in large vernal pools, they are most common in smaller pools, particularly those that are less than 0.05 acre (USFWS 2005a). The species may also occur in artificial, ephemeral habitats including ditches, graded areas, and depressions in firebreaks (Eng et al. 1990).

At the onset of the winter rains, dormant eggs (cysts) of vernal pool fairy shrimp hatch and develop through a series of instars over approximately 41 days, depending on temperature. Within a ventral brood sac, females carry eggs that either drop to the bottom of the pool or remain in the brood sac until the mother dies and sinks. When pools dry, the eggs dry up and go dormant as cysts, which tolerate summer heat and prolonged desiccation until pools refill, when some, but not all, of the cysts hatch, leaving a persisting "cyst bank" in the soil (USFWS 1994). These cysts, which can be dispersed by waterfowl and other migratory species, hatch in water of appropriate temperature and chemistry. Fairy shrimp may be found in sites that provide the needed hatching conditions but may not provide the conditions necessary for the long-term persistence of the species in that site (Eriksen and Belk 1999).

Vernal pool fairy shrimp are filter feeders and eat bacteria, algae, protozoa, rotifers, and detritus. Their predators include larger aquatic invertebrates, and vertebrates including amphibians and birds (USFWS 1994). Vernal pool fairy shrimp are primarily threatened by loss and degradation of vernal pool habitat throughout the Central Valley and elsewhere in their range (USFWS 1994). The species may also be impacted by the factors that degrade vernal pool habitats, including exotic plants and animals including mosquito fish (*Gambusia* spp.).

In the Central Valley, the diversity of vernal pool invertebrates, including various types of fairy shrimp and tadpole shrimp, was found to be greater in grazed vernal pools than ungrazed vernal pools: an effect that was attributed to the increased depth and period of inundation within the grazed pools, which allowed a greater number of invertebrate species to complete their lifecycle before pools dried out (Marty 2005). It is not known how vernal pool fairy shrimp responded to grazing treatments. Cattle grazing may not affect pool period of inundation in areas of reduced precipitation, such as in the Carrizo Plain (Marty 2005). Moreover, cattle grazing could negatively affect vernal pool fairy shrimp by reducing the quality of water through defecation and sedimentation, and through directly trampling.

Of the five species of fairy shrimp know from the Carrizo Plain National Monument, the vernal pool fairy shrimp is the most restricted as it has been observed only in vernal pools north of the CPNM near Seven Mile Road (BLM 2010b). The species is also known from an ephemeral pond within the Los Padres National Forest north of the Gifford parcel on the west side of the South Chimineas Unit of the CPER (CDFW 2016a). The species has not been observed within the CPER during targeted surveys conducted by the Department's Resource Assessment Program (RAP) (R. Stafford, pers. comm. 2010).

E.2.2 Longhorn Fairy Shrimp (*Branchinecta longiantenna*): Federal Endangered Species

Endemic to California, longhorn fairy shrimp are extremely rare and are known from only four populations in the Central Valley and adjacent Coast Range Mountains, one of which is the Carrizo Plain (USFWS 2007). Distinguished by the male's extremely long second antennae, longhorn fairy shrimp occupy seasonally ponded areas including vernal pools, shallow lakes, and a variety of artificial habitats including roadside ditches, agricultural drains, and ruts created by heavy equipment (Eng et al. 1990).

Like vernal pool fairy shrimp, longhorn fairy shrimp are omnivorous filter-feeders that consume a variety of materials they encounter in the water, including bacteria, unicellular algae, and other small organisms (Eriksen and Belk 1999). They are adapted to the unpredictable conditions of vernal pool ecosystems, including variable hydroperiod. They average 43 days to reach maturity but can mature in 23 days (Helm 1997). As with other species of fairy shrimp, their cysts can be dispersed by waterfowl and other migratory species (Eriksen and Belk 1999).

At the time of its listing, the long-horn fairy shrimp was primary threatened by habitat loss due to agriculture conversion and urbanization. Owing to its extreme rarity, the species is threatened by severe drought, habitat degradation due to exotic plants, incompatible grazing regimes, and other factors that could cause population extirpations (USFWS 2007).

Within the Carrizo Plain, the longhorn fairy shrimp is known from 20 localities within desert scrub communities north and northwest of Soda Lake and at the southern end of the plain (USFWS 2007). During targeted surveys conducted by the RAP program, the species was observed within the American Unit near Soda Lake (R. Stafford, pers. comm. 2010).

E.2.3 Kern Primrose Sphinx Moth (*Euproserpinus euterpe*): Federal Threatened Species

A member of the Sphingidae, the Kern primrose sphinx moth is endemic to central California and is known only from three locations: Walker Basin in Kern County, the Carrizo Plain in eastern San Luis Obispo County, and Cuyama Valley near Ventucopa in Ventura County. The species inhabits sandy washes and alluvial fans with open soil conditions, which it uses for basking on cool winters days. Loose sandy soil appears necessary for burrowing larva, and within the Carrizo Plain, the species has not been observed in stabilized sandy soils or on clay soils (Jump et al. 2006).

While adults are generalists, the larva of the Kern primrose sphinx moth are specialist on suncups (*Camissonia* spp.), and in the Carrizo Plain feeds on Mojave suncup (*Camissonia campestris*), though they may also utilize the co-occurring contorted suncup (*C. contorta*).

Little is known about the management needs for this narrowly endemic species. Soil disturbance and trampling caused by cattle grazing, equestrians, and hikers may impact the species, which may be especially vulnerable during its larval stage. These or other activities that negatively affect its host plants may also have consequences for the species (Jump et al. 2006).

Since its discovery in the region in 2002, the Kern primrose sphinx moth has been observed in five sandy washes on the eastern side of the Carrizo Plain, with two additional unconfirmed sites on the Elkhorn Scarp (BLM 2010b). It is unknown whether the species occurs within the CPER units; however, both the Elkhorn and Panorama units feature sandy washes and the larval host plant, Mojave sun cup, occurs at relatively high abundance within the Elkhorn Unit (Appendix C). The Elkhorn Unit is less than 0.5 miles north-northeast of the putative location within the Elkhorn Scarp (Figure 22; BLM 2010b).

E.3 Fish

E.3.1 Arroyo chub (*Gila orcutti*): California Species of Special Concern

The Arroyo chub, a member of the family Cyprinidae, is a small fish generally 2.75 to 4 inches in length with a deep body, relatively large eyes, and a small mouth (Moyle et al. 1995). It is native to Los Angeles and Ventura counties where it is known from the Los Angeles, San Gabriel, San Luis Rey, Santa Ana, and Santa Margarita rivers and from Malibu and San Juan creeks (Wells and Diana 1975). Arroyo chub have been introduced into other water bodies in California including the Santa Ynez, Santa Maria, Mojave, and Cuyama river systems (Miller 1968).

Arroyo chub inhabit slow moving waters in warm, fluctuating streams, typically over muddy or sandy bottoms, and are physiologically tolerant of hypoxic conditions (Moyle et a. 1995, Castleberry and Cech 1986). Algae and freshwater invertebrates constitute major components of their diet. Breeding occurs between February and August but primarily in June and July (Tres 1992). Mating and egg deposition typically occur in pools or other areas of gently flowing water and in the presence of aquatic plants. Where they co-occur, notably in the Cuyama River, Arroyo chub are known to hybridize with California roach (*Lavinia symmetricus*; Greenfield and Greenfield 1972, Greenfield and Deckert 1973). The Arroyo chub is threatened in its native range by habitat degradation due to urbanization and by competition with introduced species, especially the red shiner (*Cyprinella lutrensis*).

Within the CPER, arroyo chub occurs only in the Cuyama River, where they were observed near the road crossing (R. Stafford pers. comm. 2010). Invasion and spread of tamarisk (*Tamarix ramosissima*) may degrade habitat by channelizing flows and reduce the amount of shallow water habitat available. Nitrates from agricultural runoff may degrade water quality within the Cuyama River. Though the Cuyama River is outside of their native range, conservation of the species may be important to its long-term persistence owing to widespread loss of lower gradient streams within their native range.

E.3.2 California roach (*Lavinia symmetricus*): California Species of Special Concern

California roach is a small (<10 cm), chunky fish that is generally found in small, warm intermittent streams, including the lower reaches of some coastal streams, where dense populations often occur in isolated pools (Moyle et al. 1982). They can tolerate a range of habitat conditions, including temperatures of 30-35°C and dissolved oxygen levels as low as 1-2ppm. In streams with piscivorous fish such as Sacramento pikeminnows, California roach avoid pools and instead occur along stream margins (Moyle 1976).

The omnivorous fish feed mostly on filamentous algae, crustaceans, and insects. The short-lived fish reach sexual maturity in two to three years, and spawn between March and July in gravel beds or riffles where groups of females lay eggs on, and into, the substrate.

California roach varies amongst the geographically isolated basins in which it occurs (Moyle et al. 1995). The population within the Cuyama River may have been introduced (Moyle 1976), though this is not fully understood and genetic studies will be necessary to ultimately determine the subspecies and evolutionary lineage.

Within the CPER, the California roach occurs in the Cuyama River. It is not anticipated to occur in the other streams of the CPER, due to their insufficient hydroperiods and populations of piscivorous, exotic fish (R. Stafford, pers. comm. 2010).

E.4 Amphibians

E.4.1 California Red-legged Frog (*Rana aurora draytonii*): Federally Threatened, California Species of Special Concern

Endemic to California and Baja California, California red-legged frog occurs in California along the Coast Range Mountains from Mendocino County to the California/Mexico border, in parts of the Cascade Range, and along the western Sierra Nevada foothills between Shasta and Fresno counties (Shaffer et al. 2004). The threatened species, which has been extirpated from an estimated 70% of its range due to habitat loss and degradation, occurs primarily within rivers and coastal drainages in central California (USFWS 2002).

California red-legged frogs inhabit ponds, marshes, springs, streams, and reservoirs. They preferentially occur in deep pools with dense stands of overhanging willows and an intermixed fringe of cattails, though eggs, larvae, juveniles, and adults also have been found in ephemeral creeks and drainages and in ponds that do not have riparian vegetation (USFWS 2005b).

California Red-Legged Frog in the CPER
(Photograph by Morgan Ball)

Upland migration away from breeding habitat occurs primarily during wet periods within the non-breeding season (e.g., November to April; Fellers and Kleeman 2007). California red-legged frog have been found to disperse more than two miles through a diversity of intact and degraded habitats including agricultural land, forests, and grasslands (Bulger et al. 2003, Fellers and Kleeman 2007).

Breeding begins in January in southern populations, such as in the CPER, or March in northern areas, and continues through July. Eggs are attached to emergent vegetation at the surface of the water. Larval development requires between 11 and 20 weeks (Stebbins 1954, Hayes and Tennant 1985). While larvae are primarily herbivorous, adults have a varied diet that includes terrestrial and aquatic insects, crustaceans, and snails (Hayes and Tennant 1985). California red-legged frogs are threatened by habitat loss and degradation due to agriculture and urban development. They are also impacted by competition with and predation by introduced species, particularly bullfrogs (*Rana catesbeiana)* and fish (Moyle 1973, USFWS 2002). California red-legged frogs can also be infected by diseases including chytridiomycosis—a disease caused by chytrid fungi, which causes deformations and mortality (USFWS 2002).

Within the CPER, the California red-legged frog is known only from the Cuyama River, where it has been observed in numerous locations during the breeding season along an approximately 2.3-mile-long stretch of the Cuyama River within and adjacent to the Reserve's southern border (Figure 23). In a 2010 study, the USGS found low levels of chytrid fungus within the California red-legged frog within the Cuyama River (USGS, unpublished data). The threatened frog has not yet been observed in surveys of the ponds or within San Juan, Barrett, or Carrizo creeks, which appear to lack the appropriate hydroperiod for breeding.

E.4.2 Western Spadefoot Toad (*Spea hammondii*): California Species of Special Concern

A member of the family Pelobatidae, the western spadefoot toad occurs throughout the Central Valley region from Shasta to Kern County and along the Coast Range Mountains from Monterey County to the Mexican border. Though they occasionally inhabit woodlands, western spadefoot toads are primarily associated with grasslands and preferentially occur where grass is short and soils are sandy or gravelly (Stebbins 1985, Jennings and Hayes 1994, USFWS 2005a).

Adults range in length from 1.5 to 2.5 inches and have distinctive black, sharp-edged 'spades' on their hind feet. For most of the year, adults reside in subterranean burrows that they generally excavate, though abandoned mammal burrows are sometimes used (Ruibal et al. 1969). Surface movements are typically associated with rains or periods of high humidity (e.g., fog) when temporary pools, seasonal ponds, and ephemeral drainages fill (Dimmit and Ruibal 1980a). During the breeding season, which begins in late winter and lasts through April, adults seek out pools for mating and egg laying (Stebbins 1985). Ponds or

Western Spadefoot Toad
(Photograph by Bob Stafford)

other pooled water must have a hydroperiod of at least four weeks as eggs take from 1 to 6 days to hatch and metamorphosis can be completed within 3 to 11 weeks (Jennings and Hayes 1994). Preferred ponds are largely seasonal, as they lack predators including bullfrogs and predatory fish (Jennings and Hayes 1994).

Female western spadefoot toads deposit small clusters of 10 to 42 eggs to plant stems or other debris in the pool (Jennings and Hayes 1994). Juveniles and adults eat insects, worms, and other invertebrates (Dimmitt and Ruibal 1980b). Western spadefoot toad populations are threatened by habitat loss associated with urbanization and agricultural land development and the introduction of exotic predators (USFWS 2005a). Factors that reduce the hydroperiod of breeding ponds and pools beyond the critical duration required for metamorphosis may similarly impact populations of this species (USFWS 2005a).

Within the CPER, western spadefoot toads have been observed within the American Unit, near the Painted Rock Ranch Headquarters, and within the Chimineas units in the Cuyama River, San Juan Creek, Barrett Creek, and Carrizo Creek drainages, including in association with five ponds: Quarry, Number 3, Scale, Corral and Feed Lot (Figure 23). Western spadefoot toad breeding has been confirmed within Scale, Corral, Feed Lot, and Number 3 ponds. These ponds are perennial in average or above averages years, but dry up in low rainfall years and thus lack populations of bullfrogs or fish. The ponds, which were created as part of the historic ranching operation at the site in order to provide water for cattle (Section 2.4.5), are surrounded by grasslands that are actively managed with cattle grazing to maintain grasslands of low structure. Cattle grazing or other vegetation management will be needed to maintain open conditions required by this species within the breeding ponds and adjacent upland habitat.

E.5 Reptiles

E.5.1 California legless lizard (*Anniella pulchra*): California Species of Special Concern

The California legless lizard, a member of the family Anniellidae, occurs within the Coast Range Mountains from Contra Costa County to the Mexican border and in scattered locations in the San Joaquin Valley, the western foothills of the southern Sierra and Tehachapi mountains, and the southern California mountains. Favored habitats of this fossorial species include coastal dunes, chaparral, and coastal scrub (Miller 1944), though the species is thought to inhabit a variety of vegetation types occurring on well-drained, porous soils such as sand and sandy loams, where dry sand overlays damp sand such that the lizards can readily move between the soil layers (Miller 1944).

California legless lizards eat a variety of small insects and are themselves consumed by a variety of reptiles (snakes and lizards), birds, and mammals. The California legless lizard can tolerate and remain active at relatively low temperatures compared to other reptiles. As a result, winter hibernation occurs mostly in inland areas, with individuals in coastal and southern populations remaining active for most of the year. Mating occurs in late spring and early summer and live young are born in early to mid-autumn after a gestation period lasting four months (Jennings and Hayes 1994).

California legless lizards may be impacted by livestock grazing, which can limit food availability, reduce leaf litter, or compact the substrate (Jennings and Hayes 1994). These effects may be most acute where cattle congregate under trees within woodlands and savannas.

Within the CPER, California legless lizards have been observed within the Chimineas units, primarily in blue oak woodland and grassland habitat in the North Chimineas Unit, and in the river terrace grassland near Feed Lot Pond in the South Chimineas Unit (Figure 23). The cryptic species is expected to occur at moderate abundance in coastal scrub, desert scrub, juniper woodland, and riparian communities featuring appropriate soils and other conditions (Appendix D). Abundance of the species appears to have increased within the unit since it was acquired by the Department (R. Stafford, pers. comm. 2010).

E.5.2 San Joaquin Coachwhip (*Masticophis flagellum ruddocki*): California Species of Special Concern

A member of the family Colubridae, the San Joaquin coachwhip is endemic to central California between Arbuckle in the Sacramento Valley (Colusa County) and the Grapevine portion of the San Joaquin Valley (Kern County) and westward into the Inner South Coast Range Mountains. The slender, fast-moving snake favors open, dry, areas, including grassland and saltbush scrub (Wilson 1970). Individuals often seek thermal refuge in rodent burrows, bushes, trees, and rock piles and hibernate below the soil surface (Wright and Wright 1957). Mating occurs between April and May with clutches of eight to 10 eggs laid between June and July. Incubation typically lasts around 80 days (Stebbins 1954, Fitch 1970).

San Joaquin Coachwhip on the CPER (Photograph by Jennifer Moonjian)

Coachwhips eat rodents, lizards, other snakes, young turtles, insects, eggs and carrion and are likely preyed upon by predatory birds including raptors and roadrunners (Cunningham 1959, Jones and Whitford 1989). Coachwhips typically occupy xeric habitats with dense ground cover of grasses and other herbaceous vegetation but open canopies. These environments may offer increased foraging opportunities, more abundant refugia, and/or beneficial thermal properties (Halstead et al. 2009). The San Joaquin coachwhip is threatened by extensive land use changes, including conversion of large areas of suitable habitat to row crops in the San Joaquin Valley and urban development in portions of the Inner Coast Range Mountains, which eliminate the species' prey and the mammal burrows it uses for refuge.

Within the CPER, the San Joaquin coachwhip has been observed within grasslands and desert scrub within the Chimineas units and along Sprague Hill Road on the western border of the American Unit (Figure 23). The species has also been observed on Soda Lake Road in the Carrizo Plain, and is expected to occur within the grasslands and desert scrub of the Panorama and Elkhorn units (Appendix D).

E.5.3 Coast Patch-Nosed Snake (*Salvadora hexalepis virgultea*): California Species of Special Concern

A member of the family Colubridae, the coast patch-nosed snake occurs in California from the northern Carrizo Plain south through the coastal zone into coastal northern Baja California (CDFW 2010b). It occurs in coastal chaparral, desert scrub, washes, sandy flats, and rocky areas, where it is diurnally active and occasionally seeks refuge in bushes, crevices, and animal burrows (Stebbins 1985). It seems to favor sandy soils or rocky areas in lowland deserts with scrub vegetation but also occurs in grasslands in flat areas and on the lower slopes of mountains.

Little is known about the species' ecology. Mating likely occurs between April and June, with egg laying (clutches average five to six eggs) occurring through August (Fitch 1970). Egg incubation in the lab required approximately 85 days (Stebbins 1954). Western patch-nosed snakes are likely opportunistic foragers and have been observed taking small lizards and mammals and the eggs of lizards and snakes (Stebbins 1985). Predators likely include raptors, roadrunners, small mammals, and larger snakes (CDFW 2010b).

Within the CPER, coast patch-nosed snake has been observed in two locations west of Quarry Pond on Barrett Creek in the North Chimineas Unit (Figure 23). The snake is expected to also occur within the juniper woodland, chaparral, and perhaps blue oak woodland elsewhere in the North Chimineas Unit (Appendix D). Conversion of shrub communities through too-frequent wildfire is a threat to this species (Jennings and Hayes 1994). Reduction of fine fuels through vegetation management including cattle grazing may reduce this risk.

E.5.4 Two-striped garter snake (*Thamnophis hammondii*): California Species of Special Concern

A member of the family Colubridae, the two-striped garter snake is found throughout the Coast Ranges from the Salinas Valley through the south coast and Transverse Ranges to northern Baja California (CDFW 2010b). It is typically associated with permanent or semi-permanent bodies of water, particularly streams with rocky beds that are lined by willows, but also ponds, lakes, wetlands and vernal pools (Stebbins 1985). During winter months, snakes may move to upland areas including oak woodlands and chaparral (Rathburn et al. 1993).

This highly aquatic species generally forages for small invertebrates, fish, and amphibians (and their eggs) along the water's edge and perhaps underwater. Mating begins in March and April and clutch sizes range from three to thirty-six eggs (Cunningham 1955). Young are hatched in July and August. The species is threatened by loss of aquatic habitat due to agricultural conversion and urban development, by predation from introduced bullfrogs, fish, and feral pigs, and by reductions of their amphibian prey (Jennings and Hayes 1994, Rossman et al. 1996).

The two-striped garter snake has not been observed within the CPER, though it has the potential to occur within the appropriate riparian areas and ponds of the Chimineas units at low abundance (Appendix D). The bedrock-lined reaches of San Juan Creek may provide habitat for the snakes, which seek cover amidst rocks.

E.5.5 California Glossy Snake (*Arizona elegans occidentalis*): California Species of Special Concern

California glossy snake is a medium-sized snake in the family Colubridae, restricted to the central San Joaquin Valley south to the Tehachapi Mountains and along the base of the Coast Range Mountains farther south to San Quintin, Baja California. Occurrences have been observed between sea-level to approximately 5,900 feet elevation (Thomson et al 2016).

Generally active between late February and November, California glossy snake is nocturnal and feeds primarily on diurnal lizards and small nocturnal mammals; large individuals also take small birds and other snakes. During the day, California glossy snake occupies burrows that it creates or that are created by small mammals (Thomson et al. 2016).

Glossy Snake
(Photograph by Alice Abella)

California glossy snakes occur at low population densities, relative to other snakes. Declines in California glossy snake populations have been attributed to agricultural development and habitat modification throughout the San Joaquin Valley and urban development within the Los Angeles basin (Stebbins 2003). The species may also be threatened by large, intense wildfires that convert shrublands to grassland (Thomson et al. 2016).

Within the CPER, California glossy snake have been observed in the Garcia Farming Management Unit within the northeast portion of the North Chimineas Unit, and in the southern portion (i.e., along Highway 166) of the East Grantline and West Grantline management units in the South Chimineas Unit. Consistent with range-wide assessments that the species occupies open microhabitat conditions, the observations within the CPER have been in very short-statured grasslands featuring less than 500 lbs./acre residual dry matter (R. Stafford, pers. comm. 2016). The species is expected in open microsites within grassland, coastal scrub, chaparral and desert scrub, but in very small numbers (Appendix D).

E.5.6 Western Pond Turtle (*Emys marmorata*): California Species of Special Concern

A member of the family Emydidae, the western pond turtle occurs from the San Francisco Bay south, along the coast ranges into northern Baja California, with isolated populations found also along the Mojave River. Individuals typically associate with permanent bodies of slow or stagnate water including ponds, lakes, and streams. They require basking sites such as exposed logs, rocks, or floating mats of vegetation (Holland 1994).

Between March and August females lay clutches of three to 11 eggs (Feldman 1982). Eggs may be deposited along sandy banks of slow-moving streams or farther (up to 100m) from the banks of foothill streams (Nussbaum et al. 1983). Eggs hatch following an incubation period of approximately 80 days.

Hatchling Western Pond Turtle (Photograph by Alice Abela)

Western pond turtles are omnivorous and may consume aquatic plants and invertebrates, fish, frogs, and occasionally carrion (Nussbaum et al. 1983, Stebbins 1972). Hatchling and juvenile turtles are preyed upon by fish, bullfrogs, garter snakes, wading birds, and some mammals. Movement of turtles along waterways or between pools is common and can involve distances of over three miles (Holland 1994). Individuals also regularly move away from ponds to hibernate during cold periods or estivate during periods when seasonal ponds dry up (Pilliod et al. 2013). In general, males tend to be more mobile than females; adult male turtles may have a home range size up nearly 2.5 acres (Bury 1972).

The primary threat to the western pond turtle is habitat destruction and the elimination of wetlands as part of agricultural development, flood control, damming/water diversion projects and urbanization (USFWS 1992). Other threats may include reduced genetic variability in isolated populations, an upper respiratory disease, spills of toxins into waterways, grazing, off-highway vehicle use, and severe drought (USFWS 1993). The influence of invasive tamarisk (*Tamarix* spp.) on stream channel morphology and hydrology can also degrade western pond turtle habitat (Lovich and Gouvenain 1998).

In the CPER, western pond turtles occur within the streams and ponds within the Chimineas units (Figure 23). The species has been observed along the entire length of the Cuyama River within the Reserve, along Carrizo Creek where a road-side spring ponds along the road, and in several locations on various tributaries of San Juan Creek. Western pond turtles also occupy eight ponds within the San Juan and Barrett Creek drainages: Broken Dam, Anna/Betty, Taylor, Gillam, Joe, Quarry, Number 3, and 26 ponds.

A radio telemetry study following three male and six female western pond turtles from the Taylor and Gillam ponds of the North Chimineas Unit found that, as water levels receded during the fall, turtles migrated between 400 and 1,100 feet from ponds into chaparral and oak woodland vegetation, where they burrowed into the litter and surface soil to estivate for 62 to 259 days (Pilliod et al. 2013).

In a 2005 study of western pond turtles in six ponds, Number 3, Quarry, Anna/Betty, Broken Dam, Joe, and Gillam, turtles produced an average of 4.9 eggs per clutch. Individuals within Joe Pond, the only pond with continued access for cattle, exhibited significantly greater growth rates when compared with other ponds. Moreover, this pond featured a higher incidence of hatchlings than any other pond (D. Germano, unpublished data). All of the turtle populations on the reserve suffered significant declines during the drought of 2013-2015, when all of the ponds on the reserve dried up.

E.5.7 Blainville's horned lizard (*Phrynosoma blainvillii*): California Species of Special Concern

A member of the family Phrynosomatidae, Blainville's horned lizard is found in the Coast Ranges from San Francisco to Baja California and parts of the San Joaquin Valley, foothills of the Sierra Nevada Mountains, and Transverse ranges. It inhabits open areas on sandy soil within grasslands, coastal scrub, chaparral, woodlands, and forests, and often is found in sandy washes with scattered shrubs (Fisher et al. 2002). Individuals favor open areas such as sandy expanses of washes, flood plains, and wind-swept areas.

Horned lizards are ant specialists, but may take small beetles, wasps, grasshoppers, flies, and caterpillars, especially when abundant. Research on populations near San Diego showed that 94% of the diet was comprised of native ants, and that the species does not eat the introduced Argentine ants (*Iridomyrmex humilis*). As these ants displace native ants, factors which facilitate the invasion of Argentine ants into horned lizard habitat are thought to threaten populations (Suarez et al. 2000). Moreover, this study showed that a diversity of ant species is required by horned lizards throughout their development, with smaller individuals feeding on smaller ants.

Blainville's Horned Lizard
(Photograph by Bill Bouton)

The timing of reproduction varies with local environmental conditions but likely occurs in May and June. Clutch size varied from six to 16 eggs, which are laid in loose soil and hatch after approximately two months (Pianka and Parker 1975). Horned lizards are predated upon by leopard lizards, sidewinders, striped whipsnakes, loggerhead shrikes, and hawks.

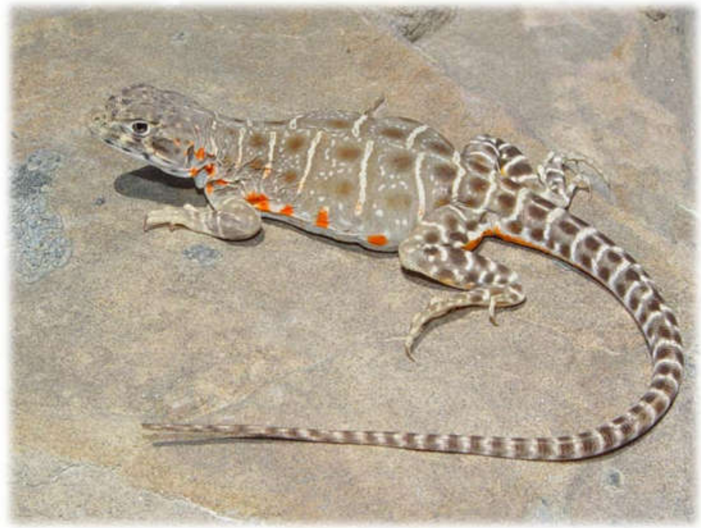
Within the CPER, Blainville's horned lizards have been observed in the Chimineas units, two areas within the American Unit, and at multiple locations on the Panorama and Elkhorn Units (Figure 23). The highest percentages of occurrences have been in coastal scrub and desert scrub, though the species is also observed in grasslands, juniper woodland, oak woodland, and riparian areas.

E.5.8 Blunt-nosed leopard lizard (*Gambelia sila*): Federally Endangered, California Endangered

The blunt-nosed leopard lizard is a narrowly endemic member of the family Cryotaphytidae that occurs only in scattered locations in the southern San Joaquin Valley and adjacent Carrizo Plain. Populations are typically associated with sparsely vegetated, low-relief alkali scrub, desert scrub, and grasslands which occur on alkali flats, broad sandy washes, arroyos, canyons and low foothills (Germano and Williams 1992, 2005). Blunt-nosed leopard lizards hibernate during winter months and are active between March and July. Mating occurs in April and May and females normally produce a single clutch of 2 to 6 eggs per year. Incubation takes roughly two months (Tollestrup 1982).

Blunt-nosed leopard lizards eat primarily insects and other lizards, and are in turn eaten by a variety of birds, snakes, and mammals including shrikes, American kestrels, burrowing owls, roadrunners, spotted skunks, and ground squirrels (Tollestrup 1979).

Blunt-nosed leopard lizard populations may be positively correlated with the frequency of burrows created by kangaroo rats, California ground squirrels, and other mammals, which the species uses during reproduction and as a thermal refuge (Warrick et al 1998). Much of the species' original habitat has been converted for agriculture, oil drilling, and urbanization. Cattle grazing may enhance habitat by creating open, bare ground amidst scattered shrubs and grasses (Germano et al. 2001), though it may have negative effects on the species if it removes the lizard's preferred shrubs or destroys mammal burrows used for shelter (USFWS 1998).



Blunt-Nosed Leopard Lizard
(Photograph by Marty Felner)

Within the CPER, blunt-nosed leopard lizards occur within the desert scrub and grasslands of the Elkhorn and Panorama units (Figure 22; Appendix D). The Elkhorn Unit served as an ungrazed (control) site for a study of effects of grazing on the species, which found that blunt-nosed leopard lizards survived in similar proportions in grazed and nongrazed areas both in years of low and high plant productivity; though, drought and lack of grazing during several years of the study may have rendered the results inconclusive (Williams et al. 1993, Germano and Williams 1994).

E.6 Birds

E.6.1 Bald eagle (*Haliaeetus leucocephalus*): California Endangered Species and Fully Protected Species

Within California, bald eagles breed mostly in the northern mountains and foothills, particularly in the Klamath Basin, though they also nest locally further south near large, inland waters including the Nacimiento and San Antonio reservoirs in southern Monterey County and the Channel Islands. Additionally, bald eagles breed further north winter in California in areas with large water bodies or rivers with abundant fish, which they hunt from adjacent snags or other perches. Between January and August, bald eagles build stick nests in large trees with open architecture (e.g., broken tops, sparse branches) near water (Zeiner et al. 1990).

Bald eagles were greatly impacted by pesticide-induced eggshell thinning in the 1960s and 1970s, which was a major factor in their listing as state and federal endangered. Their population recovery resulted in their removal from the federal endangered species list, though they remain state-listed as endangered. Presently, they suffer mortality due to collisions with power lines, shooting, and poisoning, while nest failures occur due to timber harvest and recreation (Zeiner et al. 1990).

Bald eagles have been observed at Broken Dam pond, the large pond within San Juan Creek on the western border of the North Chimineas Unit, which supported non-native fish. They are presumed to utilize the pond within the Reserve infrequently as part of migration and wintering habitat (Appendix D).

E.6.2 Swainson's Hawk (*Buteo swainsoni*): California Threatened Species

A member of the family Accipitridae, the Swainson's hawk migrates annually between breeding grounds throughout western North America to their wintering grounds in the pampas habitat of South America. This migration, which is one of the longest among raptors, begins in August or September and ends in November (National Audubon Society 2012). Importantly, Swainson's hawks have been observed wintering in parts of California as well as southern Mexico and Florida (National Audubon Society 2012).

Breeding habitat extends throughout the Rocky Mountains, southern Canada, northern Mexico, and into the western Great Plains near western Minnesota (National Audubon Society 2012). Within California, the breeding range of the Swainson's hawk is greatest in the Central Valley and the Great Basin; additional breeding habitat can be found in the Shasta and Owens valleys, as well as the Mojave Desert (CDFW 2012b).

Swainson's hawks forage aerially in open shrubland, such as juniper and sagebrush communities, and grassland (Woodbridge 1998) and roost in trees along riparian corridors near foraging (i.e., open) habitat as well as single trees along roadsides or in pastures (CDFW 2012b). In their breeding range, Swainson's hawks feed primarily on small rodents, including California voles (*Microtus californicus*) and reptiles, birds, and insects, with group foraging occurring when hunting larger prey such as ground squirrels (National Audubon Society 2012).

Each breeding pair produces only one brood per season that will contain one to four eggs (National Audubon Society 2012). Both parents provide care, with females responsible for brooding while males are primarily responsible for feeding. Juveniles depend on their parents until migration (Woodbridge 1998).

The two primary threats to the Swainson's hawk are loss of native foraging and breeding habitat and pesticide-use (CDFW 2012b). Although Swainson's hawks are adapted to foraging in agricultural fields including alfalfa and hay fields, pesticide-use can reduce prey populations (CDFW 2012b); a Swainson's hawk die-off occurred in their wintering grounds in the mid-1990s as a result of grasshopper control using pesticides (National Audubon Society 2012). Human disturbance near roosts can cause nest abandonment (National Audubon Society 2012).

In 2012, Swainson's hawks were obvserved nesting near an alfalfa field near the junction of Highways 33 and 166 approximately 25 miles east-southeast of the South Chimineas Unit of the CPER (R. Stafford, pers. comm. 2012). Additionally, Swainson's hawks were observed foraging in the heavily grazed grasslands on private land approximately nine miles north of the American Unit during spring migration in 2012 (R. Stafford, pers. comm.). The South Chimineas Unit's grasslands, desert scrub, coastal scrub, and open woodlands provide suitable foraging habitat, while the Reserve's riparian woodlands [i.e., Fremont cottonwood (*Populus fremontii*] may provide suitable nesting habitat (Appendix D).

E.6.3 Golden eagle (*Aquila chrysaetos*): California Fully-Protected Species

A member of the family Accipitridae, the golden eagle occurs year round in all areas of California except the Sacramento and San Joaquin valleys, the Los Angeles Basin, the Mojave and Colorado desert regions (where it is found only during the winter), and the coastal Klamath Mountains (Zeiner et al. 1990). Found in rolling foothill or exposed mountainous areas featuring open terrain for hunting, golden eagles are commonly associated with sage-juniper flats, deserts, grasslands, savannahs, and early successional stages of shrub habitats and forests (Zeiner et al. 1990).

Golden eagles primarily prey upon rabbits, hares, and rodents but will periodically eat other mammals, as well as birds, reptiles, and carrion (Zeiner et. al, 1990). Their territory size ranges from 6,400 to 48,000 acres (Smith and Murphy 1973, McGahan 1968). During their breeding season, which occurs between January through August with peak activity between March and July (Beebe 1974), golden eagles construct nests on cliffs and on large trees or other tall landscape features, such as power transmission line towers, within otherwise open areas. Breeding pairs often show high site fidelity and may reuse nests from previous years (Kochert et al. 2002). Clutches usually consist of two eggs that are laid in early February to mid-March and require approximately six weeks of incubation (Beebe 1974).

Golden eagles are primarily threatened by habitat loss due to urban and agricultural development. Pesticide and lead poisoning as well as electrocution on powerlines are also important sources of mortality (DeLong 2004), while collisions with wind-turbine blades may be of concern in areas where such power generating structures are present (Hunt et al. 1997). Land management practices that affect prey abundance can also have effects on golden eagle populations. For example, conversion of shrublands to grassland may reduce rabbit abundance, which can have important effects of golden eagle demography (Knick and Dyer 1997, Steenhof et al., 1997). Grazing may improve the quality of foraging habitat for golden eagles because ground squirrels, one of the birds favored prey items, are often attracted to low-stature grasses common in grazed areas (Hunt et al. 1995).

Within the CPER, golden eagles have been observed breeding and foraging in the Chimineas and American units in areas featuring grassland, coastal scrub, and blue oak woodlands with cliffs and large trees for nesting. Golden eagles are also predicted to utilize desert scrub, chaparral, and riparian vegetation. Golden eagles likely use the Panorama Unit and might occasionally forage within the Elkhorn Unit (Appendix D)

E.6.4 Northern harrier (*Circus cyaneus*): Species of Special Concern

A member of the family Accipitridae, the northern harrier winters throughout low and mid-elevation areas in California and breeds along the coast, in the Inner Coast Ranges Mountains, throughout the San Joaquin and Sacramento valleys, and in the northeastern corner of the state (Zeiner et al. 1990). The species is migratory and occurs more broadly and in greater numbers during migration than during the breeding season (Loughman and McLandress 1994). They utilize a variety of open, treeless habitats including marshes and wet meadows, the edges of lakes, rivers, and streams, and annual and perennial grasslands, sagebrush flats, desert sinks, pastures with low to moderate levels of grazing, and some croplands (MacWhirter and Bildstein 1996).

Northern harriers breed between March and August with pairs producing a single brood of 3-12 eggs (average is five) during a nesting period that lasts approximately 50 days (Craighead and Craighead 1956). Nests are constructed on the ground, generally in areas of dense, tall grasses or forbs in undisturbed locations (MacWhirter and Bildstein 1996). Based on results of studies in other parts of North America, breeding home ranges cover between 200 and 2,000 acres and foraging areas vary from 30 to 640 acres (Craighead and Craighead 1956, Zeiner et al. 1990).

Northern harriers forage on a variety of vertebrates, particularly rodents and passerines. Voles (*Microtus* spp.) are a favored prey item, particularly in wet habitats (e.g., near marshes or irrigated agricultural fields) where large populations are often supported (Krebs 1966, Bildstein 1 988). A study in San Luis Obispo County found that prey includes birds (81% of diet, mostly blackbirds and sparrows), mammals (18% of diet, mostly bush rabbits and voles), and occasional reptiles (1.5% of diet, especially western fence lizards) (Selleck and Glading, 1943). The species may compete for food with buteos, especially red-tailed hawks and red-shouldered hawks (Zeiner et al 1990).

Northern harriers are threatened primarily by habitat loss, particularly due to the loss of approximately 70% of California's grasslands since 1945 to agriculture and urban development and the loss of 34% of the state's remaining wetlands between 1954 and 1985 (Noss et al. 1995). Conversion of pastureland and suitable cropland to agricultural environments unsuitable for nesting and foraging (e.g., vineyards and orchards) is also of concern, especially in the Central Valley (Schweizer and Chesemore 1996). Agricultural practices that reduce populations of rodent prey species such as haying and the use of rodenticides can have deleterious impacts on northern harriers (MacWhirter and Bildstein 1996, Schweizer and Chesemore 1996). Nest failure due to trampling by hikers, dogs, off-highway vehicles, and livestock, or as a result of tillage, and nest predation by foxes and feral cats, represent additional threats (Roberson 1993, Burridge 1995, MacWhirter and Bildstein 1996, Unitt 2004, Hunter et al. 2005).

Northern Harrier
(Photograph by Ken Hickman)

Within the CPER, northern harriers have been observed within the North Chimineas Unit, within grasslands and blue oak woodlands, and in the riparian and wetland vegetation on the margins of the Barrett Creek ponds (i.e., Number 3 and Quarry). Occurrences during spring suggest that the species breeds within or near the Reserve. The species is also predicted to occur, though at relatively low abundance, within the American and Panorama units (Appendix D).

E.6.5 White-tailed kite (*Elanus leucurus*): California Fully Protected Species

A member of the family Accipitridae, the white-tailed kite is found year round in California from the coast to the eastern edge of the Central Valley and the western edge of the Mojave Desert. It is common in herbaceous lowland communities, often in association with agricultural areas (Zeiner et al. 1990). The species uses groves of dense, broad-leafed deciduous trees for nesting and roosting and favors habitats associated with large populations of voles, which are the white-tailed kite's preferred prey (Waian and Stendell 1970). Other diurnal small mammals and occasional birds, reptiles, and amphibians may also be included in the diet (Zeiner et al. 1990). Foraging typically occurs in open grasslands, meadows, farmlands, and emergent wetlands, and often occurs within a 0.5 to 2 square-mile area surrounding the nest during the breeding season (Warner and Rudd 1975, Hawbecker 1942).

White-tailed kites are monogamous and breed from February to October (peak from May to August). Nests are built near the top of dense oak, willow, or other tree stands, often in the vicinity of foraging areas and typically 20 to 100 feet above the ground (Dixon et al. 1957). Average clutch size for the typical single brood per year is four to five eggs with incubation lasting roughly one month (Zeiner et al. 1990).

Within the CPER, white-tailed kites have been observed near Number 3 Pond—a seasonal 4.5-acre pond near the northern border of the North Chimineas Unit, which was created by damming Barrett Creek, and features wetland and riparian woodland vegetation including large red willows (*Salix laevigata*) along its perimeter (R. Stafford, pers. comm. 2010). The species is expected to occur within the CPER only infrequently as part of its migration through the region (Appendix D).

E.6.6 Vaux's swift (*Chaetura vauxi*): California Species of Special Concern

Vaux's swift is a member of the Apodidae that occurs during the summer (April to October) in California west of the Sierra Nevada Mountains, in and east of the Klamath Mountains, and in the coast range mountains from the Oregon border south along the coast to Marin County, with the southern extent of the breeding range represented in scattered areas around the northern Monterey Bay and the Big Sur Coast (Zeiner et. al. 1990). Vaux's swifts overwinter from Mexico to parts of Central America (Shuford and Gardali 2008). The species favors old-growth redwood habitats (Bull and Collins 1996).

Nests are built in large cavities in a variety of trees which, in California, include western sycamore, California red fir, pine, and coast redwood (Bull and Collins 1996, Shuford and Gardali 2008). Anecdotal evidence suggests that most California nests are in burned-out and hollow redwood snags and stumps or in basal hollows of large living trees (Hunter and Mazurek 2003, Shuford and Gardali 2008). Breeding occurs from early May through mid-August (Hunter et al. 2005, Bent 1940). Clutch sizes of four to five eggs are common, with incubation requiring 18-20 days and fledging after about one month (Harrison 1978).

Vaux's swifts forage for insects in a variety of habitats, often over water, and may travel up to three miles from the nest to feed (Grinnell and Miller 1944, Terres 1980). They roost communally in large cavities associated with natural or anthropogenic structures (e.g., chimneys). The greatest threat to the species is loss of habitat through removal of large dead or dying trees that contain suitably cavities for nesting and roosting (Shuford and Gardali 2008).

Vaux's swifts migrate through the CPER during the spring and fall when moving between breeding grounds to the north and overwintering grounds to the south. They are predicted to occasionally use the pond habitats in the North Chimineas Unit, though could occasionally utilize other habitats of the other units of the Reserve (Appendix D).

E.6.7 California condor (*Gymnogyps californianus*): Federally Endangered, California Endangered

A member of the family Cathartidae, the California condor is a permanent resident of the mountains surrounding the southern San Joaquin Valley, including the Coast Ranges south of Santa Clara County, the Transverse Ranges and Tehachapi Mountains, and the southern Sierra Nevada Mountains (Zeiner et al. 1990). California condors are scavengers that feed on carrion including the carcasses of livestock, tule elk (*Cervus elaphus nannodes*), deer (*Odocoileus hemionus*), and California ground squirrels (*Spermophilus beechyi*). They forage while gliding and soaring over broad, open areas of grassland, scrub, chaparral, and savanna up to 150 miles per day from their roots on cliffs and large trees.

California condors reproduce between February and May, when they nest in caves or on rock ledges, often surrounded by dense vegetation, and away from human disturbance (USFWS 1996). Parental care is provided for up to seven months before the young begin flying and foraging. California condors compete with turkey vultures (*Cathartes aura*) for food and their chicks and eggs are predated upon by golden eagles (*Aquila chrysaetos*).

Though California condors historically occurred throughout much of the southern United States, they were virtually extinct in 1987, when the last free bird was placed into a captive breeding program. Captive-produced condors have been re-released since 1992 and as of July 31, 2011, there were 399 California condors, including 198 birds currently living in the wild (San Diego Zoo 2011). Their 'wishbone-shaped distribution' surrounding the southern San Joaquin Valley reflects their use of topography, particularly foothills and mountains, and their associated thermal weather patterns for flight. Though sufficient habitat is present to support California condors, the species persistence is threatened by shooting, collisions with human objects, and lead poisoning that results from eating the carcasses of animals killed with lead shot. California condors may also face inbreeding depression (USFWS 1996).

California condors utilize the area in and around the CPER for foraging. Prior to their initial removal from the wild, radio-tagged California condors were observed foraging year-round over the Carrizo Plain, Panorama Hills, Elkhorn Plain, Cuyama Valley and also the upper San Juan Creek drainage (USFWS 1996). Presently, they are thought to occasionally utilize the CPER units for foraging, particularly the Chimineas units where they may feed on cattle, tule elk, and mule deer (Appendix D). They are not known to breed within the Reserve; the nearest known breeding sites are located 30 miles southeast of the nearest potential breeding habitat on the Reserve (R. Stafford, pers. comm. 2010).

E.6.8 California Mountain plover (*Charadrius montanus*): Species of Special Concern

A member of the family Charadriidae, the mountain plover breeds in high plains east of the Rocky Mountains and overwinters in central and southern California, southern Arizona, southern Texas, and northern Mexico (Shuford and Gardali 2008). Within California, mountain plovers winter in the southern Sacramento Valley, San Joaquin Valley, including the adjacent Carrizo Plain, and in scattered coastal and inland (e.g., Imperial Valley) areas in southern California (Zeiner et al. 1990, Knopf 1996). Between 1980 and 1997, and again between 1998 and 2003, 95% of the mountain plovers counted in the Christmas Bird Count occurred in California (Hunting et. al. 2001), with the Central Valley and interior Coast Ranges supporting the second largest number of wintering plovers in the state (Edson and Hunting 1999, Hunting et. al. 2001, USFWS 2003). Plover are found in California from September through mid-March with peak abundance from December to February (Garrett and Dunn 1981, Knopf 1996).

Mountain Plover in the CPER
(Photograph by Al Schmierer)

Two flocks totaling 381 birds were counted on a January 10, 2006 survey on the Carrizo Plain. More extensive habitat occurs in the Cuyama Valley but observational studies there are relatively limited (Shuford and Gardali 2008, Lehman 2016). Mountain plovers strongly associate with flat land that is nearly devoid of vegetation (Graul and Webster 1976, Knopf 1996). Physical structure (rather than plant species composition) and the availability of prey (primarily invertebrates in cracks in the soil) appear to be primary determinants in habitat selection (Knopf 1996). Fallow, grazed, or burned sites with mean vegetative heights of less than six centimeters and less than 65% cover appear optimal (Hunting et al. 2001). Alkali flat and playa habitats may also be used.

Overwintering mountain plovers tend to travel in flocks of up to 1,200 birds that may undertake long (up to 75 miles) daily movements in search of foraging habitat (Hunting et al. 2001, Knopf and Rupert 1995). Their diet consists primarily of insects including beetles, grasshoppers, crickets, and flies (Shuford and Gardali 2008).

The major threat to this species in California is loss of overwintering habitat due to conversion of native grasslands to agricultural fields, particularly for wheat and grapes, oil and gas development, destruction of eggs and young during tillage, and incompatible grazing practices (Knopf 1996, USFWS 2003). Declines in the abundance of burrowing mammals, which are positively correlated with mountain plover invertebrate prey, can also affect population density (USFWS 2003). On the Carrizo Plain, management practices that maintain tall-statured grasslands may adversely affect plovers (Shuford and Gardali 2008).

Within the CPER, mountain plovers utilize the grasslands of the Panorama Unit, which support low-growing forbs such as the native California gold fields (*Lasthenia gracilis*) the non-native red-stemmed filaree (*Erodium cicutarium*). These areas are located on the precincts of giant kangaroo rats, which create and maintain the preferred habitat for mountain plover. While the rolling hills and tall-structured grasslands of the American Unit do not provide appropriate habitat, the flat, grazed grasslands of the North Chimineas Unit provide suitable habitat for mountain plovers (Appendix D).

E.6.9 Grasshopper sparrow (*Ammodramus savannarum*): California Species of Special Concern

A member of the family Emberizidae, the grasshopper sparrow is a California summer resident (March-September) from the coast to the crest of the Cascade and Sierra Nevada mountains from Shasta County to the Transverse Range, except the Salinas and southern San Joaquin valleys, and west off the San Gabriel, San Bernardino and San Jacinto mountains from Point Conception to the Mexican border (McCaskie et al. 1979, Garrett and Dunn 1981, Zeiner et al. 1990). Grasshopper sparrows inhabit dry, moderately open grasslands, particularly those associated with a mix of grasses, tall forbs, and scattered shrubs (Zeiner et al. 1990). Large contiguous tracts of habitat may be important for this species (Vickery et al. 1994).

Grasshopper sparrows consume a mixed diet made up of roughly two-thirds animal matter, particularly insects such as grasshoppers, and one-third plant material, including seeds and young shoots (Judd 1901, Martin et al. 1961). Territory size varies from one to four acres (Smith 1963, Wiens 1969). Breeding occurs from early April to mid-July with peak activity in May and June. Nests are concealed by overhanging grasses or forbs. Pairs may produce up to three clutches averaging four to five eggs per year. Incubation requires 11 to 12 days (Harrison 1978).

Grasshopper sparrows are primarily threatened by conversion of grasslands to urban and incompatible agricultural uses (e.g., vineyards), which have been widespread in the Central Valley and Inner Coast Ranges (Merenlender 2000). Breeding bird survey data suggest that California populations experienced declines between 1980 and 2004 (Sauer et al. 2005). Invasion of native grasslands by exotic grass species may reduce habitat quality as grasshopper sparrows have been shown to prefer native bunchgrasses (Janes 1983, Holmes and Geupel 1998). Grazing management and fire suppression both have the potential to reduce habitat quality by preventing the establishment of shrubs in open grassland areas (Shuford and Gardali 2008). Clutch size and nest success are higher in ungrazed areas due to more effective concealment from predators in taller and denser vegetation (Sutter and Ritchison 2005). Disturbances including burning, haying, and heavy grazing should be avoided during the breeding season (Dechant et al. 1998).

Within the CPER, grasshopper sparrows have been frequently observed within the American and North Chimineas units. Mapped occurrences are almost exclusively within the ungrazed grasslands (Figure 23); the species has not been observed nesting within the grazed grasslands within the North Chimineas Unit (R. Stafford, pers. comm. 2010). The species preferentially occurs in areas with scattered shrubs such as silver bush lupine (*Lupinus albifrons*) and linear-leaf goldenbush (*Ericameria linearifolia*), or tall forbs such as summer mustard (*Hirschfeldia incana*), which males use as perches during breeding displays (R. Stafford, pers. comm. 2010).

E.6.10 Oregon Vesper sparrow (*Pooecetes gramineus affinis*): California Species of Special Concern

A member of the family Emberizidae, the Oregon vesper sparrow breeds in Oregon and is a winter resident (September-April) of California, where it occurs in the Sierra Nevada foothills on the eastern side of the Sacramento Valley, south to and west across the Transverse Range, and then north along the eastern margin of the Inner Coast Range, and in the Peninsular Range (Willett 1933, Shuford and Gardali 2008). Considered an obligate grassland species (Vickery et al. 1999), Oregon vesper sparrows typically occur in grassland, semi-desert scrub, sagebrush, weedy agricultural fields, stubble fields, meadows, and road edges with ample open ground and sparse cover of low growing grasses and forbs, where scattered shrubs and tall herbs may provide an important source of cover (Grinnell and Miller 1944, Lehman 2016, Zeiner et. al. 1990). Vesper sparrows forage on the ground for forb and grass seeds and for insects, with the latter being particularly important during the breeding season (Bent 1968, Ehrlich et al. 1988).

Although the range of vesper sparrows in California appears to be relatively unchanged since the middle of the 20th century, population density has almost certainly been reduced due to widespread grassland habitat conversion (Vickery et al. 1999). Conversion of suitable agricultural habitat to orchards and vineyards is also problematic. Grazing that decreases herbage cover and increases shrub density can be detrimental (Gaines 1977), with grazing shown to have a detrimental impact on breeding grounds of the related Great Basin vesper sparrow (Gaines 1992). Declines in other parts of the species range have been attributed to a variety of agricultural practices including trampling of nests by livestock, earlier and/or more frequent mowing, removing of weedy field edges and hedgerows, pesticide use, and predation by mammals associated with human habitation (Altman 2003).

Within the CPER, wintering vesper sparrows have been observed during the late fall and winter within the grasslands of the Chimineas units. The species is predicted to occur within the grasslands of the other Reserve units, and at lower abundance within the Reserve's woodlands and shrublands (Appendix D). Christmas Bird Count data indicate that the species may be relatively common on and around the Carrizo Plain (Leeman and Edson 2002).

E.6.11 American peregrine falcon (*Falco peregrinus anatum*): California Fully Protected; Delisted (State and Federal ESA)

A member of the family Falconidae, the American peregrine falcon is an uncommon, year-round resident of California's coast west of the coast and Klamath Ranges, and the Sierra Nevada and Cascade Ranges, as well as the Salton Sea. Peregrine falcons wintering range in California includes the Central Valley and adjacent Carrizo Plain, as well as southern California and the northern Great Basin, where breeding occurs.

American peregrine falcons primarily prey upon birds up to the size of ducks, but also occasionally take insects, fish, and small mammals (Zeiner et al. 1990). They breed near water, including wetlands, lakes, and streams, where they nest on ledges on high cliffs or banks as well as human-made structures.

American peregrine falcon populations in the United States declined dramatically in the 1960s and 1970s due to pesticide (DDT and DDE) contamination, with fewer than 40 breeding pairs in California in 1981 (Monk 1981). Population recovery following the ban of such pesticides in the United States led to the American peregrine falcon being removed from the federal and state endangered species list in 1999 and 2009, respectively.

American peregrine falcons incidentally utilize the ponds of the Chimineas units of the CPER during the winter (Appendix D).

E.6.12 Sandhill crane (*Grus canadensis*): California Species of Special Concern

Within California, the sandhill crane is a winter resident of a handful of scattered locations within the San Joaquin and Sacramento valleys and near the Salton Sea in Imperial County. The absolute range of this species is unclear as the taxonomic distinctiveness of the various "subspecies" has not been definitively evidenced. Collectively they are found across and migrate between North America, parts of the Caribbean, and northern Asia. The Pacific Flyway population of the lesser sandhill crane (estimated global population of 375,000) breeds in southern Alaska and overwinters primarily in the Central Valley of California (Shuford and Gardali 2008), where the species can be found from mid-September to early April, with peak abundance generally between October and February (Littlefield 1999). Intra-seasonal migration among sites within California, often involving the movement of long distances during fall and winter, is relatively common (Littlefield and Thompson 1982).

Sandhill cranes are omnivorous and consume a variety of invertebrates, amphibians, reptiles, birds, and small mammals, as well as plant matter (Walkinshaw 1973). During winter months, grains including milo, corn, wheat, rice, barley, and oats make up most their diet (Madsen 1967, Guthery 1972, Littlefield 1986, 2002), with wheat and barley important forage in and around the Carrizo Plain (Shuford and Gardali 2008). Foraging habitats may include burned grasslands, pastures, and mowed, tilled, and disked grain fields (Shuford and Gardali 2008). Cranes may also hunt for invertebrates in grazed or mowed grasslands after the onset of winter rains (Reinecke and Krapu 1986). Wetlands or other flooded sites such where shallow (1-6 inches) water collects represent preferred roosts during the winter, especially on the Carrizo Plain near Soda Lake (Gernon 1978). Roost sites are often within one to three miles of feeding fields but greater separation (up to six miles) has been observed (Gernon 1978).

The primary threat to the species in Central California is loss of preferred foraging habitats, which are grasslands, grain fields, and pastures, to orchards, vineyards, and vegetable fields, or urban development (Shuford and Gardali 2008).

Records of sandhills cranes overwintering at the Carrizo Plain began in 1955 (Walkinshaw 1973). Average annual numbers here have declined from 3,979 cranes for the period 1983-1989 to 903 cranes between 1990 and 2000 (Shuford and Gardali 2008). This decline is due to the retirement of grain farming beginning in the 1980s (R. Stafford, pers. comm. 2010).

Within the CPER, sandhill cranes are expected to only occasionally be present within the grasslands of the American and Northern Chimineas units (Appendix D). They may also utilize the shoreline of Soda Lake within the American Unit.

E.6.13 Tricolored blackbird (*Agelaius tricolor*): State Threatened; California Species of Special Concern

A member of the family Ictiridae, the tricolored blackbird features small nesting colonies in Oregon, Washington, Nevada, and Baja California, but is otherwise endemic to California (Shuford and Gardali 2008). Within the state, it occurs year-round in coastal areas south of Mendocino County and east across the Central Valley to the Sierra Nevada foothills (Zeiner et al. 1990). Results of a 2000 survey suggested a total estimated population of 163,000 birds with over 90% of breeding adults found in California's Central Valley (Hamilton 2000). While many individuals permanently reside in this area, it is not uncommon for birds to move widely within the state during the course of a year (DeHaven et al. 1975a, Hamilton 1998). For example, some flocks may move south from northeastern California sites during fall and winter, a time of year when birds become increasingly nomadic as they search for food (Zeiner et al. 1990).

Tricolored blackbirds typically breed in emergent vegetation associated with freshwater. Historically, nesting sites were typically located in tall, dense cattails or tules or occasionally in thickets of willow, blackberry, and wild rose (Neff 1937). The use of freshwater marshes for nesting has recently decreased, however, and since the 1970s, a growing percentage of nesting tricolor blackbirds have been observed nesting in Himalayan blackberry and thistles, or in silage and grain fields near dairies (DeHaven et al. 1975b, Cook 1996, Hamilton et al. 1995, Meese 2006).

Tricolored blackbirds breed between April and July (Zeiner et al. 1990). The highly gregarious nesters form the largest breeding colonies of any North American landbird (Cook and Toft 2005). Nesting areas must be large enough to support roughly 50 pairs of birds (Grinnell and Miller 1944) and colonies of up to 20,000 nests in an area of 10 acres have been observed (Neff, 1937, DeHaven et al. 1975b). Individual breeding territories are small, constituting the immediate vicinity of the nest (e.g., 85 square feet) (Orians 1961). The species is polygynous and multiple females often nest within the territory of an individual male. Nests are located over or near fresh water. Clutch size ranges from 2-6 (usually 3-4). Incubation lasts approximately 11 days, fledging occurs after about 13 days, and two broods per year are typical (Terres 1980). Breeding birds may travel as far as four miles from the nest to feed and birds associated with nesting colonies may collectively forage over an area up to 80 square miles (Orians 1961).
During non-breeding months, tricolored blackbirds tend to roost in large flocks in association with these habitats. The species is a ground forager and ideal foraging conditions involve areas where vegetation is less than six inches tall due to natural growth patterns or management in the form of shallow flooding/irrigation, mowing, or grazing. Preferred foraging habitats include seasonal wetlands, riparian

scrub habitats, open marsh borders, fields of rice and alfalfa, irrigated pastures, ripening or cut grain fields, annual grasslands, cattle feedlots, and dairies (Zeiner et al. 1990, Beedy and Hamilton 1999). Insects make up the majority of the diet although seeds and cultivated grains (e.g., rice, oats) are other important food, especially in fall and winter (Skorupa et al. 1980). Most tricolored blackbirds forage within three miles of their colony site and thus proximity to feeding habitat is a critical to colony establishment and persistence (Beedy and Hamilton 1997).

Multiple surveys conducted since the mid-1990s have documented declines in tricolor blackbird abundance in California (reviewed in Shuford and Gardali 2008). Most recently, a 34% decrease in the statewide population was observed between 2008 (395,000) and 2011 (259,000), with regional declines observed except in the San Joaquin Valley, where the population increased (Kyle and Kelsey 2011). The biggest threats to the species are habitat conversion that reduces or eliminates forage, including conversion of grasslands to vineyards, direct mortality during harvest as results from plowing and harvesting of cereal crop fields, and changes to hydrology in and around colonies that that make them more accessible to predators (Beedy and Hamilton 1999, Shuford and Gardali 2008). Tricolored blackbirds are considered by some to be disturbance dependent and the management strategy of burning cattails around marshes and ponds once every five years outside of the nesting season has been recommended (Tricolored Blackbird Working Group 2009).

Within the CPER, tricolored blackbirds have been observed in the freshwater wetland habitat along the Cuyama River in the South Chimineas Unit and in the Barrett Creek drainage in the North Chimineas Unit (Figure 23). The species has also been observed in grazed grasslands surrounding the Chimineas Unit Headquarters. Tricolored blackbirds are known to breed within the Reserve and are predicted to utilize the blue oak woodlands and savannas and occasionally grasslands of the American Unit (Appendix D). Nesting colonies have been observed at Big Spring Pond north of the North Chimineas Unit and west of the American Unit, as well as on the Cuyama River.

E.6.14 Yellow-headed blackbird (*Xanthocephalus xanthocephalus*): California Species of Special Concern

A member of the family Ictiridae, the yellow-headed blackbird is found across western Canada and the United States but has a patchy distribution in the southwestern potion of its range. Individuals migrate between summer breeding grounds in these areas, particularly in locations with extensive marshes, and wintering habitat in northern and western Mexico (Jaramillo and Burke 1999). In California, yellow-headed blackbirds occur primarily in the Sacramento and San Joaquin valleys and on the eastern slopes of the Sierra Nevada Mountains between April and early October.

Yellow-headed blackbirds breed between April and July (Twedt and Crawford 1995) almost exclusively on the margins of marshes and ponds in tall emergent vegetation (e.g., cattails, tules) (Orians and Willson 1964). Open shoreline areas and edges over water with a depth of between six and 43 inches are preferred (Shuford and Gardali 2008). The species may be territorial during the breeding season, especially if food resources are available in the immediate vicinity of the nest, but generally they are loosely colonial. Yellow-headed blackbirds are polygynous and up to six females may be present within a male's nesting territory (Twedt and Crawford 1995). Clutch size varies from two to five, with three and four eggs being common (Richter 1984). Yellow-headed blackbirds eat primarily seeds and insects with a tendency to shift strongly to insects during breeding (Twedt and Crawford 1995, Willson 1966, Orians 1980).

The primary threat to this species is the destruction or degradation of habitat (Lederer et al. 1975); specifically, elimination of marshes, ponds, and wetlands as part of agricultural expansion and development, flood control, or water diversion projects (Small 1994). The 90% loss of wetlands in California's Central Valley has likely contributed significantly to reductions in the abundance of breeding yellow-headed blackbirds in this area (Frayer et al. 1989). Modification of marsh and wetland hydrology can also be important, as yellow-headed blackbirds are highly sensitive to water depth (Twedt and Crawford 1995) and will sometimes abandon nests if the water becomes too shallow or dries up (Shuford and Gardali 2008). Water diversions can exacerbate the problem in drought years (Fletcher and Koford 2004). Lower water levels may also reduce nesting success by providing increased access to predators, which are a significant cause of mortality (Picman and Isabelle 1995). Nestling mortality due to starvation can also have a strong influence on species demography and maintaining insect abundance in and around ponds may be important for management (Orians 1980, Willson 1966). The connectivity of spatially isolated populations may also be critical for maintaining bird numbers in local populations as immigration has been shown to make important contributions to population size (Ward 2005).

Within the CPER, the yellow-headed blackbird has been observed sporadically during spring migration on the American and North Chimineas units. The species is not known to breed the CPER or elsewhere in San Luis Obispo County (Edell 2006; Appendix D).

E.6.15 Loggerhead shrike (*Lanius ludovicianus*): California Species of Special Concern

A member of the family Laniidae, the loggerhead shrike is a year-round resident of much of California's lowland and foothill areas, except for the forested coastal slopes. It preferentially occurs in open habitats featuring scattered shrubs, trees, or human-created structures such as fence posts which it perches while foraging for large insects and small amphibians, reptiles, birds, and mammals. Loggerhead shrikes breed between March and May when nests are built in dense shrubs or trees, in which 4-8 eggs are incubated for 14-15 days, and from which young fledge in 18-19 days (Zeiner et al. 1990).

Loggerhead Shrike
(Photograph by Al Schmierer)

Christmas Bird County data for California indicate a significant, statewide decline averaging 1.3% per year between1959-1988 (Humple 2008). Though the causes of the decline are unknown, they are likely due, at least in part, to habitat loss and fragmentation resulting from conversion of coastal scrub, riparian, and oak savannas to urban and intensive agriculture (Humple 2008). A study found reduced reproductive rates following fire suggesting that unnaturally frequent fire can result in the invasion of non-native annuals herbs into shrub-dominated communities which in turn, may reduce the density of loggerhead shrikes (Humple and Holmes 2006).

Though most abundant in areas with nearby shrubs, loggerhead shrike occurrences within the CPER have been mapped throughout the range of habitat types, including grasslands, shrublands, woodlands, and in association with ponds and the riparian areas within the American, Chimineas, and Panorama units (Figures 22 and 23). The species occurs year-round and breed at relatively high abundance in all units of the Reserve (Appendix D).

E.6.16 LeConte's thrasher (*Toxostoma lecontei*)-San Joaquin Population: California Species of Special Concern

A member of the family Mimidae, LeConte's thrasher occurs across hot, arid regions of the southwestern United States and northern Mexico. The disjunct population with the southern San Joaquin Valley and adjacent Carrizo Plain has been listed as a species of special concern (Shuford and Gardali 2008). It appears to be isolated from conspecifics in other populations (Sheppard 1996); however, recent evidence suggests that they are not a unique subspecies (Zink et al. 1997).

Le Conte's thrashers prefer flat to gently rolling, well-drained slopes, often bisected by washes. They occur preferentially in areas that are sparsely vegetated, featuring short grasses or no ground cover and scattered saltbush (*Atriplex* spp.) or California ephedra (*Ephedra californica*), under which they forage in the litter (Shuford and Gardali, 2008). Within and adjacent to the CPER, Le Conte's thrashers have been found principally in two areas: on the southern Carrizo and Elkhorn plains and within the Cuyama Valley. On the plains, LeConte's thrashers occupy saltbush-lined drainages and areas dominated by California (Shuford and Gardali 2008). In the Cuyama Valley most suitable habitat has been degraded by overgrazing and conversion to agriculture and the last observation of the species was in 1992 (Shuford and Gardali 2008).

LeConte's Thrasher
(Photograph by Morgan Ball)

LeConte's thrashers generally eat insects and seeds and forage in leaf litter under shrubs (Sheppard 1996). Nests are built at an average height of 32 inches in patches of dense shrubs that may be growing over an arroyo (Shuford and Gardali 2008). Birds in this area average 2.4 clutches per season and produce an average of three young per nest per year (Sheppard 1996). Availability of suitable nesting and foraging habitat in relatively close proximity is likely the factor most limiting population growth of this species.

Urbanization and habitat conversion for agriculture has had a strong deleterious impact on Le Conte's thrasher populations. Livestock grazing that removes shrubs and promotes invasion of non-native grasses and forbs can degrade habitat (Fitton 2008). However, grazing to reduce non-native herbs can help protect LeConte's thrasher habitat from fires, which kill adult saltbush plants and can convert desert scrub to grasslands (Shuford and Gardali 2008). This is less of an issue for habitat based around desert tea, which can stump sprout following fire. Type conversion due to grazing is also a concern. While inhospitable, Le Conte's thrasher habitat is favored by OHV users and their presence and activities can have deleterious effects on the physical environment as well as stressing birds, which are wary of humans (Audubon Society 2007).

LeConte's thrashers breed within the desert scrub communities of the Panorama and Elkhorn units (Figure 22) and the species has not been detected outside of these units. The desert scrub communities on the South Chimineas Unit may represent suitable but unoccupied habitat, though they were not evaluated as part of a recent habitat suitability model for the monument (Jongsomjit et al. 2012). However, California thrashers (*Toxostoma redivivum*), which are thought to outcompete LeConte's thrashers (Sheppard 1996), inhabit this area.

E.6.17 Yellow warbler (*Setophaga petechia*): California Species of Special Concern

A member of the family Parulidae, the yellow warbler is a migrant and summer resident of coastal Southern California, and central and northern California, except for the high elevation mountains (above 7,000 feet) and the Central Valley, where the species has largely been extirpated. The species utilizes riparian vegetation along streams and wet meadows where they feed primarily on insects (Heath 2008).

Yellow warblers are primarily threatened by loss and fragmentation of riparian habitat. The species may also be impacted by nest failure due to nest parasitism by brown-headed cowbirds, particularly adjacent to forest edges (Cain et al. 2003).

Yellow warblers utilize the CPER for breeding and for migration. They occur at low abundance in the riparian areas and ponds within the Chimineas and American units that are lined with willows (*Salix* spp.) and Fremont cottonwood (*Populus fremontii*), and occasionally utilize the oak woodlands and juniper woodlands within the Chimineas units (Appendix D). Within the Chimineas units, yellow warblers have been observed along the Cuyama River, around the Chimineas Unit headquarters, and along the tributaries to San Juan Creek (Figure 23).

E.6.18 Burrowing owl (*Athene cunicularia*): California Species of Special Concern

A member of the family Strigidae, the burrowing owl is year-round resident of California's Central Valley, San Francisco Bay region, Imperial Valley, and Carrizo Plain (Gervais et al. 2008). The species primarily inhabits grasslands with relatively short grass height and only sparse shrubs, and that feature burrows for roosting and nesting (Green and Anthony 1989, Haug et al. 1993). In California, burrows are primarily created by ground squirrels (e.g., *Spermophilus beecheyi*; Trulio 1997), though American badger (*Taxidea taxus*), coyote (*Canis latrans*), and San Joaquin kit fox (*Vulpes macrotis mutica*) dens or holes may also be used (Ronan 2002). Burrowing owls feed on arthropods, small mammals, amphibians, reptiles, birds and carrion (York et al. 2002), with vertebrates accounting the greatest biomass (Green et al. 1993).

Burrowing owls breed between March and August, with a peak in April and May. Clutch size can be up to 14 eggs (Haug et al. 1993), though averages 5-6 (Zeiner et al. 1990), with California vole (*Microtus californicus*) populations influencing reproductive success in California (Gervais and Anthony 2003, Gervais et al. 2006). Burrowing owls show strong site fidelity; breeding and residing in the same areas from year to year (Shultz 1997).

Burrowing owls are primarily threatened by widespread loss of grassland habitat to urban and agricultural use, with ground squirrel eradication programs representing an additional threat, particularly in rangelands

(Gervais et al. 2008). In agricultural lands, practices such as disking fallow fields may destroy burrows (Rosenberg and Haley 2004). West Nile virus presents an additional threat (Gervais et al. 2008).

One of the largest undeveloped grassland habitat areas in California for burrowing owls (Rosenberg et al. 1998), the Carrizo Plain supports the species within the grasslands on the flat plains and rolling hills (BLM 2010b). A study within grazed grasslands of the Carrizo Plain National Monument found that burrowing owls nested in areas with lower density of mulch (i.e., thatch, or dried plant material), which was correlated with plant height, perhaps reflecting their preference for areas with greater predator visibility (Ronan 2002). Burrowing owls use the grasslands of all units of the CPER for breeding as well as year-round residency and migration. They have been observed on numerous occasions within the grasslands of the American and Chimineas units, particularly the North Chimineas Unit (Figure 23). Nesting burrowing owls have been observed in the Unit 32, Scale, and Garcia Farming management units, where grazing management is used to create and maintain low grassland height preferred by this species, particularly for breeding. Free roaming herds of tule elk present in the region do not reduce grass height sufficiently to promote use by burrowing owls, since the elk leave the Reserve to find better forage conditions before reducing grass height to necessarily low levels (R. Stafford, pers. comm. 2010).

E.6.19 Long-eared owl (*Asio otus*): California Species of Special Concern

A member of the family Strigidae, the long-eared owl breeds throughout much of California except the Central Valley and Los Angeles Basin. Long-eared owls require dense cover for nesting and roosting, adjacent to open areas for foraging, and are known to occur in woodlands comprised of conifers, oaks, junipers, or riparian trees, that are adjacent to grasslands or shrublands (Hunting 2008). Between February and July, long-eared owls often nest and roost in dense vegetation and their well-concealed nests are created in the old nests of corvids (e.g., ravens), hawk, woodrats, and squirrels, or in tree cavities, cliffs, or debris piles in trees (Marks et al. 1994). They forage primarily at night over open grasslands and scrub where they catch primarily voles (*Microtus* spp.), deer mice (*Peromyscus* spp.), and kangaroo rats (*Dipodomys* spp.), though they occasionally take small birds and rabbits (Marks et al. 1994, Hunting 2008).

Long-eared owls are threatened by loss and degradation of breeding and foraging habitat (Marks et al. 1994), though they may also be impacted by nest predation from corvid populations that are unnaturally high due to human activities (Marks 1986).

Within the CPER, long-eared owls utilize the oak woodlands, juniper woodlands, and riparian woodlands primarily within the Chimineas units, where they are known to breed (Appendix D). They have been observed nesting within the juniper woodland and just west of the Chimineas Unit Headquarters. Owing to their occurrence, the mosaic of grasslands, juniper, and oak and riparian woodlands on the Chimineas units are thought to provide highly suitable habitat for the species.

E.6.20 Short-eared owl (*Asio flammeus*): California Species of Special Concern

A member of the family Strigidae, the short-eared owl is a year-round resident in certain areas within California. It breeds locally between March and July with the largest breeding areas occurring in the Modoc Plateau, Great Basin near Mono Lake, and the Inner Coast Range Mountains between Santa Clara and San Luis Obispo counties (Roberson 2008). The species distribution in California expands and contracts as the population responds to cycles of prey abundance, with nesting in the Coast Range and adjacent San Joaquin Valley greatest after wet winters (Roberson 2008).

Short-Eared Owl in the CPER
(Photograph by Maggie Smith)

Short-eared owls inhabit open, tall (min. 1-2 feet), herbaceous communities including marshes, ungrazed grasslands, and pastures, which conceal their ground nests (Holt and Leasure 1993) and support their primary prey, voles (*Microtus* spp.), which they hunt for in the early evening and late morning. In the San Joaquin Valley, short-eared owls may also inhabit sparse desert scrub (Roberson 2008).
Short-eared owls are threatened primarily by loss of suitable wetland and grassland habitat, particularly tall grasslands, which support higher vole concentrations and suitable cover for nesting owls. Short-eared owls are also hit by cars and are known to be infected with West Nile virus (Fitzgerald et al. 2003).

Within the CPER, short-eared owls utilize the grasslands of the Chimineas and American units, for breeding and wintering as well as migration (Figure 23). They might also occasionally utilize the grasslands of the Panorama and Elkhorn units, perhaps in wet years when cover is greater (Appendix D).

E.6.21 Olive-sided flycatcher (*Contopus borealis*): California Species of Special Concern

A member of the family Tyrannidae, the olive-sided flycatcher breeds from Alaska through central latitudes of the United States and migrates south to overwinter in Mexico and Central America (Shuford and Gardali 2008). In California, it occurs primarily in the foothills and mountains of the Coast, Sierra Nevada, and Transverse ranges and San Gabriel and San Bernardino Mountains. It is found from April through October with peak abundance between May and August for breeding (Bent 1942, Altman and Sallabanks 2000, Shuford and Gardali 2008). The species favors late successional conifer forests with open canopies, particularly near forest edges, gaps, and clearings (Verner 1980), with breeding sites typically located at mid- to high elevations (3,000 to 7,000 feet) (Altman and Sallabanks 2000). Nests in California locations are typically in conifers at an average height between 30 and 50 feet (Altman and Sallabanks 2000). The genus *Contopus* has the lowest reproductive rate of all North American passerines (Altman and Sallabanks 2000) and breeding pairs of olive-sided flycatchers raise a single brood per year. Olive-sided flycatchers eat insects almost exclusively (Beal 1912).

While the geographic extent of its range has been largely unchanged during the past century, bird surveys indicate significant reductions in abundance between 1968 and 2004 at a relatively constant rate (Sauer et al. 2005). The primary threats to this species are habitat loss and habitat degradation such as that caused by the removal of snags that provide nesting and perching habitat as part of logging activities (Shuford and Gardali 2008, Manly et. al 2006). Given its preference for open, patchy habitat with a high proportion of edges, olive-sided flycatchers may also be adversely affected by fire suppression (Hutto and Young 1999).

Within the CPER, olive-sided flycatchers have only been observed during spring migration and appropriate habitat for breeding (coniferous forests) does not occur within the Reserve (Verner 1980). They are thought to occasionally use the woodlands and riparian and pond habitat within the Chimineas units of the CPER as part of their migration (Appendix D).

E.6.22 Willow flycatcher (*Empidonax traillii*): California Endangered Species

A member of the family Tyrannidae, the willow flycatcher is a neotropical migratory bird that arrives in California from Central and South American wintering grounds in May and June and breeds in wet meadows and riparian habitats between 2000-8000 feet in elevation. Though historically more widespread, the species breeding range in California is presently thought to be limited outside of the Sierra Nevada and Cascade Range to broad rivers that still support dense willow thickets including the Santa Ynez River (Santa Barbara County) and the Santa Clara River (Ventura County). Willow flycatchers are more common in lowland riparian areas during the spring and fall as migrants (Zeiner et al. 1990). Willow flycatchers primarily occupy dense thickets of primarily tree-sized willow (*Salix* spp.), which they use for roosting, nesting, and as perches for foraging for flying insects.

In addition to widespread loss of riparian habitat, willow flycatchers are threatened by nest parasitism by brown-headed cowbirds and incompatible grazing. Specifically, cattle grazing that removes the lower branches of willows ("high-lining") can degrade nesting habitat. Cattle can also directly impact nests if grazing occurs in breeding areas and promoting cowbird populations: nest parasites of the willow flycatcher (Craig and Williams 1998).

Within the CPER, willow--dominated riparian woodland habitat that is appropriate for willow flycatchers occurs along the Cuyama River, and in the San Juan and Barrett creeks within the Chimineas units (Appendix D). This species has not been documented breeding in San Luis Obispo County (Edell 2006) and has only been observed briefly on the CPER near Barrett Creek during fall migration (R. Stafford, pers. comm. 2010).

E.7 Mammals

E.7.1 Fringed Myotis (*Myotis thysanodes*): Western Bat Working Group- High

Fringed myotis range throughout western North American between British Columbia, Canada to Chiapas, Mexico, and from the Pacific Coast to South Dakota (Weller 2005). Within this range, the species is patchily distributed and primarily occurs at mid-elevations in oak, juniper, and pine woodlands, though it may also be found in grasslands and desert scrub (Weller 2005).

Fringed myotis roost in the crevices of old trees, snags, rocks and cliffs, as well as mines, buildings, and bridges. Colonial maternity roosts contain 10-2,000 individuals while males roost solitarily or in small groups. They hibernate in caves, mines, and buildings.

Fringed myotis eat invertebrates including beetles and moths though also harvestmen, spiders, and crickets, which they glean from vegetation or capture on the wing. They are adept at foraging in and among trees. They are threatened by loss of their roosting habitats and hibernacula as well as chemicals that can reduce prey availability (e.g., pesticides) (Weller 2005).

Within the CPER, fringed myotis have been detected within the North Chimineas Unit at Quarry Pond on Barrett Creek, around the unit headquarters, and around Feed Lot Pond in the South Chimineas Unit.

The species is expected to occur year-round at low abundance within the oak and juniper woodlands of the unit and in association with the ponds. Fringed myotis may forage and otherwise infrequently utilize other habitats and units of the Reserve (Appendix D).

E.7.2 Spotted Bat (*Euderma maculatum*): California Species of Special Concern

A member of the family Vespertilionidae, the spotted bat occupies habitat between sea level and 2,700 meters throughout western North America. Though locally abundant in parts of British Columbia and portions of the American Southwest, including western Texas, the spotted bat is relatively uncommon throughout much of its range. Migratory behavior is mostly unknown. In the north, the spotted bat appears to hibernate locally; in the rest of its range, it is unclear whether it migrates or merely moves along elevational gradients throughout the year (Chambers and Herder 2005).

The spotted bat occupies a wide range of habitat including desert-scrub, canyon bottoms, and cliff edges, and woodlands including pinyon-juniper, ponderosa pine, and mixed conifer forests; the spotted bat has also been observed in fields, pastures, and riparian areas. Access to water and prominent rock features such as cracks, crevices, fractured rock cliffs, or caves appear essential to foraging and roosting (Chambers and Herder 2005).

Noctuid, Lasiocampid, and Geometrid moths compose a major portion of their diet (Chambers and Herder 2005). Although solitary foragers, spotted bats can roost in small groups and reuse roosts nightly. The breeding season likely begins in late summer; postpartum females have been observed from June to late August, and only single pups are produced per female during a breeding season (Chambers and Herder 2005).

Spotted bats are impacted by activities that adversely affect roost sites, such as rock climbing, dam construction, and urbanization. Reduced prey base due to pollutants and pesticides, loss of foraging habitat due to invasive species, and reduced availability of open and clean bodies of water may also threaten this species, which has low fecundity and long generations (Chambers and Herder 2005).

Within the CPER, spotted bats were detected using acoustic monitoring at Broken Dam Pond in the North Chimineas Unit and at the bottom of Carrizo Canyon on the South Chimineas Unit (Figure 23). It is anticipated to occur occasionally within the Chimineas units, particularly in association with water or cliffs (Appendix D). Because this species can fly long distances, repeated surveys are needed to understand their spatial and temporal distribution within the Reserve.

E.7.3 Giant kangaroo rat (*Dipodomys ingens*): Federal Endangered Species, California Threatened Species

A member of the Heteromyidae, the giant kangaroo rat is endemic to the San Joaquin Valley and adjacent Carrizo Plain. The species inhabits primarily grasslands within loose sandy-loam soils and few shrubs on gentle slopes (<10°). It also occurs within scrub communities on steeper slopes (up to 22°), though such areas are thought to represent suboptimal habitat (USFWS 1998, 2010, Bean et al 2012).

Giant kangaroo rats eat primarily seed, but also consume green plants and insects. They forage at night and are most active two hours after sunset. They cut the ripening inflorescences of grasses and forbs, particularly annual species, which they then store in small surface pits located above their burrow system. They also create large stacks of seed heads on or near the entrance of their burrow system, which can be used to identify occupied habitat.

Giant kangaroo rat (Photo by John Roser)

Giant kangaroo rat population density and distribution tracks plant productivity, which is largely dependent on annual rainfall in the region (Single et al. 1996, USFWS 1998). During high rainfall years, population density increases and the distribution expands into suboptimal habitat where the species is not observed in low rainfall periods (USFWS 1998, R. Stafford, pers. comm. 2010). High giant kangaroo rat abundance in high rainfall years that follow drought years suggests that seed caches may sustain population abundance through single year droughts, though multiple years of low production cause populations to decline (Williams et al. 1993).

Giant kangaroo rats are a keystone species in the grassland communities they inhabit (Prugh and Brashares 2012). They are significant prey for San Joaquin kit fox (*Vulpes macrotis mutica*), their burrows are used by blunt-nosed leopard lizards (*Gambelia sila*) and San Joaquin antelope squirrel (*Ammospermophilus nelsoni*) (Williams 1992), and the disturbance associated with their colonial burrows or 'precincts' promotes disturbance-adapted plants including California jewelflower (*Caulanthus californicus*) (Cypher 1994a).

As a result of habitat loss, the species occurs in less than 5% of its historic range, and is presently restricted to six main population areas, two of which are the Carrizo Plain National Monument and the Cuyama Valley (USFWS 2010). Long-term population studies show populations of the giant kangaroo rat on the Carrizo Plain to be increasing or stable (USFWS 2010).

Recent studies have attempted to understand the complex interactions between giant kangaroo rat herbivory and diggings, the abundance and diversity of plant species, and cattle grazing, which occurs within much of the grasslands within the species' range. Preliminary results from a long-term study within desert scrub habitat at the Lokern Natural Area in western San Joaquin Valley suggests grazing benefits giant kangaroo rats by reducing the cover of dense, non-native annual grasses, as a greater number of giant kangaroo rats were observed in grazed areas compared to ungrazed areas (Germano et al. 2003). However, data from the study have not yet been analyzed statistically and giant-kangaroo rats occur at only low abundance within the site (USFWS 2010).

Experimental research manipulating the presence of giant kangaroo rats and cattle within the CPNM is being conducted to understand the complex interactions between giant kangaroo rats, cattle grazing, plant community structure and species composition in the grasslands. Most recent results indicate that in high rainfall years, cattle grazing may promote giant kangaroo rat abundance, with the results attributed to immigration of the small mammals into grazed areas, rather than differential reproduction or survival (Prugh and Brashares 2010). Giant kangaroo rats also reduced the abundance of peppergrass (*Lepidium* spp.), which along with goldfields was found to be favored in diet trials (Prugh and Brashares 2009). In 2009, researchers reported that both cattle and giant kangaroo rats remove approximately 200 pounds per acre of plant biomass, and reduced the abundance of the native herb goldfields (*Lasthenia* spp.). With greater precipitation in 2010, giant kangaroo rats and cattle reduced biomass by 500 lbs. per acre (Prugh and Brashares 2010). These initial results suggest that, while giant kangaroo rats create open ground similar to cattle, they may benefit might from cattle grazing to remove biomass and create open conditions during above average rainfall years such as occurred in 2010 (Prugh and Brashares 2010.) The drought of 2013-2015 resulted in highly significant declines in giant kangaroo rat densities within the CPNM (Prugh unpublished data).

Within the CPER, giant kangaroo rats occur at high densities within the grasslands and desert scrub of the Elkhorn and Panorama units and the northeast portion of the American Unit near Soda Lake. They also occur in the South Chimineas Unit near Taylor Spring (Appendix D). These areas are not currently managed using cattle, though they feature short-structured vegetation that becomes increasingly sparse during the growth season as a result of the giant kangaroo rat activity.

E.7.4 San Joaquin kit fox (*Vulpes macrotis mutica*): Federal Endangered Species, California Threatened Species

The San Joaquin kit fox is currently found within the San Joaquin Valley and foothills of the Coast Range Mountains. It utilizes primarily grasslands and scrublands and to a lesser extent, oak savannas. It can also occur in human-modified environments including oil fields, wind farms, pastures, orchards and cultivated fields (USFWS 1998). Arid grasslands, or those that are short-statured and have bare ground, rather than tall or dense grasslands, are preferred by San Joaquin kit fox. The species occurs preferentially in flat or rolling terrain and is less commonly observed in mountains or steep or rugged areas (Cypher et al. 2007). Active year round, San Joaquin kit foxes are primarily nocturnal but can be seen during the day in late spring and early summer. They shelter, reproduce, and avoid predators in dens, which they create themselves or by modifying ground squirrel, badger, and coyote burrows. They can also utilize culverts, abandoned pipes, and banks in roadbeds as dens (USFWS 1998).

San Joaquin kit foxes feed on a variety of nocturnal small mammals, including kangaroo rats (*Dipodomys* spp.), pocket mice (*Chaetodipus*), white-footed mice (*Peromyscus leucopus*), and other rodents, with vegetation and insects also occurring in their feces. Their home ranges are estimated to be between one and 12 miles. Their primary predators are coyote, though they are also killed by large raptors, red foxes, grey foxes, and bobcats (USFWS 1998).

San Joaquin Kit Fox
(Photograph by Bob Stafford)

Kit foxes currently persist in a metapopulation consisting of three cores and several satellite populations, of which the Carrizo Plain is part of a core population (USFWS 1998). Individual movement between patches will likely be critical for long-term persistence (Cypher et al. 2007).

Within the CPER, highly suitable habitat for the San Joaquin kit foxes occurs throughout the relatively flat grasslands and desert scrub of the Elkhorn and Panorama units, and to a lesser extent on the rolling grasslands on the northeastern portion of the American unit. The remaining grassland habitat within the American and Chimineas units is moderately suitable, as is the desert scrub in the South Chimineas Unit (Penrod et al. 2010). Observations of San Joaquin kit fox have been recorded by the Department within all units of the CPER, with the Elkhorn and American units having the highest density of observations because the Department's quarterly spot light survey transects traverse these units (Bidlack 2007).

San Joaquin kit fox occur at greatest abundance within the sparse desert scrub and short-statured grasslands of the Elkhorn and Panorama units. They utilize the open grasslands of the Chimineas units in areas where cattle have been used to maintain short-statured grassland conditions (Appendix D). In the absence of cattle grazing, these grasslands, which do not support populations of the native keystone herbivore giant kangaroo rat, feature tall, dense grass, particularly during above-average rainfall years.

E.7.5 San Joaquin antelope squirrel (*Ammospermophilus nelsoni*): California Threatened Species

The San Joaquin antelope squirrel is a small ground-dwelling squirrel found in the San Joaquin Valley and adjacent foothills. The species occurs in arid grasslands and desert scrub, especially areas featuring relatively sparse cover of shrubs including saltbushes (*Atriplex* spp.), California ephedra (*Ephedra californica*), bladder pod (*Isomeris arborea*), and goldenbush (*Ericameria* spp.), which the species uses to escape predators and excessive heat (Williams 1980, USFWS 1998). In open grasslands, the burrows of giant kangaroo rats are commonly used by San Joaquin antelope squirrels for these same purposes (Williams et al. 1988).
Active year round, the diurnal squirrels are opportunistic feeders and eat insects such as grasshoppers and harvester ants as vegetation, seeds, and fungi, with the developing seeds of *Ephedra* species being a major component of their diet during the breeding season (Harris 1993). Breeding occurs between late winter and early spring, with young typically born in March or April. The small squirrels are prey to a variety of animals including birds of prey, snakes, San Joaquin kit fox, coyote, and badger. A study conducted within the Elkhorn Unit found that the mortality rate of San Joaquin antelope squirrels was 70 percent during the first year of life, and 50 to 60% for adults (Williams et al. 1988).

San Joaquin Antelope Squirrel (Photograph by Al Schmierer)

The species is threatened by widespread habitat loss due to agriculture and urbanization in the San Joaquin Valley, with rodenticide use associated with agriculture also credited with declines in the species populations (USFWS 1998). The largest remaining populations are within the Carrizo and Elkhorn plains and the Lokern and Elk Hills in western Kern County (Williams 1980, USFWS 1998).

Though cattle grazing, particularly during high rainfall years, has been hypothesized to promote abundance of this species by reducing dense grass and thatch produced primarily by exotic plant species (Germano et al. 2001), recent results from an experiment within the CPNM revealed that cattle grazing was associated with reduced captures of San Joaquin antelope squirrels in 2010, an above average rainfall year. The effect was tied to lower reproduction rates in grazed areas compared to ungrazed areas (Prugh and Brashares 2010). Ongoing research is needed to inform when and how cattle grazing can serve as an effective vegetation management tool to promote native species such as San Joaquin antelope squirrel.

Within the CPER, San Joaquin antelope squirrels occur at high relative abundance within the grasslands and desert scrub of the Panorama and Elkhorn units as well as the eastern portions of the American Unit (Figure 22, Appendix D).

E.7.6 Short-nosed Kangaroo Rat (*Dipodomys nitratoides brevinasus*): California Species of Special Concern

One of three subspecies of San Joaquin kangaroo rat, the short-nosed kangaroo is endemic to the western San Joaquin Valley, the adjacent Tehachapi foothills and the Carrizo Plain (USFWS 1998). They inhabit desert scrub communities dominated by saltbush (*Atriplex* spp.) and California ephedra (*Ephedra californica*) on friable, often sandy soils on flat to gently sloping plains and hilltops, though they are occasionally found on steep, rocky hillsides and can occupy arid grasslands (USFWS 1998).

Active year-round, short-nosed kangaroo rats are nocturnal and are active shortly after sunset (Williams et al. 1988). They primarily eat the seeds of herbs and subshrubs, which they collect and carry in their fur-lined cheek pouches but will also consume herbaceous vegetation and insects.

Within the Carrizo Plain, short-nosed kangaroo rats typically breed between late February and May most years, though reproduction may continue through August in years with a prolonged wet spring (Williams et al. 1993). Populations fluctuate dramatically in response to varying rainfall and plant productivity.

Short-nosed kangaroo rats are primarily threatened by habitat loss, which is estimated to have eliminated all but 1.5% of the habitat within their historic range and left remaining populations small, fragmented, and widely scattered (USFWS 1998). The population within the Carrizo Plain and adjacent Caliente Mountains and Cuyama Valley is one of the largest remaining, the other being in the Lokern and Elk Hills region (USFWS 1998). Fire and grazing that remove the scattered shrubs are thought to degrade habitat, while cattle grazing during years of high herbaceous plant productivity is thought to promote populations by preventing build-up of thatch (USFWS 1998).

Short-nosed kangaroo rats have been observed within the California ephedra Alliance within the Elkhorn Unit of the CPER (Figure 22). They are expected to occur within the grassland and desert scrub communities there and within the Panorama Unit in small numbers, though have not been detected within the Chimineas units (Appendix D).

E.7.7 Western Mastiff Bat (*Eumops perotis californicus*): California Species of Special Concern

North America's largest bat, the western mastiff bat occurs in central Mexico and the southwestern United States, including California west of the Sierra Nevada and Cascade mountains and the southeastern deserts, excluding the north Coast Range mountains. Within this range, this cliff-dwelling species inhabits areas with significant rock features offering suitable roosting habitat in a variety of habitats including oak woodland, chaparral and desert scrub.

Western mastiff bat maternity colonies, which can have 30 to several hundred females and young, and occasionally males, typically occur under rock slabs though boulder crevices and buildings are also used (Pierson and Siders 2005). Active year round in California, western mastiff bats primarily feed on moths, which they take while foraging up to 2,000 feet above the ground in open areas including flood plains, washes, grasslands, chaparral and oak woodland, as well as agricultural areas, often far from roosting sites (e.g., 15 miles; Pierson and Siders 2005). This species is limited by water and, due to its large size, can only access water from sources that are eat least 100 feet long (Bat Conservation International 2011).

Western mastiff bats are threatened by habitat loss, including loss of roosting and foraging habitat as well as clean, open water, and factors that reduce moth abundance including pesticides (Pierson and Siders 2005).

Within the CPER, western mastiff bats have been observed at the Chimineas Unit Headquarters and nearby Corral Pond (Figure 23). The species is predicted to occur in small numbers within most of the vegetation types within all units of the CPER, and occur at greater abundance within the ponds in the North Chimineas Unit (Appendix D).

E.7.8 Big Free-tailed Bat (*Nyctinomops mactrotis*): California Species of Special Concern

Big free-tailed bats range between South America and the southern United States, where they are found associated with a variety of communities, including desert scrub, woodlands, and evergreen forests, primarily in rocky, lowland areas within arid regions (Navo 2005). Within California, the species range is limited to the San Diego region, with a few observations recorded within the San Francisco Bay Area.

The species roosts primarily in rock crevices within cliffs, though occasionally will use buildings, tree cavities, or caves. Maternity colonies consisting of females and their single young born in late spring or early summer appear to utilize the same roosts each year (Navo 2005).

Big free-tailed bats feed primarily on moths but also take grasshoppers, beetles, crickets, and other flying insects. They are subject to predation by owls (Navo 2005). They are seasonal migrants, though little is known about their migration patterns. They are threatened by habitat loss and factors that affect prey populations including pesticides (Navo 2005).

Big free-tailed bats have only been reported on a single occasion in the Carrizo area but could utilize habitats within the CPER seasonally as part of their migration (Appendix D).

E.7.9 San Diego Desert Woodrat (*Neotoma lepida intermedia*): California Species of Special Concern

San Diego desert woodrats occur in coastal California from San Luis Obispo south through the Transverse and Peninsular Ranges into Baja California. The species inhabits coastal and desert scrub vegetation.

This species was recently reclassified as Bryant's woodrat (*Neotoma bryantii*) by Patton et al. (2007). Its status as a species of special concern is in question. While it was not listed in Williams (1986) or in the 1998 update, it continues to be listed as a species of special concern on the "special animals" list.

San Diego desert woodrats are nocturnal rodents that feed primarily on plant materials. They nest and take cover in houses that they build using plant materials including our lord's candle (*Yucca whipplei*) (Patton et al. 2007). Woodrats are subject to predation from owls, coyotes, bobcats, and snakes (Zeiner et al. 1990).

Within the CPER, San Diego desert woodrat observations have been recorded within the Chimineas units, primarily within the coastal scrub habitat (Appendix D). The species is also observed in adjacent areas that have been mapped as grassland. The species is anticipated to also occur within the juniper woodland and less frequently within the other main vegetation types within the Chimineas units (Appendix D).

E.7.10 Tulare Grasshopper Mouse (*Onychomys torridus tularensis*): California Species of Special Concern

The Tulare grasshopper mouse historically occurred within the San Joaquin Valley and adjacent foothills, Carrizo Plain, Cuyama Valley, various locations in southern Kern County, the Tulare Basin, and the Panoche Valley (Williams et al 1998). Within its range, the species is preferentially found in arid grasslands and desert scrub habitat that feature sandy or otherwise friable soils for digging (Collins 1998).

The nocturnal species feeds primarily on arthropods, including grasshoppers and other orthopterans and scorpions but also moths and beetles, though seeds are also eaten. It nests in burrows and can breed year-round. The species' predators include burrowing owl, American badger, San Joaquin kit fox, and coyote (Collins 1998).

The Tulare grasshopper mouse is threatened by habitat loss and fragmentation due primarily to agricultural conversion in the San Joaquin Valley. The species is adversely affected by insecticides, which can cause direct and indirect poisoning as well as reducing their food source. Secondary poisoning from rodenticides, used to control California ground squirrels may also have affected this species (Collins 1998).

Within the CPER, the Tulare grasshopper mouse has been captured or is expected in small numbers within the more arid communities, including the grassland, juniper woodlands, coastal scrub, and desert scrub, within all units of the CPER (Appendix D).

E.7.11 Pallid Bat (*Anrtozous pallidus*): California Species of Special Concern

Pallid bats range throughout western North America where they occur primarily in rocky, arid regions including deserts and canyons below 6,000 feet elevation. They roost alone or in groups within cliffs, caves, mines, trees, and human-created structures such as bridges and buildings, with roosts typically featuring unobstructed entrances/exits high above the ground (Sherwin and Rambaldini 2005).

Pallid bats mate between October and February, with young born April to July and weaned in August, after which maternity colonies disperse. Pallid bat migration is poorly understood, though the species is thought to migrate only short distances in winter.

Pallid bats feed on a variety of arthropods including scorpions, beetles, centipedes, grasshoppers, Jerusalem crickets, katydids, and moths, which they primarily glean from surfaces though they occasional catch prey on the wing while foraging over open grasslands, oak savannas, and other habitats as well as orchards and vineyards. Because they often forage on the ground, reduced understory vegetation cover and areas of bare ground constitute preferred foraging habitat. Pallid bats are threatened by habitat loss, particularly to their roosts and hibernacula but also to foraging habitat, and widespread use of pesticides which can reduce prey (Pierson and Rainey 1998a).

Within the CPER, pallid bats have been observed within the western portion of the CPER, including grassland, coastal scrub, oak woodland, pond, and riparian communities within the Chimineas units (Figure 23). The species is generally expected to be a year-round resident of the Reserve, and occur at high relative abundance within the grassland, oak woodland, and riparian areas of the Chimineas and American units. Pallid bats may also occur at low abundance within the juniper woodlands, shrublands, and ponds of the Chimineas units, and the Elkhorn and Panorama units (Appendix D).

Townsend's Big-Eared Bat (Photograph by Chris Wemmer and Craig Fiehler)

E.7.12 Townsend's Big-eared Bat (*Corynorhinus towsendii*): California Species of Special Concern

Townsend's big-eared bats range throughout the west including California, where the species inhabits a wide range of communities below 10,000 feet elevation, including coastal habitats, grasslands, deserts, riparian communities, forests, and agricultural areas (Sherwin and Paiggio 2005). Within these areas, Townsend's big-eared bats are primarily associated with caves and mines, which it uses as its primary roosts, though buildings, bridges, and tree cavities are also utilized (Pierson and Rainey 1998b).

Mating generally takes place between October and February and single young are born between May and July. Maternity colonies ranging in size from a few to several hundred individuals form between March and June, with roost sites varying among seasons and years. Males are solitary during the maternity period but males and females comprise winter hibernating colonies of up to several hundred animals. Townsend's big-eared bats are moth specialists that forage on the wing often over long distances (up to 90 miles) along streams and in a variety of wooded communities (Sherwin and Paiggio 2005).

Townsend's big-eared bats are threatened by habitat loss, particularly due to forestry and conversion of riparian communities, as well as activities which destroy roosts such as mining. This species is especially sensitive to human disturbances, which can lead to roost abandonment (Humphrey and Kunz 1976). Pesticides in forests and agricultural areas that reduce moth abundance could also reduce populations (Sherwin and Paiggio 2005).

Within the CPER, Townsend's big-eared bats have been detected within the oak woodlands, and occasionally in the grasslands and coastal scrub of the Chimineas units (Figure 23). The species was also observed at the Painted Rock Headquarters within the American Unit (Figure 23). The species may also occur at limited abundance within intact habitat of the American Unit and in other communities of the Chimineas units (Appendix D.)

E.7.13 Western Red Bat (*Lasiurus blossevillii*): California Species of Special Concern

Western red bats range from southern British Columbia south through the western United States and into Mexico as well as Central and South America. The typically solitary bats occasionally use caves though more commonly roost in woody plant foliage near streams or open fields, as well as orchards and occasionally urban areas (Bolster 2005a).

Western red bats prey on a variety of nocturnal insects and forage primarily when they are active one to two hours after sunset and again several hours before sunrise. Regarded as highly migratory, red bats migrate in groups in the summer. Though their winter activity is poorly understood, red bats have been observed hibernating in leaf-litter, with winter activity in the San Francisco Bay area suggesting they may be active year-round in moderate climates (Bolster 2005a).

Western red bats are predated upon by birds including scrub jays, raptors, and owls, and possums. They are primarily threatened by loss of riparian habitat which is important for roosting and foraging. Other threats may include pesticide use, which reduces prey abundance, and controlled burns which may kill roosting or hibernating bats (Bolster 2005a).

Within the CPER, western red bats have been observed utilizing Feed Lot Pond in the South Chimineas Unit. The species is anticipated to be a year-round resident and occur at relatively high abundance within mature riparian habitat of the Chimineas units, particularly the Cuyama River. It is also expected to utilize the ponds for foraging and water, and occasionally forage within other habits and other units (Appendix D).

E.7.14 Ringtail (*Bassariscus astutus*): California Fully Protected Species

Found throughout the southwestern United States, Mexico, and northern Central American, ringtails occur within California, except much of the Central Valley, where they inhabit low to mid-elevation shrublands and forests, specially, areas near rock outcroppings and within 0.6 mile of permanent water (Zeiner et al. 1990). The omnivorous species forages on the ground or in trees and feeds primarily on small mammals, arthropods, and fruits, including that of junipers, oaks, and manzanitas (Poglayen-Neuwall and Toweill 1988). Nocturnal, solitary ringtails take cover and nest in rock crevices, logs, snags, and other cavities and covered areas, including woodrat nests (Zeiner et al. 1990).

Ringtails are prey to coyote (*Canis latrans*), bobcat (*Felix rufus*), raccoon (*Procyon lotor*), and large owls, particularly great horned owls (*Bubo virginianus*) (Poglayen-Neuwall and Toweill 1998). The species is primarily threatened by habitat loss though trapping outside of California may also limit populations.

Despite extensive surveys, this secretive species has not been observed within the CPER. It may occur in small numbers within the oak and juniper woodlands, chaparral and coastal scrub, and riparian areas of the Chimineas units (Appendix D).

E.7.15 American Badger (*Taxidea taxus*): California Species of Special Concern

American badgers range throughout the western United States and Canada, including much of California. They inhabit grasslands but may also occur in open areas within other communities including coastal scrub, desert scrub, oak woodlands, wetlands, and riparian areas. This fossorial species may preferentially occupy finer, sandier soils, though habitat selection appears largely driven by availability of prey, which primarily includes California ground squirrels (*Spermophillus beecheyi*), pocket gophers (*Thomomys bottae*), California vole (*Microtus* californicus), and kangaroo rats (*Dipodomys* spp.).

American badgers are primarily nocturnal, though occasionally are active during the day, particularly in winter. They can travel more than 1.5 miles and typically occupy different burrows each night. Their home range depends on prey availability and can be several square miles in areas with patchy resources (Quinn and Diamond 2011).

American badgers have few natural predators though can be taken by mountain lions, bears, and packs of coyotes. American badgers breed in late summer and then give birth in early spring, owing to delayed implantation. Litters range from 1-5 with 2 being the average. Females may not breed each year and with high juvenile mortality rates, reproduction rates can be relatively low (Quinn and Diamond 2011).

American Badger in the CPER
(Photograph by Bill Bouton)

The species is threatened by habitat conversion for urban and agricultural uses. Due to their large home range, American badgers are sensitive to habitat fragmentation, which results in mortality caused by roads and the spread of diseases from domestic animals (e.g., canine distemper virus). Direct trapping and secondary poisoning through consumption of prey poisoned by rodenticide may also reduce populations (Quinn and Diamond 2011).

Within the CPER, American badger observations have been recorded on multiple occasions in the North Chimineas Unit grasslands, including both grazed and ungrazed areas, and in the desert scrub in the South Chimineas Unit. The species is anticipated to occur at low abundance within the Reserve's woodlands and shrublands including habitats within the other three units (Appendix D).

E.7.16 Hoary Bat (*Lasiurus cinereus*): Western Bat Working Group- Medium

Members of the family Vespertilionidae, hoary bats are found through much of the Western Hemisphere, including Hawaii, South America, and the Galapagos Islands, and are more abundant in central and western North America compared with the northern Rocky Mountains and areas further east.

Roosts are typically found along forest and open-canopy ecotones, but have also been reported in disused nests of woodpeckers and grey squirrels, within caves, and on structures. Hoary bats roost solitarily and primarily along the ends of coniferous and deciduous tree branches. They group together for fall migrations; their return migrations in the spring are considerably less organized and will contain fewer individuals than in the fall. Wintering locations and specific migratory routes are poorly understood (Bolster 2005b).

Hoary bats mate in the fall; however, implantation of the male's sperm is delayed so that birth occurs between May and July of the following year. Litters range from one to four but average two (Bolster 2005b). Hoary bats generally feed on the wing, preferring moths (Lepidoptera) as their food source. Wasps, flies, beetles, and non-flying insects such as termites and grasshoppers are also utilized. Foraging occurs late in the evening, except during winter when they are also observed in the late afternoon and around dusk.

Hoary bats are subject to predation by snakes, raptors, and other predatory birds such as owls and jays (especially in suburban areas), particularly while sleeping or hibernating (Bolster 2005b). They are threatened by timber harvests, which alter or eliminate roosting habitat, and pesticide-use, which reduces prey-populations and can impact roosting hoary bats themselves (Bolster 2005b).

During acoustical surveys of the Chimineas units of the CPER, hoary bats have been detected during spring and fall migration in grassland, blue oak woodland, coastal scrub, and riparian areas (Figure 23, Appendix D).

E.7.17 Long-eared Myotis (*Myotis evotis*): Western Bat Working Group- Medium

A member of the Vespertilionidae, long-eared myotis range throughout much of western North America from southwest Canada to the western Great Plains states and to isolated populations in Baja California (Bogan et al. 2005). They predominately inhabit coniferous forests, but they also occur in agricultural areas, semiarid shrubland, sage, and chaparral. Within these habitats, long-eared myotis occasionally roost within buildings and under bridges, but are most commonly found within rock outcrops, abandoned mines, caves, sinkholes, and cliff walls. Long-eared myotis also roost in hollowed-out trees and under loose tree bark (Bogan et al. 2005).

Long-eared myotis bats form small maternity colonies in the early summer months, when adult females produce a single pup. Males and juvenile females either roost solitarily or within small groups in the general vicinity of the maternity colonies. Winter migrations and roosting by long-eared myotis are poorly understood, although it is presumed they use hibernacula (Bogan et al. 2005).

Long-eared myotis forage at dusk, gleaning insects including moths, neuropterans, flies, wasps, and small beetle species from foliage, tree trunks, boulders, or the ground. This feeding behavior suggests open habitat may be important to this species (Bogan et al. 2005).

The long-eared myotis is threatened by the loss of roosting habitat. They are known to form roosts within active or abandoned mines (Bogan et al. 2005). Surveys can be conducted prior to building renovations, mine closures, timber harvests or other forest-management activities affecting decaying trees, or erosion-control along cliff-faces where the species often roost. Roosts can be abandoned as a result of recreational caving (Bogan et al. 2005). Due to the small size of maternity colonies and the single pup produced by a female per breeding season, protection of maternity colonies is essential to the protection of this species.

During acoustical surveys of the Chimineas units of the CPER, long-eared myotis have been observed around Number 3 Pond within the northern portion of the unit, and at Feed Lot Pond and the Cuyama River in the southern portion of the Unit (R. Stafford, unpublished data). The species is anticipated to occur in appropriate habitats albeit at small numbers elsewhere in the Chimineas units, and to occasionally use the ponds and upland habitat within the American Unit (Appendix D).

Appendix F
Cultural Resources Report

Appendix F Cultural Resources Report

This confidential report is omitted from public version of the CPER LMP.

Appendix G
Personnel Needs to Impement the Plan

Appendix G Personnel Needs to Implement the Plan

This appendix estimates the personnel time required for Department staff to implement this plan. In the table below, each management task (Section 3) was assigned to one of two categories based on their general frequency:

- Annual tasks (A) are anticipated to be conducted, at least in part, during each year. The level of effort may vary from year to year; the annual average is included in the table.
- Periodic tasks (P) are those that are conducted occasionally, such as preparing or updating plans, and conducting specific restoration and enhancement projects.

The hours required for personnel to complete the tasks are estimated for seven main positions.

- Senior Environmental Scientist Supervisor (Sr. E.S. Sup.);
- Environmental Scientist (Env. Sci.);
- Environmental Scientist, Resource Assessment Program (E.S. RAP);
- Scientific Aid (Sci. Aid);
- Tractor Operater Laborer (TOL)
- Habitat Assistant (Hab. Asst.);
- Fish and Wildlife Officer (Warden); and
- Archaeologist or cultural resources specialist (Arch).

Cells for tasks that are repeated in multiple elements of the LMP are shaded in grey and are blank, to avoid double-counting.

The level of effort was summed separately for the two types of tasks and the total number of personnel years required for each position was calculated, based on the annual tasks and one-third of the hours in the periodic tasks; the latter approach reflects the assumption that periodic tasks will be conducted every three years, on average. To identify the number of personnel years, the number of hours was divided by 1,760—the number of hours of a total 2,080-hour full-time equivalent position that will be spent working on tasks outlined in the plan.

The resulting estimates are included in Table 32 of the plan.

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
Biological Elements										
Landscape Element										
B1: Maintain or enhance the mosaic of communities of varying structure and successional stages by facilitating the occurrence of fires in the natural range of variation of the fire regimes for the different communities within the CPER.	B.1.1: Support research examining the fire ecology of the CPER to inform fire management.	A	2	16	8					
	B.1.2: Develop a fire management plan that identifies proactive fire management strategies and wildfire management responses based upon the disturbance ecology of the communities and landscape within the CPER.	P	16	80					8	
	B1.3: Implement fire management to maintain or enhance the mosaic of natural communities.	A	8	80	16	16				
B2: Maintain or enhance habitat connectivity and landscape permeability to promote movement of plants, animals, and ecological processes that sustain the populations and communities within the CPER.	B2.1: Coordinate management with adjacent landowners, including the BLM, USFS, and private landowners, and other agencies and organizations including San Luis Obispo County, where doing so can promote habitat connectivity.	A	6	16						
	B2.2: Evaluate and address road barriers. a. Collect and evaluate road kill data and other information to identify areas along roads where mortality to wildlife is high. b. Work with the California Department of Transportation and County of San Luis Obispo to design and implement projects to remove road barriers and impediments to wildlife movement (e.g., Highway 166).	P	4	12	12					
	B2.3: Remove or retrofit fences. a. Remove any fences that are not necessary for management, such as cross-fencing used to create	P	16	20		160	40	120		

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
	pastures in areas that are no longer grazed (Section 4.7). b. Retrofit all fences in pronghorn habitat so that the bottom wire is at least 18" above the ground to facilitate their ducking fences (Section 3.4.2). c. When installing or repairing fences required for management, make more wildlife friendly, including by increasing the height of the lowest wire. d. Install elk crossings in appropriate areas to reduce injury to elk and damage caused by existing fences.									
	B2.4: Promote growth of native shrubs and trees along drainages to enhance connectivity of riparian habitats and facilitate its use as a corridor for wildlife movement. a. In areas managed using cattle grazing, fence drainages to exclude cattle where doing so is necessary to prevent cattle use that would deter growth of riparian vegetation. b. Restore hydrologic function in riparian areas to increase the cover and diversity of woody vegetation along suitable drainages.	P	16	100		160	80	120		
	B2.5: Create and maintain connectivity between grassland habitat of similar structure (e.g., height) within and adjacent to the CPER, to facilitate movement by wide-ranging wildlife species.	P	4	24	8	8				

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
	a. Use vegetation management (fire and grazing) to create and maintain contiguous areas of short grassland within the CPER that are adjacent to short grasslands on adjacent properties, to facilitate habitat use by San Joaquin kit fox (Sections 4.2.2.1 and 4.4). b. Manage for contiguous areas of tall grasslands within the CPER that are adjacent to tall grasslands adjacent to the Reserve, to provide important habitat for tule elk and pronghorn (Section 4.2.2.1).									
Grassland Element										
B3a: Maintain sufficient areal extent of grasslands, an important habitat within the CPER, to support grassland plants and animals. B3b: Maintain or increase the total diversity of native plants and animals supported by the grasslands, including the many sensitive species, by creating and maintaining a diversity of grassland habitat structure, which promotes the total	B3.1: Implement fire management, in coordination with grazing, to create and maintain the varying structure in the grasslands, which promotes plant and animal diversity and populations of special-status species. This includes herb-dominated areas as well as those with scattered shrubs including linear-leaved goldenbush and silver bush lupine which are utilized by grasshopper sparrow and other native species.	A	4	24						
	B3.2: Use grazing as a management tool within the grasslands, in coordination with fire, to: a. maintain areas of short-statured grasslands (<6" tall in spring) to provide suitable habitat for burrowing owl, mountain plover, San Joaquin kit fox, and other native species (Table 21);	A	1	4						

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
richness of native plant and animal species.	b. maintain areas of tall-statured grasslands utilized by northern harrier, short-eared owl, tule elk, pronghorn, and other native species (Table 21); c. promote the richness and abundance of native plants within the grasslands by creating low-thatch conditions that promote establishment of many native plants, and by reducing competition with exotic annual grasses and forbs, which can limit diversity and abundance of native plants; and d. limit the abundance and competitive effects of non-native plants, including summer mustard, slender wild oat, ripgut brome, soft chess, red brome, and redstem filaree, among others (Table 23).									
B4: Restore grassland plant species diversity and composition in areas affected by cultivation.	B4.1: Implement a revegetation program to increase the richness and cover of native grasses and forbs by increasing their propagule supply through outplanting (seeding, adding bulbs, planting etc.) in grassland areas of low species richness, such as areas that were previously cultivated.	P	8	60		40		12		
B5: Increase understanding of the ecology of the grassland communities of the CPER to inform their effective long-term management.	B5.1: Support research to understand the factors affecting the distribution and species composition of grasslands within the CPER and broader Carrizo Plain region, to inform their effective management.	A	1	2	2					
Coastal Scrub Habitat Element										

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
B6a: Maintain or increase the areal extent of coastal scrub within the CPER. B6b: Maintain or increase the total diversity of native plants and animals supported by the coastal scrub, including the many sensitive species, by maintain a mosaic of habitat structure and reducing the cover of exotic plants.	B6.1: Implement fire management in coordination with managed grazing to: a. maintain the areal extent of coastal scrub, by preventing too-frequent fire that can convert coastal scrub to grassland; b. promote regeneration of native plants in long-unburned areas, and reduce establishment by non-native plants including annual grasses that might inhibit regeneration; and c. create a mosaic of stands of various times since fire and thus a variety of habitat conditions for animals that inhabit coastal scrub.	P	4	24						
	B6.2: Utilize seasonally timed cattle grazing, as needed, in coordination with fire management to reduce the cover of exotic annual grasses and forbs in order to: a. increase the richness and abundance of native coastal scrub herbs and shrubs; and b. prevent the spread and increased frequency of fire through development of dense fine fuels, particularly during years of high productivity (e.g., above average precipitation), that can convert coastal scrub to grassland.	A	1	4						
B7: Increase understanding of the ecology of the coastal scrub communities of the CPER to inform their effective long-term management.	B7.1: Support research to increase understanding of the factors that affect the distribution and composition of coastal scrub.	A	1	2	2					

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
Chaparral Habitat Element										
B8a: Maintain or increase the areal extent of chaparral within the CPER. B8b: Maintain or increase the total diversity of native plants and animals supported by the chaparral, by maintaining a mosaic of chaparral associations reflecting time since fire, and reducing the cover of exotic plants.	B8.1: Implement fire management in coordination with managed grazing to: a. maintain the areal extent of chaparral, by preventing too-frequent fire that can convert it to grassland, or unnatural succession in the absence of fire; b. create a mosaic of chaparral stands of various times since fire, promoting assemblages dominated by stump-sprouting species and obligate seeding species, maintaining populations of fire-following herbs, and maintaining a diversity of chaparral habitat conditions that support different animal assemblages; c. Create open chaparral conditions adjacent to oak woodlands, to promote use by mule deer.	P	4	24						
	B8.2: Utilize seasonally timed cattle grazing, as needed, in coordination with managed fire to reduce the cover of non-native annual grasses and forbs in order to: a. increase the richness and abundance of native chaparral herbs and shrubs. b. prevent the spread of fires through development of dense fine fuels, particularly during years of high productivity (e.g., above average precipitation), that can convert chaparral to grassland.	A	1	4						

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
B9: Increase understanding of the ecology of the chaparral communities of the CPER to inform their effective long-term management.	B9.1: Support research to increase understanding of the factors that affect the distribution and composition of chaparral.	A	1	2	2					
Desert Scrub Habitat Element										
B10a: Maintain or increase the areal extent of desert scrub within the CPER. B10b: Maintain or increase the total diversity of native plants and animals supported by the desert scrub, by maintaining the rich mosaic of desert scrub communities.	B10.1: Implement fire management to: a. prevent fires in desert scrub by reducing the likelihood that anthropogenic fires ignited along highways (e.g., Highway 166), other frequently traveled roads, or in other areas of human activity, will spread into intact desert scrub habitat. Techniques to prevent fire spread can include reducing the cover of fine fuels by creating and maintaining fuel breaks along areas of fire ignition (e.g., Highway 166). b. suppress fires that can convert desert scrub to grassland using the most non-destructive methods.	P	4	24			80	36		
	B10.2: Restore native shrubs following wildfires in desert scrub, where/when natural shrub recruitment is limited.	P	8	80	80	80	20	60		
B11: Increase understanding of the ecology of the desert scrub communities of the	B11.1: Support research to increase understanding of the factors that affect the distribution and composition of desert scrub	A	1	2	2					

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
CPER to inform their effective long-term management.										
Oak Woodland Habitat Element										
B12a: Maintain or increase the areal extent of oak woodlands within the CPER. B12b: Maintain or increase the total diversity of native plants and animals supported by oak woodlands, by maintaining the rich mosaic of communities of varying seral stages. B12c: Promote recruitment of oaks to maintain persisting populations over time.	B12.1: Implement fire management to: a. Maintain the areal extent of oak woodlands, by preventing too-frequent fire resulting from anthropogenic factors, which could prevent oak recruitment and convert oak woodland to chaparral or grassland; b. Use fire of varying frequency and other methods to create and maintain the mosaic of oak woodland communities and associations (Section 3.1.5), which feature diverse understory conditions and support different animal assemblages; c. Promote establishment and growth of seedling and sapling oaks, particularly in blue oak woodlands where recruitment and stand regeneration may be patchily limited by competition from exotic annual grasses; d. Create areas of open chaparral adjacent to oak woodlands, which can to promote use by mule deer.	P	4	24						
	B12.2: Use grazing as a management tool to: a. Facilitate blue oak regeneration, by reducing competition from exotic annual grasses and forbs	A	1	4						

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
	while limiting livestock herbivory of acorns, seedlings, and saplings; b. Promote the richness and abundance of native plants within the understory by creating low-thatch conditions that promote establishment of many native plants, and reducing competition with non-native annual grasses and forbs which can limit diversity and abundance of native plants; and c. Limit the abundance and competitive effects of non-native plants, including ripgut brome, soft chess, and red brome (Table 23).									
B13: Increase understanding of the ecology of the oak woodland communities of the CPER to inform their effective long-term management.	B13.1: Support research to increase understanding of the factors that affect the distribution and composition of oak woodlands.	A	1	2	2					
Juniper Woodland Habitat Element										
B14a: Maintain or increase the areal extent of juniper woodlands within the CPER. B14b: Maintain or increase the total diversity of native	B14:1 Implement fire management to: a. reduce the likelihood that anthropogenic fires ignited along Highway 166, other frequently traveled roads, or in other areas of human activity, will spread into juniper woodlands, by reducing fine fuels, particularly by controlling exotic herbs; and	P	4	24						

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
plants and animals supported by juniper woodland, by maintaining the rich mosaic of communities of varying seral stages.	b. Suppress fires in juniper woodland using techniques that are least impactive to the native plants and animals of this community.									
B14c: Promote recruitment of California juniper to maintain persisting populations over time.	B14.2: Use grazing as a management tool to: a. Reduce fine fuels created by exotic herbs, to reduce the risk of a fire that would kill California juniper and other non-fire adapted species in the community; b. Facilitate California juniper recruitment, by reducing competition from non-native annual grasses and forbs while limiting livestock herbivory of seedlings and saplings; c. Promote the richness and abundance of native plants within the understory by creating low-thatch conditions that promote establishment of many native plants, and reducing competition with exotic herbs which can limit diversity and abundance of native plants; and d. Limit the abundance and competitive effects of non-native plants, including red brome (Table 23).	A	1	4						
B15: Increase understanding of the ecology of the juniper woodland communities of the CPER to inform their effective long-term management.	B15.1: Support research to increase understanding of the factors that affect the distribution and composition of juniper woodlands.	A	1	2	2					

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
Riparian and Riverine Habitat Element										
B16a: Increase the areal extent of riparian communities within the CPER. 16b: Maintain or increase the total diversity of native plants and animals supported by riparian and riverine areas, by creating and maintaining a rich mosaic of intact natural communities and the range of abiotic conditions which support them. 16c: Promote recruitment of riparian shrubs and trees where feasible, to create and maintain contiguous areas of riparian vegetation along streams.	B16.1: Restore riparian areas to attain the following objectives: a. Restore the hydrologic functions of the drainages, where practical and where doing so does not degrade other important habitats, including ponds that support native plants and animals including several special-status species (Section 3.1.7); b. Establish native riparian plant species, including riparian shrubs and trees, through direct planting, fencing to reduce cattle herbivory and trampling, and other techniques in areas that feature the appropriate hydrologic conditions to support the native riparian species; and c. Eradicate, where feasible, and control elsewhere the populations of non-native animals that impact native species within streams, including predatory fish (Section 3.5.2.1) and wild pigs (Section 3.5.2.3).	P	24	240	200	440	40	80		
	B16.2: Implement fire management to: a. Reduce the likelihood that anthropogenic fires ignited along Highway 166 other frequently traveled roads, or in other areas of human activity, will spread into riparian areas, by reducing fine fuels, particularly exotic herbs and highly flammable tamarisk, or through other appropriate techniques; and	P	4	24						

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
	b. Suppress anthropogenic fires using techniques that are least likely to impact the sensitive species and communities.									
B17: Increase understanding of the ecology of the riparian and riverine systems of the CPER to inform their effective long-term management.	B17.1: Support research to increase understanding of the factors that affect the distribution and composition of riparian shrublands and woodlands.	A	1	2	2					
Wetland Habitat Element										
B18: Maintain or enhance the natural structure and native species composition of wetlands by maintaining or improving the hydrologic conditions.	B18.1: Coordinate with BLM to manage the wetlands surrounding Soda Lake.	P	2	20	20	20				
	B18.1: Recreate the topographic conditions to support wetlands that were altered or destroyed through cultivation, including by creating microrelief to promote vernal pools in grasslands, where appropriate.	P	10	100	80	200	160	60		
	B18.2: Manage exotic plants within wetlands to: a. Prevent alteration of the hydrology, including reduced hydroperiod, as a result of uptake of soil moisture by non-native plants. b. Reduce competition with native plants, including the three special status-plants.	A	1	8		24		24		
B19: Increase understanding of the ecology of the wetlands of the CPER to inform their effective long-term management.	B19.1: Support research to inform wetland management,	A	1	2	2					
Pond Habitat Element										

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
B20: Maintain or increase the total diversity of native plants and animals supported by ponds by creating and maintaining a range of pond conditions, in terms of hydrology, vegetation, and other aspects including structure.	B20.1: Enhance pond habitat to: a. maintain open water conditions preferred or required by many species including western spadefoot toad, vernal pool species such as fairy shrimp, and many bats, which rely on open water ponds for foraging and water; b. maintain appropriate upland habitat for pond-breeding species, including open conditions for western spadefoot toad and woody structure required by western pond turtle (Section 3.3); c. designate ponds or portions of ponds where cattle will be excluded to promote establishment and growth of native vegetation within and along the margins of ponds, which can enhance habitat for native many native birds such as tricolored blackbird, common yellowthroat, and yellow warbler; and d. create opportunities for basking, such as exposed logs, rocks, or floating mats of vegetation.	A	1	4						
	B20.2: Control invasive plants and animals within the CPER ponds, including: a. eradicate, where feasible, and control elsewhere the populations of non-native animals that impact native species within ponds, including the predatory fish (Section 3.5.2.1) and wild pigs (Section 3.5.2.3); and b. control invasive plant species including bull thistle, yellow star-thistle, and other species that	A	1	8		24		24		

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
	outcompete native plants and degrade habitat for animals.									
B21: Increase understanding of the ecology of the ponds of the CPER to inform their effective long-term management.	B21.1: Support research to inform pond management.	A	1	2	2					
Cliff and Rock Outcrop Habitat Elements										
Goal B22: Prevent anthropogenic impacts and disturbances to cliffs and rock outcrops.	B22.1: Limit public access to rock outcroppings and caves by: a. avoiding them when siting trails, roads, other facilities and programs; b. seasonally limiting access for hunting and other recreational activities, as needed, to avoid disruptions to nesting and roosting species; c. erecting signage and fencing; and d. enforcing closures to cliffs, rock outcroppings, and other highly sensitive habitat areas.	P	2	2	4				8	
Goal B23: Increase understanding of the ecology of the rock outcrops and cliffs of the CPER to inform their effective long-term management.	B21.1: Support research to inform rock outcrop and cliff management, including studies that: a. increase understanding of their use by plants and animal species, including lichens and invertebrates; and b. examine susceptibility of native species to anthropogenic impacts and disruptions.	A	1	2	3					

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
Species Elements										
B22: Maintain or increase populations of special status species and otherwise promote their long-term viability within the CPER.	B22.1 Conduct management and restoration projects to address anthropogenic factors thought to unnaturally limit special status species populations within the CPER, including controlling and eradicating, where feasible, non-native plants and animals (Section 3.5).	P	8	24	16	80	40	40		
	B22.2 Reintroduce special status species to suitable habitat where dispersal limitation might prevent natural recolonization; for example, aquatic species (e.g., California red-legged frog) could be reintroduced following eradication of predatory fish.	P	4	40	40	80	40			
	B22.3 Evaluate introducing rare species not currently within the Reserve, where doing so will promote their populations without impacting other native plants and animals.	P	2	20						
	B22.4 Limit impacts of human activities on the special-status species within the Reserve, through careful implementation of the habitat management, public use, and facilities management elements. The following are specific actions that can reduce impacts to special status species. a. Maintain a spatial database (i.e., GIS) of rare species occurrences within the Reserve to inform project planning and updates to the LMP. b. Continue to inventory the Reserve, as resources allow, and prior to projects, and update the	A	8	40	40	80				

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
	database based on new occurrences observed during inventories and monitoring. c. Evaluate potential impacts of management projects on special-status species during project planning and identifying steps to avoid or minimize impacts as part of CEQA analyses and consultations with the federal agencies, as needed. The EIR outlines the full suite of species protection measures, which include: i. Avoiding activities in areas or times of the year (e.g., breeding season) where and when impacts could occur; and ii. Conducting pre-project surveys to identify potential significant impacts and making adjustments to avoid or minimize them. d. Monitor projects to evaluate their effects and effectiveness on special-status species.									
	B22.5: Ensure that all actions in the CPER comply with the federal Endangered Species Act and California Endangered Species Act, Section 1602 of Fish and Game Code, and other applicable regulations to protect of special-status species or their habitats.	A	4	20						
B23: Increase understanding of the ecology of the special status species of the	B23.1: Continue to conduct surveys to evaluate the distribution and abundance of special status plants and animals within the CPER.	A	2	40	60	100				

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
CPER to inform management that promotes long-term viability of their populations.	B23.2: Periodically evaluate habitat within the Reserve to qualitatively assess its condition for special status species.	A	2	24	40	64				
	B23.3: Monitor the status and trends in the distribution and abundance of special status species and evaluate effects of management. Priority should be given to focal species from the range of taxonomic groups which have been identified as collectively representing the diversity of habitat needs of the broader suite of special status species (S2.4).									
	B23.4: Support research to inform management of special status species.	A	1	2	2					
B24.1: Maintain or increase populations of focal management species and otherwise promote their long-term viability within the CPER.	B24.1: Design and implement habitat management and restoration projects within the CPER to address anthropogenic factors that unnaturally limit tule elk, pronghorn, and mule deer populations, including controlling and eradicating, where feasible, populations of non-native plants and animals (Section 3.5).	P	8	20	40	80				
	B24.2: Manage grazing to protect mule deer, tule elk, and pronghorn habitat, including by: a. Maintaining areas of tall grasslands, including at least 15” tall herbaceous vegetation during the spring to provide cover for fawns. b. Maintaining large, contiguous areas within the grasslands of the Chimineas and American units that are not managed using cattle and thus preferred by tule elk.	A	1	4						
	B24.3: Design and implement enhancement projects that can improve habitat conditions and promote populations of tule elk, pronghorn, and mule deer,	P	8	60	40	80	176	80		

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
	without negatively impacting other native species, particularly special status species. Examples of habitat enhancement projects include creating new water sources including ponds and troughs to complement existing water sources to provide water at approximately one-mile distance within suitable habitat, including grasslands and oak woodlands of the Chimineas and American units.									
	B24.4: Manage Carrizo Plain herds of tule elk to promote genetic diversity, including by: a. Maintaining large, contiguous areas of suitable habitat that promote habitat connectivity and thus movement of animals between herds; b. Translocating individuals between other herds in California and that within the Carrizo Plain area, as needed, to facilitate genetic exchange.	P	4	40						
	B24.5: Coordinate management of tule elk, mule deer, and pronghorn within the CPER as part of the larger state-wide management plans. a. Implement management activities that are appropriate for the CPER within the updated management plans for tule elk, mule deer, and pronghorn. b. Monitor tule elk, mule deer, and pronghorn populations to inform their management within the CPER as well as updates of the respective management plans.	A	2	20						

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
	B24.6: Conduct and support research to inform management of focal management species, including: a. Evaluate tule elk and pronghorn habitat specificity within the grassland associations of the CPER mapped by VegCAMP, to inform grassland management for structure and species composition. b. Increase understanding of the tule elk and pronghorn diet within the CPER. c. Increase understanding of the population dynamics of the Carrizo Plan tule elk and pronghorn herds, to inform estimates of the carrying capacity.	A	1	4	7					
Scientific Research Element										
S1: Increase understanding of the ecology and management needs of the species, communities, and ecosystems and their response to management, restoration, and enhancement projects by promoting, supporting, and conducting research within the CPER.	S1.1: Create and maintain a prioritized list of research topics to provide to researchers interested in conducting studies within the CPER.	A	1	4	4					
	S1.2: Encourage researchers to conduct studies within the CPER, through outreach including: a. posting information about the Reserve and the list of research topics information on the Department's website; b. conducting presentations about the Reserve and opportunities for research at universities, other research institutions (e.g., USGS), and scientific meetings and conferences; and	A	2	16	8					

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
	c. circulating letters to researchers to describe the Reserve and its research opportunities.									
	S1.3: Manage the Reserve to maintain the ecological conditions of the communities and species, so that it can be effectively used for scientific research. a. Restrict public access to the North Chimineas Unit to special permitted uses only, to protect biological resources and reduce the potential for the public to disrupt research sites or equipment. b. Limit access to the South Chimineas Unit to primarily walk-one use, to reduce impacts associated with vehicle access including increased likelihood of unauthorized entry into the North Chimineas Unit.	A	2	16	8				8	
	S1.4: Evaluate proposals for research projects and provide feedback to increase the effectiveness based on several criteria	A	1	16	16					
	S1.5: Issue permits for approved research projects that specify the conditions under which research can be conducted.	A	1	4						
	S1.6: Establish and maintain relationships with regional academic institutions to promote ongoing research at the CPER, including long-term ecological studies that are essential to effective	A	2	12						

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
	management including monitoring climate change impacts.									
	S1.7: Create and maintain resources to promote research at the Reserve and enhance the effectiveness of individual projects and the overall research program at the CPER. Resources include: a. infrastructure and facilities to promote research, including a laboratory with basic equipment (e.g., microscopes, scales, etc.) for on-site research use, internet access, one or more weather stations; b. An electronic database of research projects, monitoring studies, and surveys conducted on the Reserve as well as background literature on the region such its geology, soils, hydrology, and other information to inform research; c. A geographic information system (GIS) for the Reserve, which contains base layers, regional datasets, and data collected within the Reserve by the Department and researchers; d. Species lists for the Reserve; and e. Records of all habitat management projects and the occurrences of	A		40	50		80	40		

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
	natural disturbances (e.g., fire) or other information about the site.									
Monitoring Element										
S2: Enhance long-term effectiveness of the management of the CPER by evaluating the effectiveness of management and tracking the status and trends in communities and species to detect declines that could trigger the need for new management projects.	S2.1: Evaluate the effects of public use, facilities management, and other human activities on the biological and cultural resources of the Reserve. Specific monitoring elements could include: a. Tracking aspects of public use including type, frequency, intensity, and locations of use. b. Recording facilities maintenance activities including road maintenance by type, frequency, and location. c. Identifying and periodically assessing the conditions of the types and locations of resources that could be affected by human activities.	A	2	40	24			16		
	S2.2: Periodically examine the areal extent of the communities within the CPER, in order to evaluate success toward the landscape and habitat elements related to maintaining or increasing important communities.	P	2	80	90	80				
	S2.3: Periodically examine the species composition and structure of the communities to evaluate success toward the habitat elements related to maintaining or increasing the cover and diversity	P	2	80	90	80				

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
	of native species and decreasing the cover of exotic plant species.									
	S2.4: Track the status and trends of the focal species populations within the CPER	A	1	80	200	350				
	S2.5: Monitor occurrences of invasive plant species to detect their potential spread and inform the need for management.	A	1		40	40		20		
	S2.6: Evaluate the effects of specific management, restoration, and enhancement projects.	P	1	60	80	140				
Adaptive Management Element										
S3: Increase the long-term effectiveness of management of the CPER by updating management actions according to new information obtained from scientific research and monitoring, and to changes in the Reserve.	S3.1: Review the newly developed scientific information relevant to management of the Reserve. Methods to obtain and assimilate the information include: a. Convening a team of scientists, biologists from other portions of the Department (e.g., state headquarters), staff of agencies responsible for managing the adjacent public lands (BLM, USFS, USFWS, etc.), and other knowledgeable individuals for an annual meeting to discuss scientific research and monitoring relevant to conservation in the region; b. Attending scientific meetings and conferences hosted by other organizations (e.g., Wildlife Society	A	2	24	24					

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
	meetings, California Invasive Pest Council Conference, etc.) c. Reviewing the annual reports of researchers working on the CPER as well as those prepared by agencies managing other protected lands nearby; and d. Direct outreach to knowledgeable individuals including scientists, conservation practitioners, and land managers.									
	S3.2: Prepare an annual report for the CPER that contains information for each element of the LMP (i.e., biological, public use, cultural resources, and facilities).	A	4	40	60					
	S3.3: Develop an annual work plan for the CPER, based upon the LMP and prior year's annual report.	A	6	24	16			16		
	S3.4: Update the LMP every 20 years or as needed to maintain its relevance to inform management of the Reserve.	P	20	320	100					
Fire Management Element										
V1: Manage fire to protect and enhance the biological systems, cultural resources, and facilities of the CPER, and promote	V1.1: Develop a fire management plan for the CPER to manage wildfires and use prescribed fire as a vegetation management tool to attain the biological s related to fire, and protect cultural resources, facilities, and public safety.	P	24	160	80					

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
attainment of the s described under the corresponding elements.	V1.2: Implement fire management and fire protection in coordination with agency partners, which may include the California Department of Forestry and Fire Protection (CalFire), Los Padres National Forest (USFS), Carrizo Plain National Monument (BLM), County of San Luis Obispo, and adjacent landowners.	A	4	40						
	V1.3: Provide public information on fire management to promote public understanding of and support for the Department's fire management within the Reserve.	A	4	8						
Grazing Management Element										
V2: Maintain and enhance the biological systems that are promoted by grazing management, while protecting cultural resources and Reserve facilities, allowing public uses, and promoting attainment of the goals described under the corresponding elements.	V2.1: Develop a grazing management plan for the CPER to use livestock as a landscape-level management tool to attain the biological s related to grazing, while protecting sensitive biological and cultural resources and facilities.	P	8	120						20
	V2.2: Implement grazing management through the adaptive management framework outlined in the plan, including by developing and administering grazing permits, conducting annual monitoring of grazing effects and effectiveness, and identifying adjustments to the grazing permits, as needed, to promote achievement of the goals.	A	4	64	80	120				
	V.2.3: Coordinate grazing management with the staff of the Los Padres National Forest (USFS) and Carrizo Plain National Monument (BLM) that administer the grazing leases on the federal land adjacent to the Reserve.	A	1	12						

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
	V2.4: Provide public information on grazing management within the CPER to promote public understanding of and support for the Department's efforts to manage the Reserve.	A	2	8						
Exotic Plant Management Element										
V3: Control and eradicate, where feasible, exotic plant species and prevent their invasion and spread into the Reserve, in order to promote attainment of the biological, public use, and facilities goals of the LMP.	V3.1: Control and eradicate priority exotic plants within the Reserve, using the most effective control techniques for the species or guild, while minimizing impacts to non-target species or other natural resources.	A	2	16		20	40	80		
	V3.2: Monitor priority exotic plant populations to evaluate effectiveness of treatment and detect changes in their distribution and abundance that can inform adjustments to management.	A	1	8		24		16		
	V3.3: Reduce the likelihood of new invasions and the spread of non-native plants, by: a. Cleaning vehicles and heavy equipment that enter the Reserve; b. Disposing of plant debris, including from exotic plant control projects; c. Conducting outreach to the public to prevent movement of exotic plants; d. Feeding livestock used in grazing management only certified weed-free hay, when feasible. e. Encouraging equestrians using the Reserve to use only certified weed-free hay and considering restrictions	A	2	8	12	40	12	12	6	

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
	on equestrian use of trails should it be identified as promoting the invasion and spread of non-native plants.									
	V3.4: Implement an Early Detection/Rapid Response program for the Reserve, to identify new invasive species occurrences and eradicate them before they spread. Such EDRR programs are the most cost-effective way to manage exotic plants in large and diverse natural lands such as the CPER.	A	1	8	24	40		40		
	V3.5: Coordinate exotic plant control with fire and grazing management whenever possible, and use an integrated pest management to limit negative impacts of control methods including biocides (herbicides and pesticides) on non-target species and resources, including water.	A	1	4						
	V3.6: Coordinate exotic removal efforts with adjacent landowners USFS, BLM, private landowners to coordinate regional exotic plant control, particularly where efforts within the CPER alone cannot address exotic plant impacts (e.g., Tamarisk along the Cuyama River).	A	1	4						
	V3.7: Enlist the assistance of government agencies and scientific and conservation organizations with exotic plant management.	A	1	4						
	V3.8: Provide public information about exotic plant management within the CPER to promote public understanding of and support for the Department's efforts to manage the Reserve.	A	1	4						

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
Public Use Elements										
P1: Educate the public about the unique ecology and natural history of the CPER to increase understanding of the conservation values and threats to the region.	P1.1: Develop and support public education programs and activities for the CPER including: a. educational workshops (e.g., on invasive plant ecology, wildlife tracking); b. guided tours of parts of the Reserve that are popular destinations for day-use visitors and that highlight the Reserve's unique natural resources; c. presentations to school or university classes and/or at educational conferences to promote educational programs and opportunities. d. opportunities for volunteers to gain hands-on experience with management and monitoring activities (e.g., through participation in wildlife surveys and habitat restoration and management projects).	A	4	16	22					
	P1.2: Facilitate site-appropriate, wildlife-dependent programs at the Reserve by: a. providing permits for, and staff assistance with, programs as Department time and resources permit;	A	4	16	8					

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
	b. encouraging user groups to incorporate the Department's guidelines for natural resource education in their activities, curricula, and interpretive programs, both on and off-site; and c. collaborating with partner agencies and local organizations and user groups to develop natural resource education opportunities.									
	P1.3: Create and maintain tools and materials for use in environmental education programs and activities including: a. interpretive information that describes the ecology of the Reserve, identifies areas where visitors can observe unique natural resources, resource degradation, and management challenges, and describes how the Department is working to restore and manage habitat; and b. curriculum materials and field equipment for use by environmental education groups and programs.	A	2	8		8				
Wildlife Observation Element										
P2: Promote public enjoyment of and awareness about the	P2.1: Develop and make publicly available on the website and at Reserve access points information about the native species and communities of the	A	2	8		8				

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
native species and communities of the CPER and adjacent region, by maintaining and enhancing opportunities for self-guided hiking, wildlife observation, illustration, photography, and plant identification.	Reserve, including species lists, maps indicating areas of interest, and other brochures, to facilitate pubic wildlife observation.									
	P2.2: Consider establishing wildlife viewing areas such as observation towers or platforms, boardwalks in habitats and locations that provide for undisturbed wildlife viewing and where they will not have deleterious environmental impacts or result in undesirable visual effects.	A	2	16						
Hunting Element										
P3: Provide high-quality hunting opportunities within the CPER.	P3.1: Develop and continue to refine the elements of high-quality hunting program, based on feedback from hunters.	A	4	16						
	P3.2: Regulate hunting including access, harvest rates, and hunting locations to maintain a relatively high abundance of game.	A	2	16					8	
	P3.3: Monitor hunting activity (hunter days and harvest) and game abundance and make adjustments to the hunting program, as needed, to maintain high quality hunting opportunities.	A	2	16		16			8	
P4: Minimize the impacts of hunting on the biological and cultural resource s while providing high quality hunting opportunities.	P4.1: Post on the Department website and at Reserve access locations the allowed hunting opportunities (species and the appropriate seasons), and the hunting restrictions, including the prohibition on target shooting, hunting certain species, and lead ammunition.	A	1	4						
	P4.2: Monitor hunting activity (hunter days and harvest) and animal populations and make adjustments to	A	2	24		72				

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
	the hunting program, as needed, to minimize impacts to native species.									
P5: Maintain the safety of hunters and non-hunting visitors to the Reserve.	P5.1: Provide hunter safety instruction during apprentice hunts and other on-site workshops, as well as posted signs and websites.	A	2	24					8	
	P5.2: Provide visitor information through posted signs and website content to maintain safety of non-hunting visitors during hunting season and/or in areas where hunting is ongoing.	A	2	16					8	
	P5.3: Where needed, designate separate hunting areas and non-hunting areas during hunting seasons.	A	1	4						
	P5.4: Monitor or supervise hunting as needed to promote compliance with the regulations and safety guidelines.	A	2	40					80	
P6: Enhance and expand hunting opportunities and the number and variety of users taking advantage of them.	P6.1: Coordinate with non-profit groups that promote hunting to plan activities and programs.	A	4	32						
	P6.2: Encourage hunting by under-represented groups such as youth, women, and mobility-impaired individuals.	A	4	8						
	P6.3: Periodically solicit and review feedback from the public for changes to the hunting program on the Reserve.	A	2	8						
P7: Accommodate cultural uses of the Reserve by Native Americans.	P7.1: Collaborate with native peoples to determine the purpose and needs related to specific requests for access and collections within the Reserve.	A	2	6						
	P7.2: Maintain regular dialog with representatives of the Carrizo Native American Advisory council to promote regular exchange and good relations.	A	2	8						
	P7.3: Develop and implement a standardized procedure to evaluate requests and grant permits for cultural use of the Reserve by native peoples.	A	2	8						

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
Public Access Element										
P8: Maintain and improve access to the Reserve that is compatible with the biological and cultural resource management elements.	P8.1: Maintain roads and parking areas in a drivable condition (F1.3). a. Maintain roads seasonally and as needed. b. Clearly designate roads that are not passable or are otherwise closed using signage and notations on Reserve maps. c. To facilitate effective management and public use, upgrade the northern and southern access roads to the Chimineas units to provide all-weather access to the Reserve headquarters. d. Provide an effective system of opening, closing, and locking gates to control vehicular access to the Reserve.	A	4	24		40	480	240		
	P8.2: Create a system of trails based in part on the Reserve's existing dirt roads.	P	8	40				40		
	P8.3: Install informational signs in the Reserve.	P	2	20				40		
	P8.4: Coordinate public use of the Reserve with adjacent landowners.	P	10	20					8	
Public Safety Element										
P9: Promote safety through thoughtful design, management, and operation of the Reserve.	P9.1: Ensure that Reserve management and operation activities comply with safety codes and procedures outlined in the facilities maintenance and safety plan (F1.1).	A	8	16			16	16	8	

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
	P9.2: Encourage safe use of the Reserve and minimize conflicts by providing visitors with appropriate safety information including: a. providing information at access points and on the Department website that clearly identify when and where hunting is permitted; b. posted signs identifying acute safety concerns, including speed limits and fire prevention, where necessary; and c. information at the Reserve headquarters and other facilities, which clearly communicates regulations, safety warnings, and codes of conduct.	A	4	12		16		16	4	
	P9.3: Restrict access to unsafe areas such as construction zones, habitat management areas, locations where hunting is ongoing, and other restricted areas.	A	4	12				12	16	
	P9.4. Provide emergency contact numbers at parking areas or other areas of public congregation.	A	1	4		4		4		
P10: Promote safety and limit property loss during emergencies.	P10.1: Develop and maintain an emergency response plan for the Reserve that identifies appropriate responses to fire, flood, earthquake or other emergency (F1.1).	P	8	24					16	
	P10.2: Post relevant emergency information on the Department's website, on signage, and at the Chimineas Unit Headquarters to facilitate appropriate public responses.	A	1	4		4		4		

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
	P10.3: Review and update the emergency plan annually to ensure staff familiarity with procedures and protocols.	A	4	8					6	
	P10.4: Work with local, regional, and state agencies to coordinate on the Reserve operations, facilities, and personnel into emergency communications and response plans.	A	4	16					6	
	P10.5: Collaborate with federal, state, and local fire and law enforcement personnel to improve coordination of emergency services, including through development of the fire management plan (Section 4.4.1).	A	4	16					16	
Community Outreach and Involvement Element										
P11: Increase support for the Reserve and its management through outreach and coordination.	P11.1: Utilize a variety of mechanisms to increase the awareness about public use opportunities, management programs, and regulations within the Reserve, including: a. Providing talks to community organizations, schools and universities, and at scientific and professional society meetings; b. Creating and maintaining a website that provides up to date information about the Reserve and its management, including public uses, regulations, and volunteer opportunities; c. Maintaining and utilizing an updated list of outreach contacts to notice regarding the Reserve,	A	4	16	8					

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
	including public events, closures, changes in regulations and, if time and resources permit, periodic updates about the Reserve's management; d. Coordinating press releases and other forms of media outreach with the Department's public information officers; and e. Soliciting input from the public regarding management of the Reserve on the Department website and posted signs, which provide appropriate contact information for Reserve staff.									
	P11.2: Develop and expand volunteer opportunities on the Reserve including through collaboration with the Chimineas Ranch Foundation. Specific actions could include: a. Creating a volunteer program to promote regular involvement with environmental education, wildlife observation, and/or natural resource conservation and management; b. Recruiting new volunteers through regional media, community organizations, local colleges, professional associations,	A	4	40			8	8		

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
	conservation organizations, and at public events; c. Tracking volunteer hours for use as in-kind labor contribution for state and federal grant programs, and as part of a volunteer recognition system; and d. Periodically soliciting and reviewing feedback from volunteers to enhance and expand volunteer programs and opportunities.									
Unauthorized Public Use Element										
P12: Discourage, prevent, and reduce the frequency and impacts of unauthorized use of the Reserve, such as vehicle access, illegal dumping, vehicle use (esp. off-highway vehicle), poaching, and camping.	P12.1: Post Reserve regulations on Reserve signs and the Department's websites, and provide Department staff contact information (name, phone number, and e-mail address) for questions, comments, and suggestions.	A	1	4				12	4	
	P12.2: Patrol the Reserve and enforce regulations that prohibit unauthorized uses. Issue citations, request assistance from law enforcement agencies, and/or pursue legal action when voluntary cooperation cannot be obtained. Adjust allocation of enforcement efforts based on the nature, frequency, magnitude, and impacts of unauthorized uses of the Reserve.	A	1	6					416	
	P12.3: Coordinate with Department law enforcement personnel and representatives from other law enforcement agencies, including county and	A							8	

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
	federal, to facilitate enforcement and public safety within the Reserve (M2.3).									
	P12.4: Restore lands and ecosystems damaged by unauthorized use as necessary. When feasible, determine restoration costs so that payment for remediation from parties deemed responsible for adverse impact(s) can be pursued through legal action.	A	2	20			24	24		
	P12.5: Establish a regular monitoring and removal program to discourage, and clean up following, illegal dumping. Ensure that removed materials are taken to an appropriate and approved disposal facility. P12.6: Install physical barriers at points used to access the Reserve for illegal vehicular use. Select barriers that are consistent with the rural character of the region and the aesthetics of the natural environment of the Reserve.	A	1	6				20	6	
	P12.7: Coordinate with local law enforcement agencies and adjacent landowners to reduce the frequency of trespass and illegal activities in and around the Reserve.	A	1	6					8	
Cultural Resources Elements										
C1: Identify locations of cultural resources within the Reserve and use this information to facilitate their protection during management.	C1.1: Create and maintain a database of the cultural resources that have yielded or have the potential to yield information important to the prehistory or history of the Reserve or that otherwise would meet the significance criteria of the California Register of Historical Resources, including resources that may have traditional use or religious values to Native Americans. Information about cultural resources	P	2	8						40

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
	includes electronic information, maps, and reports for all of the inventories and investigations of cultural resources on the Reserve. This information can by synthesized through the following steps: a. Conduct a records search at the Archaeological Information Center at California State University, Bakersfield. b. Contact Native Americans who have historical ties to the Reserve lands and solicit information on resources that may not be previously identified or that they deem important. c. Contact the Native American Heritage Commission for an archival search of their Sacred Lands files. d. Research the relevant literature to obtain information about newly discovered or previously documented resources. e. Coordinate with the adjacent federal agencies (USFS and BLM) regarding their cultural resource investigations and information related to adjacent lands.									
	C1.2: Support efforts to document the history of human activities at the Reserve.	A	1	4						8

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
	C1.3: When cultural resources are found during surveys or other projects, complete and submit the necessary record documentation to the California Historical Resources Information System (i.e., DPR Form 523).	A	1	4						8
C2: Pro-actively manage cultural resources on the Reserve to ensure their long-term preservation.	C2.1: Mitigate all potential adverse impacts to cultural resources through passive site preservation (avoidance) in-place, insofar as this is possible.	A	2	4						8
	C2.2: Where passive preservation alone may not be adequate to ensure cultural resource protection, use active site management techniques that minimize impacts to the resources. These can include: a. Installing carefully-placed fencing or barriers around site boundaries. b. Capping site areas with non-cultural soils. c. Revegetating disturbed or altered site areas. d. Monitoring the conditions of sites periodically. e. Closing areas from public entry using signage indicating that an area is sensitive.	P	4	16					12	24
	C2.3: Ensure that ongoing and routine Reserve activities, including road maintenance, public use, and vegetation management, do not adversely impact cultural resources. Methods to achieve this can include:	P	4	12				40		16

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
	a. Re-route roads through known sites to non-sensitive areas, or cap existing roads within site areas with load-bearing geotextile matting and non-cultural fill; and b. Fence-off archaeological sites in areas of intensive livestock use and/or move livestock facilities to non-sensitive areas.									
	C2.5: Conduct intensive Phase I cultural resource surveys before ground-surface disturbing activities (e.g., grading, excavations) in all areas that have not been previously surveyed by archaeologists.	P	1	4						40
	C2.6: Prepare an "inadvertent discovery plan" to be followed when cultural resources are encountered that have the potential to be adversely impacted by projects involving ground-surface disturbance.	P	1	4						40
C3: Mitigate any unavoidable impacts to significant cultural resources.	C3.1: In cases where projects may result in adverse impacts to known archaeological resources, and site avoidance may not be feasible, conduct Phase II tests excavations and determinations of significance to establish whether the sites are eligible for listing on the California Register of Historical Resources.	P	12	12						80
	C3.2: In cases where projects involving built structures that meet the 50-years-age-criteria may be altered, conduct an architectural assessment of the integrity and significance of the structure to establish	P	2	6						24

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
	whether the structures are eligible for listing on the California Register of Historical Resources.									
	C3.3: If a project has the potential to have an adverse impact on a cultural resource that has been recommended as eligible to the California Register of Historical Resources based on the significance evaluation, consult with the State Historic Preservation Officer to obtain concurrence on the eligibility determination.	P	4	4						20
	C3.4: In cases where adverse impacts resulting from a project cannot be avoided, prepare a treatment/data recovery plan and consult with the State Historic Preservation Officer on the adequacy of the plan, and implement the approved plan.	P	2	2						20
	C3.5: Follow all best management practices and provisions related to accidental discovery of human remains, as provided for in Section 7050.5(b) of the California Health and Safety Code, and CEQA Guidelines Section 15064.5, including by ceasing excavation and calling in a coroner and qualified archaeologist if human remains are discovered.	P	2	2						
C4: Increase awareness and appreciation of cultural values of the Reserve to promote their long-term persistence.	C4.1: Develop and implement a cultural resources interpretive plan that provides for education about the Reserve's cultural resources without threatening their integrity.	P	4	8						40
	C4.2: Develop educational and information materials to increase public awareness and appreciation of the cultural resources of the Reserve.	P	4	8						40
	C4.3: Involve the community in cultural resource stewardship activities. This could include nation to nation consultation during the project planning	A	2	8						16

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
	process, regular collaboration with Native American groups, creating a public contact list of interested parties or stakeholders, and developing outreach programs through presentations and lectures.									
Facilities Maintenance Elements										
F1: Maintain, improve, and expand existing facilities as necessary to facilitate the management s associated with the other elements of the plan and promote safety for staff and visitors.	F1.1: Develop a facilities maintenance and safety plan.	P	8	48				8	8	8
	F1.2: Maintain the general facilities by implementing the tasks in the facilities maintenance and safety plan, including. a. Maintaining a database of facilities (e.g., as a GIS data) to inform management. b. Repair, replace, or remove facilities as needed	A	4	16			80	158		
	F1.3: Maintain and upgrade, where feasible, roads and parking areas to facilitate their use, including by: a. Maintaining roads and parking area surfaces, so they are smoothly graded and/or graveled; b. Upgrade roads, as feasible, to make them passable during all weather. Priority should be given to the main access road(s) to each unit of the Reserve; c. Periodically clearing vegetation, as needed, to maintain clearance for vehicles including fire engines; and	A	4	16			104	160		

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
	d. Maintaining access gates in smooth operational condition.									
	F1.4: Maintain and upgrade, where feasible, fences, kiosks, and signage. a. Inspect and repair fences to deter unlawful entry by vehicles and facilitate grazing management. b. Upgrade fences, where possible, to make them wildlife friendly, using smooth wire on the top and bottom strand, as feasible. In pronghorn habitat, fences should either be removed or retrofitted so that the bottom wire is at least 18" from the ground. c. Replace gates on interior fencing used for grazing management with cattle guards, where feasible and desirable, to facilitate access. d. Inspect kiosks and signage and repair or replace as needed. e. Update signage, as necessary, to display current public information. f. Install additional kiosks at areas of new ingress as needed to deter new unauthorized activities.	A	1	8		40	40	40		
	F1.5: Maintain the buildings and grounds on the North Chimineas and American units.	A	8	20		40	120	240		

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
	a. Periodically inspect the condition and functionality of buildings and other structures (e.g., paint, structural and roof integrity, plumbing, electrical, painting, fixtures). b. Repair, replace, or remove structures that are unauthorized or have become unsafe or otherwise in undesirable condition. c. Create and maintain defensible space (i.e., reduced fuels) within 100 feet around structures to protect them from fire. d. Control noxious plants (weeds) and animals (e.g., rodents) in and around structures. e. Remove remnants of recent human activity (e.g., abandoned structures, debris piles, etc.) provided that such remnants have no historical or management value. In particular, tear down the shed and corrals at Panorama and the silo at Painted Rock Ranch. f. When available, work with volunteers to maintain facilities and the grounds within the two headquarters.									

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
	g. Inspect and maintain the septic systems.									
	F1.6: Maintain and upgrade water-related facilities. a. Maintain water-related facilities associated with the headquarters and grazing infrastructure, including wells, pumps, pipelines, storage tanks, ponds, troughs, and filtration systems. b. Retrofit and upgrade open water tanks and troughs to facilitate their use by native animals, such as tule elk and bats, and prevent impacts to native species, including by including wildlife escape devices. c. Conduct water quality analyses of drinking water on the Reserve to insure public safety. Post warning signs when water is deemed non-potable and provide potable water or conduct treatments to make water potable, as feasible.	A	24	24		930	40	240		
	F1.7: Maintain the system of power generation and delivery on the Reserve. a. Maintain and/or upgrade the Department-owned power lines that extend across the Reserve from Highway 166, to the Chimineas Ranch house. Reduce the amount	A	24	16				24		

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
	of above-ground power lines, where feasible. b. When possible, increase the proportion of Reserve power produced by on-site (e.g., solar) energy generation to reduce long-term energy use and facility maintenance costs.									
	F1.8: Maintain and upgrade field and office equipment. a. Inspect the condition and functionality of field equipment (e.g., road graders, tractors, field vehicles, miscellaneous field tools including survey equipment) and office equipment (e.g., computers, printers, copy machines, and telephones). b. Maintain the shop facility on the North Chimineas Unit so that field equipment can be safely and serviced.	A	12	8		16	80	40		
F2: Improve the condition of the Reserve's habitats and its visual resources while protecting public safety by removing obsolete facilities and equipment including dilapidated infrastructure.	F2:1: Remove unnecessary fences, including cross fencing.	P	1	8		16		24		
	F2.2: Remove dilapidated infrastructure associated with land use of prior owners. Items that might be removed include: a. grain storage tanks (American and Panorama units) b. sheds (American and Panorama units)	P	8	16				24		

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
	c. trailers (American and Chimineas units)									
	F2.3: Abandon any unused wells using the appropriate techniques to safeguard groundwater.	P	2	8				8		
F3: Limit negative impacts associated with maintenance of utilities and infrastructure managed by other entities that occurs on the Reserve.	F3:1: Work with those that maintain the high-voltage electricity transmission lines and the gas transmission lines to limit impacts associated with their maintenance on the grassland habitat and species in the northern portion of the North Chimineas Unit.	P	12	20						
	F3:2: Work with the County Public Works to limit negative impacts associated with road maintenance on the sections of County-maintained road that traverse the American, Panorama, and Elkhorn units of the CPER.	P	2	20						
	F3-3: Research subsurface mineral rights and work to acquire them, where needed.	P	8	40						
	F3-4: Survey portions of the Reserve's boundaries where needed to facilitate effective management.	P	8	40						
Management and Monitoring Coordination Elements										
M1: Facilitate attainment of the Reserve's multiple s through management that promotes compatibility and minimizes conflicts, and that reflects and reinforces the purposes of the acquisitions.	M1.1: Protect special status and sensitive animals and plants and their habitats with particular emphasis on the locations and times where and when impacts may be especially pronounced (e.g., during the breeding season, in nesting or calving areas).	A	4	16	16	32				
	M1.2: Identify and manage the inevitable conflicts between management goals and strategies for the various biological systems, to promote to the maximum	A	4	16						

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
	extent possible, the attainment of each of the biological goals while prioritizing the species and communities for which the CPER is most critical to persistence.									
	M1.3: Assess conflicts between public uses and the condition of biological and cultural resources, and modify management of the public uses to reduce or eliminate these conflicts.	A	24	16						
	M1.4: Promote safe use and operation of the Reserve and strive to ensure compatibility of multiple public uses, prioritizing wildlife-dependent activities, particularly those for which the CPER is uniquely suited.	A	24	16						
	M1.5: Periodically review the relevant regulations and guidelines and make revisions to management or regulations as necessary, to ensure that they are appropriate given the condition of biological and cultural resources and the frequency, nature, and demand associated with the various public uses.	A	8	8					8	
M2: Enhance long-term effectiveness of management by coordinating and collaborating on Reserve management with other agencies, non-profit organizations, user groups, and neighbors.	M2.1: Coordinate with federal, state, and local agencies regarding plans and projects that may affect or be affected by management of the Reserve.	A	48	24	8					
	M2.2: Coordinate with other law enforcement agencies whose jurisdictions overlap or are contiguous with those of the Departmental law enforcement staff (i.e., game wardens) to collaborate and explore opportunities for cooperative programs and joint funding requests.	A	1						8	
	M2.3: Coordinate with local public service agencies to increase fire safety and conduct surveillance and suppression of wildlife diseases.	A	2	8						

Table G-1: Estimated personnel time required to complete LMP tasks.

Goal	Task	Type[1]	Sr. E.S.S.[2]	Env. Sci.	E.S. RAP	Sci. Aid	TOL	Hab. Asst.	Warden	Arch.
	M2.4: Coordinate with non-profit organizations, neighboring and local landowners, lessees, user groups, and others interested in the management of the Reserve, to obtain assistance and support.	A	4	40						
M3: Promote long-term effective and efficient management of the Reserve by maintaining organized, accurate, and complete records related to the management and resources of the Reserve.	M3.1: Develop protocols to standardize the collection and management of data, including records, GIS data (including metadata), survey data, and photographic data.	A	2	24	40	40				
	M3.2: Include within the annual reports and work plans explanations of the management actions, including their rationales and effects; notations of changes in management strategies; changes in the status of sensitive species, habitats, and cultural resources; public use accidents or other safety issues; and ongoing or upcoming projects.	A	4	12	12					
	M3.3: Regularly update the Reserve's GIS as new or updated information becomes available.	A		8	20					
	M3.4: Maintain financial records that include expenditures and costs and hours associated with staff, maintenance, and administrative functions, including volunteer activities.	A	16	8						
	M3.5: Provide data on special-status species to the California Natural Diversity Database.	A		8	20					
	Total Annual Task Hours		**429**	**1690**	**914**	**2208**	**1124**	**1,546**	**640**	**40**
	Total Periodic Task Hours		**348**	**2336**	**980**	**1744**	**676**	**792**	**60**	**412**
	Annualized Periodic Task Hours (Periodic Task Hours/3)		116	779	327	581	225	264	20	137
	Total Estimated Personnel Hours Per Year		545	2469	1241	2879	1349	1810	660	177

Table G-1: Estimated personnel time required to complete LMP tasks.											
Goal	**Task**	**Type[1]**	**Sr. E.S.S.[2]**	**Env. Sci.**	**E.S. RAP**	**Sci. Aid**	**TOL**	**Hab. Asst.**	**Warden**	**Arch.**
	Personnel Years (Total Personnel Hours/1,760 hrs./year)		0.3	1.4	0.7	1.6	0.8	1.0	0.4	0.1

[1] Type: A= Annual Task, P=Periodic Task

[2] Positions:

Sr. E.S.S: Senior Environmental Scientist Supervisor

E.S.- Senior Environmental Scientist

E.S. RAP: Environmental Scientist, Resource Assessment Program

Sci. Aid: Scientific Aid

T.O.L.-Tractor Operater Laborer

Hab Asst- Habitat Assistant and/or Habitat Assistant 1

Warden- Fish and Game Warden

Arch- Archaeologist or cultural resources specialist

Appendix H
Public Input from the Plan Visioning Meeting

Appendix H Public Input from the Plan Visioning Meeting

This appendix describes the comments received from the public during the visioning period for the Carrizo Plains Ecological Reserve (CPER) Land Management Plan (LMP). The comments were used to inform development of the LMP. Additional public input regarding the LMP was provided during the scoping period for the environmental impact report in December 2012 (Appendix J) and on the EIR itself (Appendix K).

H.1 Introduction

As part of the CPER LMP planning process, the Department of Fish and Game (Department) implemented a public visioning process, designed to provide information about the CPER and the LMP planning process, and to gain public input to inform development of the LMP. Four methods were used to solicit and obtain public input for the vision for the CPER and the LMP:

1. Public Notice: A public notice describing the CPER and the LMP and inviting comments to be sent to Bob Stafford was posted on the DFW website (www.dfg.ca.gov/news/pubnotice), sent via e-mail to individuals who had expressed interest in the LMP as well as a wide variety of stakeholders, and provided as a press release to at least 5 newspapers in communities surrounding the CPER (Table H-1).
2. Letter to Adjoining Landowners: A letter from DFW was sent to 13 private landowners holding property contiguous with one or more units of the CPER (Appendix A).
3. Public Meeting Comment Card: Attendees of the May 15, 2008 visioning meeting were invited to complete a comment card or mail a separate letter to Bob Stafford.
4. Public Meeting Open House: Meeting attendees were invited to share their vision to representatives of DFW and the consulting team staffing three booths at the open house.

CPER LMP Visioning Meeting (Photograph by Jodi McGraw)

Table H-1: Newspapers to which press releases for the CPER LMP Visioning Meeting and Process were sent.

Newspaper	Region Served
San Luis Obispo Tribune	San Luis Obispo County
Santa Maria Times	Santa Maria
Taft Midway Driller	Taft, Maricopa, western Kern County
Times Press Recorder	Arroyo Grande, Five Cities region
Bakersfield California	Bakersfield, central Kern County

This following section lists comments recorded on wall-sized post-its at the three topical stations at the open house:

- Vision for the CPER;
- Habitat and Species Management; and
- Public Uses and Access.

It then lists the responses received to the questions on the comment card, and provides the two letters submitted in response to the notice. It also provides a brief discussion of the comments and recommendations for next steps.

H.2 Comments Received

Open House Stations

Station 1: Vision

- Hunters should pick up shells
- Strictly enforce non-lead ammunition regulations
- Fence riparian areas to keep cattle out of streams
- Eradicate feral pigs
- Manage cattle better via better pasture rotations, consideration of appropriate livestock class (stockers vs. cow/calf), and water distribution, etc.
- Install wildlife escape devices in water troughs
- Increate water supply distribution for wildlife
- Employ more wardens to patrol the Reserve
- Coordinate law enforcement between CDFW and the US Forest Service
- Conduct an on the ground survey for property lines between CDFW and federal lands administered by the USFS and BLM
- Encourage controlled public use and monitor use so that increased use is not detrimental to the species
- Conduct active fire management to simulate natural fire regimes
- Investigate sub-surface mineral rights and try to acquire them
- Leave the property alone as much as possible' don't change what CDFW is currently doing
- Don't pave roads
- Increase access to water for cattle and wildlife on the South Chimineas where water is limited
- Limit bird hunting on dry years to let populations bounce back
- Increase public awareness of the property boundaries to deter trespass; post signs around Red Rock and Taylor Canyon in the Chimineas Unit

- How does data gathered on the CPER relate to private property and the concerns and rights of indigenous people?
- Keep the area essentially the same, except with more riparian habitat
- Fewer and better managed cattle especially to allow riparian growth
- Limit access to protect research and facilitate appreciation for the Reserve
- Evaluate education opportunity for conservation and ranching compatibility

Station 2: Habitat and Species Management

- Increase water for wildlife (i.e., through development of springs, etc.)
- Use grazing as a vegetation management tool; do not over graze
- Conduct exotic plant species management, esp. for yellow star-thistle
- Use the least toxic method possible for exotic plant species management
- Protect native plant populations in consideration of their regional importance
- Examine the mineral rights and their guidelines
- Identify the carrying capacity (of the Reserve)?
- Assess public use conflicts with wildlife
- Examine fire danger
- Eradicate wild pigs
- Establish a repository for sharing data and research results (e.g., a website)
- Post a list of the observed wildlife for the public
- What are the guidelines for collection of native plants for public and traditional use?
- Maintain the roads but do not improve them (no pavement).
- "What constrains cattle grazing on CDFW properties? Can we eliminate them? (unclear)
- Encourage research on the effects of grazing on native and non-native species
- Develop compatible management goals with neighbors (BLM, USFS, and private)
- Share information with private inholdings; work together to deter poaching and coordinate law enforcement
- Install pronghorn-friendly fences in pronghorn areas
- Establish and maintain healthy herds of native ungulates
- Recognize and respond the concerns and rights of native people
- Determine the fire regimes: historical and present.

Station 3: Public Uses and Access

- Current allowable uses are OK, though some concern about conflicts with target shooting

- Allow camping within a low number of designated sites possible (USFS has two places)
- Allow horseback riding for 100-mile endurance rides on designated trails or off trail, preferably
- Could there be mountain biking on designated trails? Can bikes be used to hunt?
- Develop an access agreement for thru fare with the private landowners within the Chimineas Unit.
- Construct or repair the fence between BLM and CDFW land in Saltos, which is being grazed
- Provide maps of the Reserve to facilitate public use
- Do not change hunting program or access
- Limit hunting to subsistence; no trophy hunting
- Increase access to the North Chimineas
- Make hunting permits (or application forms) available electronically on the web
- Expand the CPER website to include information regarding access
- Provide guided tours for hiking and wildlife viewing
- Employ more game wardens
- Incorporate adaptive management principles and techniques in the LMP
- Conduct tamarisk removal
- Develop a fire control plan
- Prohibit hunting of coyotes, rabbits, and ground squirrels
- Protect cultural resources from public use; cultural resources protect should take precedence over public use
- Educate hunters about endangered species protection and take prohibition
- Host a "photopalooza" (opportunity for people to come onto property in order to take photographs)
- Post information about the "paloozas" on the CPER website
- Will the LMP include route designation study for trails, hunting, etc.?

Comment Card Questions and Responses

The following responses were received to visioning questions on the 6 comment cards which were received at or following the meeting.

What is your vision for the future of the Carrizo Plains Ecological Reserve? What should it look like in 20 years? In 50 years?

1. Restoration, overall preservation of the integrity of the land, while still allowing for sustainable human uses
2. I would like to keep the Reserve open to hunting. 20-50 years-undeveloped-no changes from the current status, perhaps develop some more water sources; keep existing roads unpaved and open

3. The beneficial management of the land. Hunting on the land in a wise and beneficial way. Protecting and growing endangered species. More access to the land in a good way.
4. Manage with wildlife growth in mind; water for wildlife.
5. Retain the remote “time capsule” historical aspects of the area.
6. Make the area a showplace for wildlife conservation, preservation, history and education WITHOUT engaging in large scale development of facilities, roads, and trails.
7. Consider consolidating the Reserve into a contiguous area by doing land swaps with BLM.
8. I would like to see maintained and increased access to the monument. Continued wise management by hunting is a must and careful application of grazing.

What biological resources do you value on Carrizo Plains Ecological Reserve? Please be specific.

1. Diversity of plant and animal species—all in one “small” area
2. water, quail, elk, wildflowers, dove
3. Bird hunting, water resources, native flowers, managing foreign invaders
4. I value the spring and water.
5. Year-round supplies of water makes a vita difference on wildlife flourishment and for food less grazing or at least wiser use of it would also cause continued growth of elk, chucker, quail, antelope, and animals in general.
6. Elk, Antelope, Deer, Birds, Wild flowers
7. Endangered species preservation and recovery through natural processes and habitat management (as opposed to the expensive and very unnatural condor restoration effort)
8. Habitat preservation for #6 and #7 above.

What management issues or environmental concerns would you like to see addressed in the Land Management Plan?

1. Sustainable balance between human uses and preserving ecological integrity.
2. Develop more water sites, control yellow star-thistle, keep hunting open
3. overgrazing cattle, over populated animals, move hunting access for managing certain animals
4. Limited, careful cattle grazing.
5. Limiting public access to specific managed events and low impact uses
6. Develop a long-term demonstration project illustrating the benefits of science based managed grazing as a habitat management tool
7. Eliminate, over time, the private cattle operation as currently structured
8. Continue recreation hunting as currently structured; evaluate adding coyotes to the “huntable species” list with appropriate restrictions
9. Fund a full-time care taker/facility manager position
10. Fund a full-time CDFW Warden position for the Reserve and the CPNM.

11. Provide state funding sufficient to maintain and manage the Reserve and its facilities
12. Move the 3rd party residency uses out of the main Chimineas house, develop the alternative sites such as the bunk house for routine group and student use, and institute security measures to protect the facility
13. Further develop partnerships with conservation groups to assist in maintaining and enhancing the Reserve
14. Partner with a private non-profit foundation to raise funds, recover costs, retain revenues and to assist in managing activities and uses of the Reserve
15. Continue with the restrictions for motorized vehicles and off road travel
16. Allow only pedestrian and equestrian access (no mountain bikes, etc.)

What types of wildlife-dependent public uses or programs would you like to see in the Carrizo Plains Ecological Reserve?

1. Naturalis or docent led hikes—public education programs; many of the existing uses
2. hunting
3. Informing the public about any new legislation or regulations. Informing the public about new scientific research or reports
4. Junior and woman hunts.
5. Hunting, Wildlife viewing, and Wildlife related conservation education

Do you have any additional comments about the Carrizo Plains Ecological Reserve, the Land Management Plan, or the environmental review process that you would like to share with the Department of Fish and Game?

1. I like the adaptive management part of the plan. I think this is very important for the health of this region, and the overall success of the plan.
2. The Reserve is a unique and irreplaceable place. It must be preserved in its current condition, enhanced when possible, but not sacrificed in any way to merely increase public access and facilitate popular recreational uses that are not compatible with ecological preservation. While the land is indeed "public property" and the public should be provided every reasonable opportunity for access, preservation should always trump public access and use where conflict is foreseeable.

Individual Letters

In response to the public notices, the Department received letters from two sources:

1. Craig Deutsche, a private individual from Los Angeles
2. Jeff Kuyper, Executive Director of Forest Watch, a non-profit organization.

The letters, each of which addressed a variety of topics and one of which is exceptionally detailed, are included at the end of this appendix.

H.3 Discussion and Synthesis

Commenters: Number and Breadth of Interest

Comments were received from approximately 20 individuals. These include a subset of the 30 attendees at the public meeting who provided comments during the open house and/or on comment cards or letters, and 1 person who did not attend the public meeting but sent in a letter. Broadly speaking, commenters can be categorized into three main stakeholder groups:

- Hunters and wildlife observers who currently use the Reserve
- Individuals and representatives of organizations concerned with environmental and cultural resources protection, including scientists conducting research within the Reserve
- Adjacent landowners or their representatives

A representative of the local Farm Bureau expressed interest in reviewing the draft LMP but chose note provide input into the visioning process.

Scope of Comments

Most commenters addressed the visioning questions that were posed on the comment card and raised during the presentation and open house components of the public meeting. The letter from Forest Watch, which was written without reference to the meeting or visioning comment card, is similar to a scoping letter for a project Environmental Impact Report, in that it recommends areas to be analyzed as part of the LMP environmental review as well as recommendations for management actions and policies for the Reserve.

Many commenters focused primarily or exclusively on management of the Chimineas units of the CPER. Though they did not do so in name, it was clear that their prior experience and main interest lie primarily or exclusively with the unit, which features different communities, species, and current management.

Summary of Comments

Generally speaking, most commenters vision for the Reserve is that it remain the same. Toward that end, most requested that the LMP maintain the status quo for management of the facilities, public uses, and access, so that impacts of human uses on the Reserve remain limited. A few requested limited, additional hunting and other drive-on programs (e.g., photopalooza) and asked whether camping or mountain bikes could be allowed, while one person asked whether more access could be provided to the North Chimineas Unit. A few commenters requested interpretive hikes and wildlife observation opportunities, including docent lead hikes. One comment inquired about regulations relating to use of the Reserve by Native Americans for cultural purposes.

The most common request for changes with respect to CDFW's current management of the Reserve was with regard to cattle grazing on the Chimineas units. Most commenters acknowledged that cattle grazing could play an ongoing role in vegetation management. However, many requested that CDFW carefully evaluate cattle grazing impacts on endangered species and habitats, and suggested that changes to the current grazing practices should be considered to redress what several people familiar with the Reserve see as overgrazing, particularly in riparian areas and wetlands.

Additional management recommended by commenters include:

- Measures to promote native biodiversity and maintain populations of rare and endangered species
- Measures to enhance game populations, including development of water sources.
- Eradication or control of exotic species, incl. pigs, yellow star-thistle, and tamarisk
- Fire management, including both wildfire management and prescribed fire to maintain habitat.
- Protection of cultural resources, incl. the historic facilities of the ranch
- Additional wardens, patrols, and enforcement, by CDFW and/or agency partners
- Provision of additional information about the Reserve via a website or other means, incl. maps, regulations, allowed uses, research projects and results, etc.

As part of the planning process, a few commenters recommended that it will be helpful to determine accurately and perhaps sign on the ground the boundaries between the Reserve, particularly the Chimineas units, and adjacent properties, including both federal lands and the private inholding.

H.4 Letters Received

The following are the letters regarding the LMP that were received by members of the public in response to the Visioning Meeting.

Comment Letter from C. Deutsche (May 21, 2008)

May 21, 2008
2231 Kelton Ave
Los Angeles, CA 90064

Mr. Bob Stafford
Department of Fish and Game, Region 4
P.O.Box 6360
Los Osos, CA 93412

Sir:

I would like to take this opportunity to submit comments on the management of the Ecological Preserve, Chimineas Unit, which is administered by the California Department of Fish and Game (CDFG). As this area is rather distant from other lands administered by the CDFG it merits special consideration.

This area, along with the a smaller unit of land administered by the Bureau of Land Management (BLM), represents a wildlife corridor between the Los Padres Forest and the Carrizo Plains monument. Along with the Bitter Creek Wildlife Preserve and the Wind Wolves Preserve this is part of an extremely important resource for wildlife in south-central California. I am asking that the resource management plan *explicitly declare that this area is to be managed for the benefit of wildlife and wildlife habitat*. Other uses should be permitted only to the extent that they are consistent with this primary goal.

Specific recommendations would be:

1) The areas should be administered in a manner consistent with policies of its neighbors, the Los Padres Forest, the Carrizo Plain National Monument, and the smaller enclosed lands belonging to the BLM. If the plans of these areas are not consistent, then both will fail.

2) With the exception of guided tours and perhaps a limited number of special events, motorized access this area ought not be available to the public.

3) A route designation plan ought to be formulated which eliminates redundant and unnecessary roads. Roads which were once needed for maintenance of the ranch may no longer be appropriate. The goal should be a minimum of vehicle travel consistent with administrative requirements.

4) Foot travel in the area, and camping with a permit, would seem to be proper.

5) The management plan should consider establishing one or two restricted and designated camping sites. These might be with permit requirements. These might also be established in conjunction with the BLM and coordinated with their holdings within the Chimineas area.

6) Although this is probably obvious, there needs to be consultation with the Native American community regarding protection of cultural resources.

7) Grazing should be permitted only if it can be demonstrated to do no harm to wildlife. If grazing is continued, it is reasonable that the area immediately around the Chimineas

ranch building may be fenced off to exclude public, but otherwise grazing ought not to displace other activities (hunting, hiking, research).

8) The Chimineas Unit lies within the historical range of the California Condor. I encourage CDFG to manage the Unit to be consistent with the recovery of the species as laid out in the latest California condor recovery plan

I visit the American Ranch unit and the Panorama unit of the Ecological Reserve several times a year, sometimes with fence removal projects directed by Alice Koch, and sometimes in conjunction with regular visits to the Carrizo Plain National Monument. More recently (April 24-25, 2008) I backpacked in the Chimineas (and enclosed BLM) areas and wish to make several specific observations. Saltos Canyon. runs for about two miles to the northeast from its confluence with Carriso Canyon. While this canyon lies within an area administered by the BLM, there are no fences separating the two (different) administrative areas. What occurs on one area affects the other. Saltos Canyon is a gorgeous riparian area, and running water was present in at least half a mile of this length. This running water had been used heavily by cattle, and their tracks largely dominated the stream bed. This circumstance (heavy use by cattle) may, or may not, be detrimental to health of the habitat. I am not any expert on these wildlife matters, but effects of these kinds must be addressed in the management plan. In view of the fact that the cattle belong to the ranch in the Chimineas Unit, these circumstances are relevant for your consideration. Ideally this stretch of the canyon should be visited and evaluated by a wildlife biologist to inform plans concerning grazing. I should also add that I found the carcasses of six (6) cows in this stretch of Saltos Canyon. While most were old, perhaps a year old, this would seem to indicate a problem for the present grazing management and perhaps future wildlife concerns.

I also visited Taylor Spring and Pearson Spring. These are both within the Chimineas Unit. The latter of these (Pearson Spring) had running water and was impacted by cattle or elk. Again, this water source needs to be evaluated by a biologist to assure that wildlife will not be impacted negatively by the future administration of the unit.

I appreciate this opportunity to submit comments, and am confident that the unique value of this area will be recognized in your management decisions. I would appreciate receiving notice of any future meetings concerning this plan and about the availability of the draft when it is released to the public.

Sincerely,

Craig Deutsche

Craig Deutsche
310-477-6670
deutsche@earthlink.net

Comment Letter from Los Padres National Forest Watch (June 20, 2008)

June 20, 2008

VIA EMAIL & CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Bob Stafford, Wildlife Biologist
California Department of Fish & Game
P.O. Box 6360
Los Osos, CA 93412
bstafford@dfg.ca.gov

RE: Comments on Land Management Plan and Initial Study for the Carrizo Plain Ecological Reserve

Dear Mr. Stafford:

Thank you for this opportunity to provide comments on the proposed Land Management Plan ("LMP") and Initial Study for the Carrizo Plain Ecological Reserve (the "Reserve"). The Reserve contains more than 39,500 acres of land in southeastern San Luis Obispo County, and was acquired by the California Department of Fish & Game (the "Department") beginning in 1971 to protect habitat for threatened and endangered wildlife like the San Joaquin kit fox, giant kangaroo rat, blunt-nosed leopard lizard, San Joaquin antelope squirrel, California jewelflower, San Joaquin woolly-threads, and other wildlife of interest such as pronghorn antelope and Tule elk. The Reserve includes lands within the Carrizo Plain National Monument, as well as lands outside the monument that serve as a linkage between the monument and the Los Padres National Forest.

Los Padres ForestWatch is a local, community-based nonprofit organization working to protect and restore the natural and cultural heritage of the Los Padres National Forest, the Carrizo Plain National Monument, and other public lands along California's central coast. We are supported by more than seven hundred members who value the Reserve for its wildlife habitat, scenic landscapes, and outdoor recreation opportunities. The Reserve serves as vital habitat and an important link connecting the Los Padres National Forest to the Carrizo Plain National Monument. We would like to submit the following comments to help guide the Department as it embarks on the planning process for this ecologically significant area.

Post Office Box 831 • Santa Barbara, CA 93102 • 805-617-4610 • www.LPFW.org

field monitoring data indicates that range conditions in the area are in poor condition due to drought and overgrazing, particularly in the last few years. As the California Department of Fish & Game (the "Department") undertakes the planning process for the Reserve, it is important to ensure that adequate safeguards are in place to protect resources from damage caused by overstocking, trampling, streambank erosion, the spread of invasive weeds, and the construction and maintenance of roads. Strict management of livestock grazing is particularly important in areas such as the Reserve that provide habitat for rare plants and wildlife, as well as important wetlands like riparian areas and vernal pools. Our field visits to this allotment over the last three years indicate that livestock grazing is significantly affecting many of these resources, and it is critical that adequate measures are implemented as soon as possible to reduce or eliminate these impacts.

Because the Reserve is an ecological reserve, we believe that grazing should only be used as a management tool and only if it can be demonstrated, based on high quality and accepted science, to be consistent with the purposes of the Reserve to protect native species and ecosystems (i.e. to control invasive weeds). If grazing is to continue on the Reserve, it should only occur in the context of a specific management prescription to achieve a measurable management objective. Grazing levels should be carefully monitored, and reduced or eliminated once those objectives are achieved.

The Department must analyze the impacts of all livestock grazing on the Reserve and ensure that such use is compatible with the protective purposes for which the Reserve was established. We recommend that the Department analyze the impacts of livestock grazing on plant and animal species (including invertebrates) and ecosystems, water quality and quantity, soils, invasive weeds, and heritage resources.

If grazing is allowed in these limited circumstances, the following measures and analyses should be incorporated in the LMP:

- Protection of springs, seeps, vernal pools, and riparian areas;
- Analysis of fencing, roads, and other infrastructure needs on wildlife and recreation;
- Evaluation of spring developments (existing and proposed) on water quality and quantity for downstream water users and wildlife;
- Assessment of the impact of livestock grazing on the presence and spread of invasive weeds and native plants;
- Evaluation of impacts to soils and soil crusts;

other wetlands, riparian areas, native grasslands, heritage sites, and habitat for TES wildlife, unless grazing must be used as a management tool.

- Discussion of the current extent of woody browse on the Reserve, as well as the impacts of continued livestock grazing on woody browse, particularly in drought years.
- An assessment of oak regeneration, the lack of which may be "attributed to wildlife and livestock grazing of seedlings, competition from nonnative annual grasses, and unnatural abundance of some acorn-eating animals such as gophers and ground squirrels." U.S. Forest Service (2005), *Final Environmental Impact Statement, Volume 1, Land Management Plans for the Four Southern California National Forests,* p.127 (citing Borchert *et al.* 1989 and Pavlik *et al.* 1991).
- Evaluation of indirect effects on mountain lions and other mammals through the issuance of depredation permits, which authorize the livestock permittee to trap and/or kill animals that are posing a threat to livestock. These impacts should be evaluated in the CEQA document. The Department should prohibit animal damage control in the Reserve. Non-lethal control methods should be encouraged.
- Development of an open decision-making process by which the public can be informed of, and participate in, grazing decisions.

If grazing is proposed to be used to achieve a specific management objective, the LMP should set forth specific, enforceable standards and guidelines and ensure consistent, effective monitoring by Department staff. Where standards and guidelines are not being met, the LMP should establish prompt compliance measures and enforcement mechanisms to ensure protection of natural resources. The LMP should establish a procedure to issue written instructions to grazing permittees specifying the appropriate stocking levels to achieve the management objective, on and off dates, required maintenance, and any other conditions or restrictions necessary for resource protection.

Finally, we understand that livestock grazing on the Reserve is currently allowed in conjunction with grazing on adjacent private lands as well as grazing allotments in the adjacent Los Padres National Forest. The LMP and accompanying CEQA document should carefully analyze the cumulative impacts of livestock grazing on the Reserve in conjunction with grazing on adjacent private and National Forest lands.

3

emphasize and ensure the recovery of threatened and endangered species, special status species, and designated critical habitat within the Reserve. In addition, the plan should require the completion of inventories to fill any gaps in the Department's knowledge of special status species and periodically re-inventory populations to determine status and trends.

The LMP should, where appropriate, restore native species that have been extirpated from the Reserve.

3. The Reserve LMP Should Ensure the Protection of Water Quantity and Quality

We recommend that the Department, through the planning process, evaluate or reevaluate all wetlands and riparian areas on the Reserve to assess whether they are in properly functioning condition (PFC) and should take action to restore and protect PFC on all streams. The Department should incorporate biotic and ecological indicators into its riparian PFC assessments. The Department should consider implementing Riparian Conservation Zones to serve as a buffer to protect these areas from degradation caused by land use activities.

Additionally we recommend that the LMP should:

- only allow water development where it is the only method to protect resources;
- not allow water developments/diversions to dewater springs or streams;
- assess existing water developments and diversions for their impact on resources,
- consider removing them where they are causing harm;
- not allow water developments for the purpose of increasing livestock numbers, unless it is determined to be consistent with the purposes of the Reserve and the broader ecosystem and;
- not allow water export from the Reserve.

We strongly encourage the Department to implement aggressive nonpoint source management practices to protect water resources within the Reserve. The Department should establish a comprehensive water quality monitoring program in the Reserve through use of multiple data points to accurately gauge water quality throughout the entire Reserve. Such a program should not only ensure compliance with the Clean Water Act, but also ensure that water quality is sufficient to support Reserve resources. Finally, the Department should ensure that land management practices (grazing, recreation, etc) protect water quality and quantity.

4

existing infestations, preventing their spread, and reducing the likelihood of new infestations.

We believe that management activities should not be allowed to significantly shift the makeup of native plant associations, disrupt their normal population dynamics, or disrupt the normal progression of those associations. The Department should develop and implement management prescriptions to fully protect and restore native species vegetation types within the Reserve. The Department should outline the status and distribution of the vegetative communities within the Reserve, and develop a plan to monitor vegetation to assess whether desired conditions are achieved. Native plants of local genotypes/provenance should be used in all restoration and revegetation projects.

The Department should analyze how to: (1) prevent conditions that have favored the introduction, establishment, and spread of invasive species and other vegetation problems; (2) restore conditions favoring native vegetation; and (3) reduce the need for continued direct control treatments of vegetation. The Department should place a priority on the control of noxious weed species and prevent the introduction of new invasive species. However, aerial chemical applications of herbicides for vegetation management should be prohibited and spraying by hand should only occur when other alternatives are not feasible. The use of machinery (e.g., roller chopping, plowing, discing) for vegetation manipulation should be carefully limited and prohibited in all circumstances where such action could harm resources and objects of interest. If machinery is used, monitoring plots should be used to gauge the effectiveness of the treatment.

Vegetation manipulation should not be allowed for the purpose of increasing forage for cattle, unless it is determined to be consistent with the protection of the Reserve, including the broader ecosystem.

5. <u>The Reserve LMP Should Accommodate Responsible Public Access</u>

We recommend that the Department identify ways to accommodate current and future visitor use in a way which will prevent or lessen the potential impacts of visitor use. The LMP should identify acceptable and allowable recreational uses. The LMP should prohibit camping in sensitive areas (or limiting camping to designated sites). In addition, the Department should an endangered species, golden eagles, and other raptors. Target shooting can result in the accumulation of litter, soil contamination by lead and wildfires. It can also impact the safety and experience of visitors.

We recommend that the Department permit only responsible hunting and firearm use and limit hunting to game species in season by licensed hunters only (i.e. no varmint hunting, as an antelope ground squirrel can easily be mistaken for a California ground squirrel, or a kit fox mistaken for a coyote). In addition, the Department should prohibit the use of lead bullets. While hunting may be a valid use of the Reserve for specific ecological purposes, no special access should be granted beyond the access granted to the general public (i.e. no special vehicle access). Finally, the Department should maintain its current policy of directing target shooters to facilities outside the Reserve.

The LMP must provide for public access to the Reserve. Vehicle restrictions may be necessary to protect Reserve resources, but pedestrian and bicycle access should be allowed except in ecologically or culturally sensitive areas. Equestrian access should be carefully managed to avoid resource damage and importation of exotic seeds. If any campsites are developed, they should be primitive with hiking access only. We do not believe that developed campgrounds are appropriate for an ecological reserve.

6. Roads, Fencing & Infrastructure Should Be Limited, Retrofitted for Wildife, and Removed Where No Longer Needed

The LMP should include an inventory of existing roads and trails on the Reserve. The plan and CEQA document should incorporate this information to measure habitat fragmentation, conduct a thorough fragmentation analysis, and inform decisions regarding road closure and other limitations on use in the Reserve. The Department must consider the impacts of existing roads in ecologically sensitive areas and consider their removal, seasonal closure, or reconstruction with appropriate mitigation measures to protect sensitive resources.

The LMP should prohibit new road construction, temporary or permanent, unless absolutely necessary for a specific public purpose that is beneficial to the Reserve. There should be no paving of existing roads and roads that are not absolutely necessary should be decommissioned and restored.

6

needs to be made, and an evaluation made of what is really needed (in light of, hopefully, new management direction regarding grazing) to manage the Reserve. All unnecessary fencing and grazing infrastructure should be removed or retrofitted as soon as possible as they negatively affect the movement of pronghorn and other wildlife and are a blight on the landscape.

7. The Reserve LMP Should Include a Comprehensive Wildfire Management Strategy

We recommend that the Department develop fire management policies and prescriptions for the Reserve which provide for the use of naturally occurring fire to restore and maintain the Reserve's species and ecosystems. This would include the development of a comprehensive fire management program for the Reserve that restores characteristic fire to the ecosystem including:

- Allocation of the maximum possible area to wildland fire use and develop prescriptions for use of prescribed fire elsewhere;
- Identification of the threats imposed by hazardous fuel situations, as well as the resource impacts of implementing fuel reduction programs;
- Defining the Appropriate Management Response to fires within the Reserve, taking into account protection and management of resources; and
- Developing appropriate Emergency Fire Rehabilitation protocols that are consistent with the protection of Reserve resources and objectives.

Should the LMP call for a prescribed burning program, it must set forth specific management objectives and monitoring. As data from burns is collected, burning protocols need to be adjusted.

8. The Reserve LMP Should Prohibit Oil Exploration and Development on the Reserve

Because the CPER is an ecological reserve established to protect wildlife habitat, we believe that oil exploration, drilling, and development are inappropriate uses of the Reserve. The LMP should prohibit any energy exploration, drilling, or development on the Reserve. The LMP should also discuss whether the Department owns the mineral rights underlying the Reserve, and if not, the plan should include appropriate steps for the Department to acquire such rights.

7

should commit to a comprehensive inventory of cultural and historical resources, develop a timeline for completing the inventory, and use this inventory to develop a specific plan for potential uses of cultural resources in the Reserve (i.e., relative sensitivity, relative opportunities for interpretive development, relative scientific importance, relative potential for research and education).

Specific management actions to protect and preserve archeological and historical sites and landscapes include stabilization, fencing, signing, closures, or interpretative development, to protect and preserve cultural resources. Law enforcement is another key component of protection and the Department should adopt measures to protect cultural resources from artifact collectors, looters, thieves, and vandals.

Thank you for your consideration of our comments. We look forward to participating in the land management planning process for the Reserve. Please send us any future public notices, draft plans, and CEQA documents as they become available. In the meantime, we welcome the opportunity to discuss any of these issues in more detail, and look forward to working with your Department to develop a comprehensive management plan for the Reserve.

Sincerely,

Jeff Kuyper
Executive Director

Appendix I
Best Management Practices

Appendix I Best Management Practices

This appendix lists steps that the Department will take to limit environmental impacts during implementation of the LMP. It was developed as part of the Environmental Impact Report (CDFW 2016C). Additional information can be found in the sections of the EIR that are referenced below.

I.1 General Requirements

BMP G-1. The Department shall comply with relevant provisions of the California Environmental Quality Act (CEQA) prior to a decision to approve an activity with the potential to adversely impact the environment.

BMP G-2. The Department shall consult with other agencies with permit approval authority over aspects of management activities undertaken within the Reserve, to identify the relevant permit practices and to ensure compliance with applicable State and federal regulations.

BMP G-3. Management activities undertaken in accordance with the LMP shall meet the applicable permitting and regulatory practices of federal and State agencies, including, but not limited to, the following:

- California Department of Fish and Wildlife;
- U.S. Fish and Wildlife Service;
- State Water Resources Control Board;
- U.S. Army Corps of Engineers (Section 404 of the Clean Water Act);
- San Luis Obispo Air Pollution Control District; and
- California Department of Forestry and Fire Protection (CalFire).

I.2 Aesthetic and Visual Resources [EIR Section 5.2]

I.2.1 New Construction — Aesthetic and Visual Resources

BMP AV-1. The design and location of wildlife viewing platforms, parking, water tanks, and other infrastructure on the Reserve shall:

- Maintain a profile below the ridgeline and conform to the natural slope wherever possible;
- Take advantage of natural topography, vegetation and other physical features to provide screening from public view;
- Avoid large, continuous walls or roof surfaces, or prominent foundation walls, poles, or columns;
- Minimize the need for grading;
- Use materials, colors, and textures that:
    - complement the rural character of the Reserve;

    - blend with the natural landscape;
    - avoid high color contrasts;
- Minimize or avoid exterior lighting; and
- Be located in areas with existing infrastructure and facilities wherever possible.

BMP AV-2. Where landscaping is conducted, plants shall be chosen that are compatible with native vegetation and which provide a visual transition from developed to open areas.

BMP AV-3. To reduce the adverse impact of light and glare, the Department shall require new light sources to be shielded and hooded to focus lighting on the area in need of illumination.

BMP AV-4. New fencing shall be placed in the least visible location practical, while still accomplishing the resource protection or safety objectives of the LMP. Where fencing will be visible from a public vantage or visible to visitors, consideration should be given to the use of historic/rustic materials (e.g., split wooden posts) so long as the resource protection objectives of the LMP can be satisfied.

I.3 Air Quality [EIR Section 5.3]

I.3.1 General Air Quality

The Department will follow all Air Pollution Control District (APCD) regulations, which change over time. The following are specific measures the Department will take to address current regulations.

BMP AQ-1. To mitigate the emission of fugitive dust associated with use of Reserve roads and parking areas, the Department shall implement at least one of the following:

- Install and maintain an all-weather surface road with material that minimizes the emission of fugitive dust such that fugitive dust emissions do not impact off-site areas; or,
- Maintain the roadway or parking area with a dust suppressant such that fugitive dust emissions do not impact off-site areas; or,
- Limit traffic speeds on unpaved roads to 15 mph.

BMP AQ-2. To reduce vehicle miles associated with special events, meetings, and management activities on the Reserve, the Department shall encourage the following:

- The use of carpools/vanpools; and
- Establishing a shuttle service or Park-and-Ride lots from areas outside the Reserve.

BMP AQ-3. The Department shall implement the relevant provisions of *DFG Going Green: Next Steps Toward Sustainability* (CDFW 2011a), which sets forth specific recommendations for reducing the Department's greenhouse gas emissions.

I.3.2 Construction and Demolition Activities — Air Quality

BMP AQ-4. To minimize potential air quality impacts associated with the emission of fine particulate matter associated with construction activities, the Department shall apply the following, as applicable:

- During construction activities, unpaved roads shall be effectively stabilized of dust emissions;
- When large, earth-moving equipment is used for construction/demolition activities, fugitive dust emissions will be controlled by presoaking or otherwise applying water to the construction/demolition area;
- Following the addition of earthen materials to, or the removal of earthen materials from, the surface of outdoor storage piles, said piles shall be effectively stabilized of fugitive dust emissions utilizing sufficient water or chemical stabilizer/suppressant;
- Limit traffic speeds on unpaved roads to 15 mph;
- Suspend excavation and grading activity when winds exceed 20 mph;
- Limit area subject to excavation, grading, and other construction activity at any one time and reduce the amount of the disturbed area, where possible;
- All roadways, driveways, sidewalks, etc. to be paved should be completed as soon as possible after grading unless seeding or soil binders are used; and
- All of these fugitive dust mitigation measures shall be shown on applicable grading and building plans.

BMP AQ-5. To minimize air quality impacts associated with construction and applicable restoration activities, the Department shall implement the following as applicable:

- Maintain all construction equipment in proper tune according to manufacturer's specifications;
- Fuel all off-road and portable diesel-powered equipment with Air Resources Board (ARB)-certified motor vehicle diesel fuel (non-taxed version suitable for use off road);
- Use diesel construction equipment meeting ARB's Tier 2 certified engines or cleaner off-road, heavy-duty diesel engines, and comply with the State Off-Road Regulation;
- Use on-road heavy-duty trucks that meet the ARB's 2007 or cleaner certification standard for on-road heavy-duty diesel engines, and comply with the State On-Road Regulation;
- Construction or trucking companies that that do not have engines in their fleet that meet the engine standards identified in the above two measures (e.g., captive or NOx exempt area fleets) may be eligible by proving alternative compliance;
- All on and off-road diesel equipment shall not idle for more than 5 minutes. Signs shall be posted in the designated queuing areas and or job sites to remind drivers and operators of the 5-minute idling limit;
- Use equipment powered by electricity rather than diesel or gasoline when feasible;

- Substitute gasoline-powered in place of diesel-powered equipment, where feasible;
- Use alternatively-fueled construction equipment on-site where feasible, such as compressed natural gas (CNG), liquefied natural gas (LNG), propane or biodiesel; and
- To ensure SLO APCD thresholds for construction-related emissions are not exceeded, limit the quantity of construction/earth moving activities as follows:
    - 1,400 cubic yards of earth moving/grading per day when conducted with diesel-powered equipment; and
    - 4,620 cubic yards per day when conducted with gasoline-powered equipment.[3]

BMP AQ-6. If the Department is removing or renovating any building(s) or relocating any utility pipelines, the Department shall comply with the relevant provisions of the National Emission Standard for Hazardous Air Pollutants (40CFR61, Subpart M - asbestos NESHAP).

I.3.3 Prescribed Burning — Air Quality

BMP AQ-7. Prescribed burning shall be conducted in full compliance with the provisions of Rule 502 of the San Luis Obispo County Air Pollution Control District (SLO APCD) Rules and Procedures, including (but not limited to) the following:

- Approval of a burn permit by the SLO APCD at least 72 hours prior to the burn date;
- Preparation and approval of a Smoke Management Plan by the SLO APCD;
- Air quality monitoring, as may be required by the Air Pollution Control Officer;
- Consultation with the SLO APCD and surrounding air quality districts in advance of the burn date; and
- Participation in the Prescribed Fire Information Reporting System (PFIRS)[4].

I.4 Biological Resources [EIR Section 5.4]

I.4.1 Protection of Sensitive Resources and Special-Status Species

I.4.1.1 General

BMP BIO-1. Any person handling special-status species must have all appropriate permits issued by the Department and/or the USFWS.

---

[3] Based on Table 2-1 of the SLO APCD CEQA Air Quality Handbook, 2012. Assumes 2.2 grams of diesel particulate matter per cubic yard of material moved.

[4] PFIRS ("P-furs") serves as an interface between air quality managers, land management agencies, and individuals that conduct prescribed burning in California. It is intended to facilitate communications by providing access to a database containing information on burn planning, burn approvals, and emissions information. PFIRS will enable individuals involved in prescribed burning the ability to view this information on a statewide level. PFIRS is a joint project of the California Air Resources Board, federal land management agencies, local air districts, and various fire agencies.

BMP BIO-2. These BMPs will be revised or updated if the USFWS or the Department issue new or revised species survey or protection guidelines.

BMP BIO-3. The timing of activities with the potential to disturb sensitive resources shall be planned to minimize impacts to such resources to the extent practical and as a take avoidance strategy.

BMP BIO-4. Activities with the potential to disturb raptor nest sites shall have seasonal restrictions imposed within a ½-mile visible radius around such sites.

BMP BIO-5. Infrastructure such as wildlife-viewing platforms, water tanks, and power lines shall not be developed within 100 yards of ridge lines to minimize potential impacts to California condor.

I.4.1.2 Surveys

BMP BIO-6. The following procedures shall be followed where construction, demolition, or maintenance activities have the potential to adversely impact special-status plant populations:

- Department staff will review existing data regarding the presence of special-status plant species (CRPR List 1, CESA, and ESA lists) in the area of potential disturbance.
- Department staff will perform a field reconnaissance of the area of potential disturbance to assess the presence of special-status plant populations.
- The conclusions of the first two steps listed above steps 1 and 2 (above) will be used to inform the design and location of the construction or maintenance activity and to identify the least sensitive area(s) for ground disturbance.
- If steps 1 and 2 reveal the presence, or potential presence of, special-status plant species or their habitat, and avoidance is not feasible, the Department shall conduct a rare plant survey in accordance with applicable guidelines of the Department, USFWS, and CNPS. The survey shall identify and map any existing rare, threatened, or endangered plant species.
- The Department shall consult with the USFWS regarding appropriate avoidance, minimization, and mitigation measures for potential impacts to federally-listed plant species found to occur within the area of potential disturbance.
- Mitigation measures shall be developed within the project-level CEQA document and implemented with performance monitoring to avoid significant impacts. Mitigation measures may include (but would not be not limited to) avoidance of the habitat and/or seasonally-timed activities in addition to the implementation of project-specific mitigation measures designed to reduce potential impacts. These measures shall be based on the biological requirements of each species found to occur at a particular site, as well as a complete description of the proposed project and its potential impacts to the subject species. At the discretion of the Department, and with concurrence from USFWS for federal-listed species, existing information, in lieu of a site specific survey, may be used to determine the presence of special-status species and appropriate measures to be undertaken to protect such resources.

- Personnel familiar with the sensitive resource may be required to be present during construction activities. Sensitive plants in the vicinity of planned activities will be temporarily fenced or prominently flagged to prevent inadvertent encroachment by vehicles and equipment during the activity. Ground-surface disturbance shall be scheduled after seed set and prior to germination. Collection of seed, with reseeding undertaken at the site following the activity, during seasonal time-frames, and when weather conditions are favorable for germination and growth, may also be required. If deemed appropriate, topsoil shall be stockpiled and replaced or translocated as soon as practicable after project completion.

BMP BIO-7. The following procedures shall be followed where construction, demolition, or maintenance activities have the potential to adversely impact special-status animal species:

- Department staff will review existing data regarding the presence of special-status animal species in the area of potential disturbance.
- Department staff will perform a field reconnaissance of the area of potential disturbance to assess the presence of special-status animal habitat or populations.
- The conclusions of steps 1 and 2 (above) will be used to inform the design and location of the construction or maintenance activity and to identify the least special-status area(s) for ground disturbance.
- In the event that steps 1 and 2 reveal the presence, or potential presence of, special-status animal species or their habitat, and avoidance is not feasible, the Department shall conduct a biological field survey to assess habitat suitability and animal utilization of the area of potential disturbance. All biological field surveys shall follow appropriate protocols established by the Department as well as relevant federal resources agencies, and the Department shall confer with applicable agencies regarding the results of these surveys and appropriate avoidance, minimization, and mitigation measures. Additionally, species-specific surveys shall be conducted in accordance with current guidelines for each rare, threatened, and endangered animal species potentially occurring at the site.
- If any federally-listed animal species are found to occur on or utilize the proposed area of disturbance, the Department shall confer with USFWS regarding appropriate avoidance, minimization, and mitigation measures prior to undertaking such activity.
- Mitigation measures shall be developed within the project-level CEQA document and implemented with performance monitoring to avoid significant impacts. Mitigation measures may include (but would not be not limited to) avoidance of the habitat in addition to the implementation of project-specific measures designed to reduce the potential impacts for individual animals. These measures shall be based on the biological requirements of each species found to occur at a particular site, as well as a complete description of the proposed projects and its potential impacts to the subject species.
- At the discretion of the Department and with concurrence from USFWS for federal-listed species, existing information, in lieu of a site-specific survey, may be used to determine the presence of special-status species and appropriate measures to be undertaken to protect such resources.

- Personnel familiar with the sensitive resource may be required to be present during construction activities.

BMP BIO-8. In the event project-specific pre-construction surveys conducted in accordance with BMP-BIO7 reveal the presence of dens or burrows for San Joaquin kit fox, giant kangaroo rat, burrowing owl, or blunt-nosed leopard lizard, the following measures will be applied:

- Disturbance to San Joaquin kit fox dens, giant kangaroo rat burrows, burrowing owl burrows, and burrows used by blunt-nosed leopard lizards shall be minimized through implementation of the avoidance buffers outlined in the table below unless consultation with the appropriate resource agency identifies other avoidance measures. New construction and new activities that would result in an increase in the potential for direct mortality/injury of these special-status species will not be conducted within these buffers, as determined by a qualified biologist.
- Personnel familiar with the aforementioned sensitive resource in this BMP shall be present during construction activities.
- The following standard avoidance measures will be applied:

Species	Avoidance Buffer/Distance
San Joaquin kit fox – potential den	50 feet
San Joaquin kit fox – known den	100 feet
San Joaquin kit fox – pupping den	As determined by the Department and USFWS
Giant kangaroo rat burrow	50 feet
Burrowing owl – outside of breeding season	50 feet until burrow is documented to be unoccupied
Burrowing owl – during breeding season	250 feet until the conclusion of breeding season or burrow is documented to be unoccupied
Blunt-nosed leopard lizard	500 feet from an observation.

- If resources cannot be avoided by the recommended distance, consultation shall be initiated with the appropriate agency.

BMP BIO-9. Disturbance to occupied San Joaquin kit fox dens, giant kangaroo rat burrows, San Joaquin antelope squirrel burrows, and burrows used by blunt-nosed leopard lizards shall be avoided unless appropriate take authorization has been obtained. If burrowing owls are present, activities shall be consistent with the Department's Burrowing Owl Mitigation (CDFW 2012a).

BMP BIO-10. Areas supporting special-status aquatic species shall be avoided to the greatest extent possible.

BMP BIO-11. Surveys of sensitive biological resources shall be conducted at the appropriate time of year to detect special-status species.

BMP BIO-12. If it has been longer than 30 days between the last biological survey and the proposed start of construction, Department biologists may require a pre-activity survey no more than 30 days prior to the commencement of activities. Surveys shall be conducted by qualified personnel familiar with the target species or sensitive communities to confirm previous survey results, make additional recommendations if conditions have changed, and assist with BMP and mitigation measure implementation.

I.4.1.3 Ground Surface Disturbance

BMP BIO-13. Vegetation removal and ground surface disturbance shall be minimized. The Department shall apply surface rehabilitation measures as necessary to protect the soil surface. The Department will emphasize hand clearing over heavy equipment.

BMP BIO-14. When applicable, soil crusts shall be removed prior to construction and re-deposited at the completion of the project.

BMP BIO-15. When considering the authorization of new ground surface-disturbing activities, the Department shall encourage the use of existing disturbed areas, thereby minimizing impacts to special-status species, sensitive communities, and significant cultural and paleontological resources.

I.4.1.4 Practices for the Control of Invasive and Non-Native Species

BMP BIO-16. The Department shall continue to implement the Integrated Pest Management Program in the control of invasive species, including mechanical, chemical, and other accepted control methods.

BMP BIO-17. The Department shall develop a weed control strategy designed to minimize herbicide use and associated impacts on non-target species consistent with the Department's Integrated Pest Management Program.

BMP BIO-18. The Department shall encourage livestock operators, researchers, fire crews, equestrians, and other authorized users and Reserve visitors to employ best management practices that minimize the spread of weeds, such as cleaning equipment prior to entering the Reserve and requiring the use of certified weed-free hay and feed on the Reserve.

BMP BIO-19. If individuals of non-native animal species are discovered, the Department shall make every effort to eradicate them before the species becomes established.

I.4.1.5 Livestock/Grazing Management

BMP BIO-20. Any authorization, or reauthorization, of new or expanded grazing activities will be preceded by the adoption of a grazing management plan following compliance with the California Environmental Quality Act. Such a Grazing Management Plan shall set forth at least the following:

- Specific goals, objectives and performance standards (targets) that define the desired habitat conditions to be achieved through grazing as a management tool, which are based upon the resource protection and enhancement goals of the LMP.

- Performance standards that are measurable, objective, and relevant to grazing management while incorporating the flexibility necessary for effective adaptive management.
- Grazing prescriptions, which identify how grazing will be conducted to attain the various goals, objectives, and performance standards. Grazing prescriptions will include:
    - animal class: the kind of animals, in terms of species, breed, and age;
    - spatial distribution: which portions of the reserve will be grazed;
    - temporal distribution: when animals will be grazing; and
    - density of animals: the number of grazing animals within each area to be grazed.

  Grazing prescriptions and methods will be developed based upon a review of the best available scientific literature examining the effects of various types grazing, based on the seasonality, intensity, and frequency, on biological systems, and the site-specific conditions of the reserve.
- Grazing facilities, such as water and fencing, that are currently present or that would be needed.
- Methods to avoid or minimize impacts of grazing on special-status species, special communities, cultural resources, and public uses.
- Performance standards such as minimum standards for residual dry matter (RDM) and/or grass height to ensure the protection of water and soil quality.
- Monitoring protocols and performance standards that will be used to assess effective implementation of the grazing prescriptions.
- Lease management requirements to ensure compliance and cooperation between the grazing permittee and Department staff.

BMP BIO-21. The Department shall implement appropriate measures to protect special-status plants that would be negatively affected from the potential impacts of grazing activities based on species-specific information. Such measures may include, but are not limited to, the following:

- Excluding livestock from areas where special-status plants that may be negatively impacted by grazing occur, or have the potential to occur but have not been surveyed, including through the construction of exclosures.
- Excluding livestock from areas where special-status plants are known to occur (or have the potential to occur) during the flowering/fruiting period (generally March through June).

BMP BIO-22. The Department will adjust grazing prescriptions or eliminate grazing following restoration treatments, if necessary to protect populations of vulnerable species and/or facilitate establishment of newly planted sites.

BMP BIO-23. Where possible, water for livestock shall be piped away from the riparian zone. If possible, livestock water sources shall be kept on year-round for use by native animals.

I.4.2 Construction Activities — Biological Resources

BMP BIO-24. Construction activities shall be minimized during evening hours when some special-status species are active and vulnerable to vehicle or equipment induced injury or mortality. In addition, the Department shall ensure that all activities requiring vehicle use during nighttime hours, including security, visitor access, or research, shall be conducted with extra caution to minimize impacts to special-status species.

BMP BIO-25. Construction activities within 1/4 mile of springs, or riparian areas should be avoided whenever practical. This restriction is intended to minimize native animal disturbance at key water locations and to limit impacts to sensitive watersheds.

BMP BIO-26. The ends of pipes, culverts, and similar structures with a diameter of at least three inches that are staged for construction shall be capped prior to being left on the CPER overnight. If a pipe, culvert or similar structure is left overnight, it shall be thoroughly inspected for entrapped animals before being moved, capped, or buried. Any animals found inside shall be allowed to escape before the pipe or culvert is moved, capped, or buried. During construction, all partially installed pipe ends, culverts, and similar structures shall remain covered unless closely attended by a monitor designated by the Department. In addition, pipe, culverts or similar material stored on-site shall have their ends covered prior to being stored or left on site. The ends of pipes stored onsite will have ends capped before or immediately after off-loading. In all cases, pipes shall be inspected for presence of animals before moving or use. If a special-status species has taken occupancy in a section of pipe, a qualified biologist shall remove it prior to the pipe being used.

BMP BIO-27. Workers shall inspect for animals under vehicles and equipment before the vehicles and equipment are moved. If an animal is present, the worker shall allow it to move unimpeded to a safe location.

BMP BIO-28. No pets shall be allowed on the CPER during construction activities.

BMP BIO-29. To protect animals, the Department shall initiate a trash abatement program for the Reserve that establishes at least the following conditions: a) trash and food items are contained in animal-proof containers and removed regularly to avoid attracting opportunistic predators such as ravens, coyotes, and feral dogs; b) absolutely no deliberate feeding of native animals shall be allowed.

BMP BIO-30. The Department shall confine parking, storage areas, laydown sites, equipment storage, and any other surface-disturbing activities to designated areas that existing disturbed areas or areas that do not represent sensitive habitat as determined by a qualified biologist.

BMP BIO-31. Prior to conducting work on-site for new projects, personnel shall attend an awareness education program specific to the potentially-affected species, consisting of a brief presentation by persons who are knowledgeable about locally found species biology and legislative protection. This information should be posted in an easily accessible area for all workers and work-site visitors to review as needed.

BMP BIO-32. Upon completion of construction or restoration projects, unused roads and work sites shall be restored where appropriate and signs or barriers shall be installed to prevent continued travel on construction roads.

BMP BIO-33. Before starting any new project within the Reserve, the Department shall clearly delineate the boundaries of the work area and any off-road access routes with fencing, stakes, flags or other visible boundaries. The Department shall restrict activities that may disturb special-status species and habitats to the fenced, staked, or flagged areas. The Department shall maintain all fencing, stakes, and flags until the completion of the project.

BMP BIO-34. If potential adverse biological issues have been identified for a project, a biological monitor may be designated by the Department to minimize project impacts as part of CEQA compliance. The biological monitor shall be responsible for field crews to be in compliance with protection measures, performing surveys in front of crews as needed to locate and avoid special-status species and habitat features, and monitoring project mitigation compliance. Biological monitors shall be required to be present on site during initial ground-surface-disturbing actions and any other activities that have a potential for "take" of federal or state listed species.

BMP BIO-35. The Department will work with utility companies to configure or modify power lines to eliminate raptor electrocutions to the greatest extent practicable.

BMP BIO-36. The Department shall prohibit the use of erosion control materials potentially harmful to native animals, such as monofilament netting (erosion control matting) or similar material.

I.4.3 Motor Vehicle Use

BMP BIO-37. Vehicle speed will not exceed 15 miles per hour on Department-administered roads in endangered species habitats. 6

BMP BIO-38. Vehicle travel for operation and maintenance purposes shall be limited to existing roadways except in the case of an emergency or as determined through project design. Appropriate biological surveys should be conducted prior to off-road vehicle travel, including travel that does not result in habitat disturbance. Construction of new roads shall be avoided if existing roads can be used.

BMP BIO-39. No aircraft will be operated in a manner that could disturb wildlife within the Reserve, unless in the performance of official duties or authorized by the Department.

BMP BIO-40. The Department will discourage the recreational use of drones (unmanned aerial vehicles) to the greatest extent possible over the Reserve to protect sensitive resources.

I.5 Cultural Resources [EIR Section 5.5]

I.5.1 General

BMP CR-1. To ensure that ongoing and routine Reserve activities, including road maintenance, public use, and vegetation management, do not adversely impact cultural resources, the Department will:

- Re-route roads through known sites to non-sensitive areas, or cap existing roads within site areas; and
- Fence-off archaeological sites at springs or water troughs and other areas of intensive livestock use including corrals, and/or move livestock facilities to non-sensitive areas.

BMP CR-2. If any prehistoric, archaeological, or fossil artifact or resource is uncovered during ground-surface-disturbing activities, all such activities shall stop and a qualified professional as determined by the Department shall be retained to evaluate the finds and recommend appropriate action.

BMP CR-3. All ground-surface-disturbing activities must stop if any human remains are uncovered, and the San Luis Obispo County Coroner must be notified according to Section 7050.5 of California's Health and Safety Code. If the remains are determined to be Native American, the procedures outlined in CEQA Section 15064.5 (d) and (e) shall be followed.

BMP CR-4. In all areas that have not been previously surveyed by archaeologists, the Department shall conduct Phase I cultural resource surveys before authorizing ground-surface-disturbing activities (e.g., grading or excavation). Should significant cultural resources be discovered, the Department shall apply strategies to protect such resources which may include, but are not limited to, the following:

- Passive site preservation (avoidance) in-place;
- Requiring the presence of a qualified professional during ground-disturbing activities;
- Covering with a layer of fill;
- Excavation, removal and curation in an appropriate facility under the direction of a qualified professional;
- Installing carefully-placed fencing or barriers around site boundaries;
- Capping site areas with non-cultural soils;
- Revegetating disturbed or altered site areas;
- Monitoring the conditions of sites periodically; and
- Closing areas from public entry using signage indicating that an area is sensitive.

BMP CR-5. In cases where a project may result in adverse impacts to known archaeological resources, and site avoidance may not be feasible, the Department shall conduct a Phase II archaeological survey to:

- Determine the extent and significance of site resources;
- Establish whether the site(s) is/are eligible for listing on the California Register of Historical Resources; and
- Identify mitigation strategies to protect significant resources as described in BMP CR-4.

BMP CR-6. The construction of any new cattle support facilities (troughs, corrals, etc.) shall be preceded by additional Phase I surveys.

- If a cultural site is located and cannot be avoided, implement a Phase 2 testing plan to determine if the site is eligible for listing in the California Register.
- If the site is determined to be eligible for listing in the California Register, either 1) design and implement an appropriate data recovery plan (Phase 3), or 2) relocate the support facility to an area free of significant cultural resources.

I.5.2 Protection of Historic Structures

BMP CR-7. Where a project may result in a substantial change to a built structure 50-years of age or older, the Department shall conduct an architectural assessment of the integrity and significance of the structure to establish whether the structure is eligible for listing on the California Register of Historical Resources. This process will not be necessary for those structures which have already been evaluated by a qualified professional and that were determined not to be significant.

BMP CR-8. Where a project may result in a substantial adverse change to a structure determined to be eligible for listing on the California Register of Historical Resources, the Department shall prepare a treatment/data recovery plan in consultation with the State Historic Preservation Officer, and implement the approved plan. The treatment plan should be consistent with the Department of Interior Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings (Weeks and Grimmer 1995).

I.5.3 Protection of Paleontological Resources

BMP CR-9. If surface-disturbing activities reveal the presence of significant paleontological resources, a Paleontological Mitigation Plan (PMP) shall be prepared by a qualified paleontologist which includes at least the following:

- General fieldwork and laboratory methods proposed;
- Curation practices; and
- Mitigation measures adequate for the recovery of a sample of significant fossils that may be applied to rock units determined to contain significant paleontological resources, if those rock units cannot be avoided by project planning. Such measures may include, but are not limited to, the following:
    - Recovering a sample of fossiliferous material prior to construction;
    - Monitoring construction and halting work to recover important fossils; and

- Cleaning, identification, and cataloging of fossil specimens collected for curation and research purposes.

I.5.4 Prescribed Burning — Cultural Resources

BMP CR-10. To protect existing and previously undiscovered cultural resources, the Department shall implement the following, as applicable, prior to the implementation of a prescribed burn:

- Conduct a reconnaissance-level cultural resources survey of the affected area to identify and avoid vulnerable cultural resources;
- Manually reduce fuels on and/or around vulnerable sites;
- pile debris offsite;
- Create fire breaks near or around sites;
- Use retardant or foam to protect structures;
- Wrap structures in fire-proof materials to protect from fire;
- Remove logs or other heavy fuels from vulnerable sites or features (e.g., clear snags off bedrock mortars), or cover with foam or retardant prior to burn;
- Flush cut and cover stumps with dirt, foam, or retardant, where burnout could affect subsurface cultural resources;
- Modify burn plans to minimize effects to cultural resources, such as burning when duff has high moisture;
- Identify and reduce hazard trees next to structures;
- Use low-intensity backing fire in areas near historic features;
- Saturate ground and vegetation adjacent to vulnerable structures with water, foam, or gel before burning;
- Preburn site at lower intensity than planned for surrounding areas;
- Limit fire intensity and duration over vulnerable sites;
- Use a fast-moving, higher-intensity fire over lithic scatters, where rock materials are vulnerable to longer-duration heating;
- Wrap carved trees, dengroglyphs, and other such features in fire-retardant fabric;
- Limb carved trees to reduce ladder fuels, where possible;
- Cover rock art in fire retardant fabric;
- Minimize fuels and smoke near rock art; and
- Cover fuels near rock art with foam, water, or retardant, avoiding the rock art.

I.5.5 Geology and Soils [EIR Section 5.5]

BMP GEO-1. Soil-disturbing activities shall be avoided during periods of runoff, or when soils are wet and muddy, in order to minimize damage.

BMP GEO-2. Ground-surface-disturbing activities shall be designed to minimize wind and water erosion.

I.6 Hazards and Hazardous Materials [EIR Section 5.7]

I.6.1 Hazardous Materials Management

BMP HZ-1. To ensure that all material is properly used, stored, and transported, Material Safety Data Sheets (MSDS), material labels, and any additional handing and emergency instruction of the materials shall be kept on file at the Reserve office. Any State employee or contractor handling these materials shall be made aware of the potential hazards, given proper training and instruction, and also made aware of the location of the MSDS, and any other documentation for the material. All contractors used in the application or use of these hazardous materials shall have the appropriate licenses and be able to read and understand the MSDS, labels, appropriate recommendations, and application instructions.

BMP HZ-2. The Department shall provide appropriate safety equipment for herbicide applications and ensure that applicators have had proper safety training. Herbicide and pesticide chemicals shall be used only in accordance with existing law and according to manufacturers' instructions. The Department shall ensure herbicide mixing sites are only located in areas devoid of vegetation, and where there is no potential of a spill reaching a vegetated area or a stream. The Department shall ensure that any herbicide used where there is the possibility that the herbicide could come into direct contact with water is approved for use in an aquatic environment. The Department shall ensure that great care is taken to avoid herbicide contact with any native vegetation, and it shall only be applied on calm days to prevent airborne transfer.

BMP HZ-3. The specific recommendation for the type of herbicide or pesticide, application rate, timing, and application method will be determined by the site-specific conditions and made by a Licensed Pest Control Advisor (PCA). Accidental spills shall be minimized, avoided or controlled, by adherence to the PCA's recommendation and instructions on the product label.

BMP HZ-4. The storage of potentially hazardous materials on the Reserve shall be in accordance with the Material Safety Data Sheets and any buildings used for storage will display appropriate placards.

BMP HZ-5. Any pesticide or herbicide work conducted by contractors shall be closely monitored by Department staff.

BMP HZ-6. When control of weeds or pests become necessary, the Department will work with a licensed PCA to determine the most appropriate integrated pest management approach to be used, with possible treatments ranging from manual to biological and chemical methods. For each project, it will be determined if additional CEQA analysis is necessary.

When pesticides or herbicides are determined to be used on individual projects, conducted under the guidance of the LMP, Department staff will review the recommended pesticides, herbicides, surfactants, and adjuvants intended use and the possible environmental effects of each and work with the PCA to determine whether the proposed use would be consistent with the label and the registration limitations.

BMP HZ-7. When pesticides or herbicides are used on the Reserve, all containers shall be secured when transported and all empty containers disposed of properly off-site.

BMP HZ-8. All spills of hazardous materials shall be cleaned up immediately.

I.6.2 Protection of Public Health

BMP HZ-9. To reduce the risk of livestock transmitting anthrax to Department staff and others visiting or working on the Reserve, the Department shall ensure that all personnel are trained to be aware of the risk of naturally-occurring anthrax being transmitted to humans from a diseased animal carcass. In addition, the following Best Management Practices shall be followed:

- Livestock carcasses shall be handled only by properly trained livestock handlers, veterinarians, or health officials;
- Animal carcass disposal shall follow accepted practice if the death is potentially related to anthrax; and
- All suspected cases of anthrax shall be immediately reported to the animal's veterinarian, the San Luis Obispo County Agricultural Commissioner, and the California Department of Food and Agriculture's Animal Health and Food Safety Services Division.

BMP HZ-10. To reduce the risk of Valley Fever to Department staff and others visiting or working on the Reserve, the Department shall implement all of the following:

- Ensure that all personnel are trained to be aware of the risk of Valley Fever and to recognize the symptoms; and
- Establish procedures to follow in the event of the onset of symptoms, including the provision of prompt medical attention, and notice to CDFW staff and the San Luis Obispo County Department of Public Health.

BMP HZ-11. When conducting management activities in areas of the Reserve with the potential to mobilize spores associated with Valley Fever, the Department shall implement the following, as applicable:

- Implement all of the Best Management Practices relating to the control of dust during construction activities;

- Provide National Institute for Occupational Safety and Health (NIOSH)-approved respirators for workers. Workers should be medically evaluated, fit-tested, and properly trained on the use of the respirators, and a full respiratory protection program in accordance with the applicable Cal/OSHA Respiratory Protection Standard (8 CCR 5144) should be in place;
- Avoid eating and smoking where dust is being actively generated and provide separate, clean eating areas with hand-washing facilities;
- Avoid outdoor operations during unusually windy conditions;
- Limit ground-disturbing activities during the fall to essential jobs only, as the risk of cocci infection is higher during this season.
- When working in dusty conditions, clothing should be changed after work every day, preferably at the work site;
- Train workers to recognize that cocci may be transported offsite on contaminated equipment, clothing, and shoes, and consider installing boot-washing stations; and
- Post warnings onsite and consider limiting access to visitors, especially those without adequate training and respiratory protection.

BMP HZ-12. In areas where public serving facilities are to be constructed and where Phase 1 environmental surveys have not been completed, the Department will develop and implement a Soil Sampling and Analysis Plan to determine the presence and extent of any residual herbicides, pesticides, and fumigants on historically-farmed land. The plan should document the areas proposed for sampling, the procedures for sample collection, the laboratory analytical methods to be used, and the pertinent regulatory threshold levels for determining proper excavation, handling, and, if necessary, treatment or disposal of any contaminated soils. Results of the laboratory testing and recommended resolutions for excavation, handling, dust control, and treatment/disposal of material found to exceed regulatory practices shall be submitted to the Department prior to construction.

I.6.3 Wildfire Risk

BMP HZ-13. To minimize the potential for wildfire ignitions associated with management activities, the Department shall require the following as applicable:

- All internal-combustion engines, stationary and mobile, shall be equipped with spark arresters that are in good working order;
- Light trucks and cars with factory-installed mufflers in good conditions, only, shall be used on roads, which shall be cleared of potential ignition sources;
- Equipment parking areas and small stationary engine sites shall be cleared of all extraneous flammable materials;
- Construction and maintenance personnel shall be trained and equipped to extinguish small fires to prevent them from growing into more serious threats;
- Construction techniques that utilize non-motorized equipment shall be used wherever feasible; and

- Smoking shall be:
  - Prohibited in wildland areas;
  - Prohibited during a Red Flag Warning (period of extreme fire danger) issued for the project area;
  - limited to paved or cleared areas lacking vegetation that are located at least 30 feet of any combustible material storage area (including fuels, gases, and solvents).

BMP HZ-14. The use of motorized equipment for construction and maintenance activities shall cease during conditions of extreme weather conducive to wildfire ignitions. To minimize the likelihood of starting a wildfire, when a Red Flag Warning is issued by the National Weather Service for the Reserve area (which is defined by the National Weather Service as "San Luis Obispo County Interior Valleys"), all construction and maintenance activities shall cease. The Department shall ensure implementation of a system that allows for receipt of Red Flag Warning each day prior to the start of construction activities.

BMP HZ-15. The Department shall minimize the potential for human-caused wildfires by carrying water or fire extinguishers and shovels in all Department vehicles and equipment used on the Reserve. The use of shields, protective mats, or use of other fire preventative methods shall be used during grinding and welding to minimize the potential for fire. Personnel shall be trained regarding the fire hazard as part of the pre-construction awareness education program (BIO-31). Prescribed burning activities shall be conducted according to an approved burn plan.

I.6.4 Wildfire Risk and Prescribed Burning

BMP HZ-16. Prescribed burning shall be conducted in full compliance with the California Department of Forestry and Fire Protection (CalFire), including (but not limited to) the following:

- Inspection per Battalion Chief Practices;
- Issuance of a CalFire LE-5 Permit;
- Issuance of an APCD Agricultural Bun Permit from the SLO APCD;
- Burn on permissive burn days only;
- Permittee must call 1-800-834-2876 before burning;
- Burning must be conducted during daylight hours only; and
- Prepare a Smoke Management Plan for any burn over 100 tons of piled material or 10 acres of standing vegetation as required by Public Resources Code §4423(b).

I.7 Hydrology and Water Resources [EIR Section 5.8]

I.7.1 Protection of Water Quality

BMP WQ-1. To protect water quality, the Department shall apply the following best management practices (BMPs) as applicable.

- Identify the most sensitive natural areas and, where possible, leave them undeveloped. To the extent possible, set back areas of ground disturbance from creeks, wetlands, and riparian habitats and preserve trees. Conform the site along natural land forms, avoid excessive grading and disturbance of vegetation and soils, and mimic the site's natural drainage patterns. Where possible, concentrate ground disturbance on portions of the site with less permeable soils, and preserve areas that can promote infiltration.
- To the extent possible, limit overall coverage of impervious surfaces. Where possible, detain and retain runoff throughout the site. Use drainage design elements such as depressed landscape areas, vegetated buffers, and bioretention facilities consisting of a shallow surface reservoir, a layer of imported planting medium, and a gravel underlayer with perforated pipe underdrains.
- Use permeable pavements, such as crushed aggregate, turf block, unit pavers, pervious concrete, or pervious asphalt could be substituted for impervious concrete or asphalt paving.
- Direct runoff to bioretention facilities, flow-through planters, dry wells, or cisterns. Consider directing runoff to facilities designed to detain and treat runoff before letting it seep away slowly. Dry wells or infiltration basins may be used if soils are sufficiently permeable and geotechnical considerations allow.

BMP WQ-2. For new construction activities with the potential to disturb more than one acre of land, a Notice of Intent (NOI) shall be filed with the Regional Water Quality Control Board to be covered under the State National Pollutant Discharge Elimination System (NPDES) General Construction Permit for discharges of storm water associated with construction activity. A Storm Water Pollution Prevention Plan (SWPPP) must be developed and implemented for each site.

BMP WQ-3. The Department shall apply runoff-control measures to minimize discharge of surface pollutants into drainage systems associated with new construction. Examples of such measures include, but are not limited to, the following:

- The use of "bioswales" and similar features (such as infiltration trenches, filter trips, and vegetated buffers) to trap contaminants;
- Installation of grease/oil separators to keep these contaminants out of storm runoff; and
- Minimizing pesticide use.

BMP WQ-4. Water diversions shall divert the minimum necessary amount. Float valves or other devices shall be installed to control diversion amounts.

BMP WQ-5. Natural drainage patterns shall be preserved to the greatest extent possible.

I.7.2 Well Monitoring

BMP WQ-6. As staffing and funding allow, the Department will regularly monitor water quality and quantity in wells on the Reserve for evidence of subsidence, changes in groundwater levels, toxic substances, mineral intrusion, and other contaminants and shall take remedial actions as necessary to protect groundwater quantity and quality. Such remedial actions may include, but are not limited to, the following:

- Treatment and/or blending of groundwater where necessary to meet safe drinking water standards;
- The abandonment of wells that either adversely impact surrounding wells or that do not meet safe drinking water standards; and
- Where feasible and consistent with the objectives of this LMP, the increased use of surface supplies to reduce dependence on groundwater supplies.

I.8 Noise Management

BMP N-1. The Department will apply the following as necessary to mitigate the adverse noise effects of construction-related activities:

- During construction, provide mufflers for all heavy-construction equipment and all stationary noise sources in accordance with the manufacturers' recommendations.
- Locate stationary noise sources and staging areas as far as is feasible from existing residences, or require contractors to provide additional noise-reducing engine enclosures to achieve approximately 10 dBA of reduction compared to uncontrolled engines.
- Equip air compressors and pneumatic equipment with mufflers, and equip impact tools with shrouds or shields.
- Design construction vehicle access routes to minimize the impact on existing residences.

I.9 Design Criteria for Fencing, New Trails and Parking Areas

BMP DC-1. New trails within the Reserve shall:

- Be consistent with all relevant Best Management Practices and consistent with the overall goals and objectives of the Reserve;
- Be designed to avoid sensitive resources;
- Be located on existing unpaved roads wherever possible;
- Follow the natural topography wherever possible;
- Minimize ground-surface disturbance, removal of vegetation, and grading;
- Minimize or avoid the use of culverts, bridges, and retaining walls; and

- Incorporate connections to existing parking areas.

BMP DC-2. New or expanded parking areas shall:

- Be located and designed to provide adequate pullout and turnaround area, sight distance and spacing between parking areas and other driveways to ensure public safety;
- Be consistent with all relevant Best Management Practices and consistent with the overall objectives of the Reserve;
- Incorporate signage and visitor information as necessary to inform visitors;
- Avoid sensitive resources;
- Be located at existing established parking areas or other disturbed areas wherever possible;
- Minimizes ground-surface disturbance, removal of vegetation, and grading;
- Incorporate a permeable surface to minimize erosion and to protect surface water quality; and
- Take advantage of natural topography, vegetation, and other physical features to provide screening from public view.

BMP DC-3. New fencing shall be designed to be permeable to native animals. New fencing in pronghorn habitat shall be designed with a smooth bottom wire that is at least 18 inches above the ground.

BMP DC-4. New watering facilities shall incorporate design features to protect wildlife, including:

- Effective escape structures;
- Unobstructed access to the water surface; and
- A minimum length or diameter of six feet, with a longer length or diameter preferred.

I.10 Sustainability

BMP S-1. The Department shall encourage the use of sustainable, energy-efficient construction techniques.

BMP S-2. The Department shall utilize, where feasible, passive solar design (passive heating and cooling) to avoid or minimize cooling needs through building orientation.

BMP S-3. The Department shall actively pursue methods of solid waste recycling and reuse, including source separation, with the goal of reducing the solid waste generation of the Reserve.

BMP S-4. The Department shall separate and recycle all recyclable or reusable materials.

BMP S-5. The design of new construction shall be in keeping with the rural character and natural environment of the Reserve.

BMP S-6. The Department shall promote the efficient use of water, including use best available technologies for water conservation including, but not limited to, water-conserving toilets, showerheads, faucets, and irrigation systems.

BMP S-7. The Department shall implement the relevant provisions of DFG Going Green: Next Steps Toward Sustainability (CDFW 2011a).

Appendix J
Environmental Impact Report

Appendix J Environmental Impact Report

Appendix K
Public Comments and Responses