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Chapter 3. Affected Environment

3.1 Introduction

This chapter describes the current physical, biological, cultural, social, and economic conditions within the Carrizo Plain National Monument (CPNM) that may be affected by implementing any of the resource management plan (RMP) alternatives. These existing conditions and trends provide a baseline for analyzing expected impacts from management actions and provide the background for the no-action/present management alternative. This chapter describes the status, or present characteristics and condition, of the public land; the status of physical and biological processes that affect ecosystem function; the condition of individual components such as soil, water, vegetation, and wildlife habitat; and the relative value and scarcity of the resources. The analysis also addresses social and economic conditions that influence how people, communities, and economies interact with the planning area. This chapter is organized by the following resource topics:

- 3.2 Biological Resources (Wildlife and Vegetation)
- 3.3 Fire and Fuels Management
- 3.4 Air Quality
- 3.5 Soils
- 3.6 Water Resources
- 3.7 Wild and Scenic Rivers
- 3.8 Climate
- 3.9 Geology and Paleontology
- 3.10 Cultural Resources
- 3.11 Visual Resources
- 3.12 Wilderness Study Areas and Other Lands with Wilderness Characteristics
- 3.13 Areas of Critical Environmental Concern
- 3.14 Livestock Grazing
- 3.15 Recreation and Interpretation
- 3.16 Public Safety and Emergency Services
- 3.17 Administrative Facilities
- 3.18 Travel Management
- 3.19 Minerals
- 3.20 Lands and Realty
- 3.21 Social and Economic Conditions
- 3.22 Solid and Hazardous Waste

The CPNM is located in California's southern Coast Ranges, to the west of the San Joaquin Valley. The CPNM is primarily within San Luis Obispo County, with the easternmost portion in Kern County. The CPNM adjoins some of the most intensively managed agricultural lands and petroleum deposits in the U.S. and is less than 100 air miles from Los Angeles. However, the area remains relatively isolated and undeveloped, and retains an intact landscape character. Prominent features include the white alkali flats of Soda Lake, vast open grasslands, and a broad plain rimmed by mountains. The plain is home to diverse communities of wildlife and plant species including several listed as threatened or endangered. The area is culturally important to Native Americans. It is traversed by the San Andreas Fault, which has carved valleys and created and moved mountains. The CPNM is surrounded by several small, unincorporated communities, with larger population centers along the U.S. 101 corridor to the west and San Joaquin Valley to the east.

3.2 Biological Resources (Wildlife and Vegetation)

3.2.1 Ecological Subregion Descriptions

CPNM Subregions

The CPNM has been divided into nine subregions based on geography and general ecological characteristics to provide a context for certain management prescriptions (see Map 3-1, Carrizo Plain Subregions). The subregions separate the area of the dry lakes from the surrounding valley floor, the valley from the foothills and surrounding mountains, and the Caliente Mountains into north and south sides. Further demarcation into northern and southern foothill and plain sections follows precipitation patterns. Plant community designations on the following pages are based on the existing Carrizo Plain vegetation map, which follows the classification system developed by Holland (1988). A more precise vegetation map is in development, based on Sawyer and Keeler-Wolf (1995), but it will not be ready for inclusion in this document (T. Keeler-Wolf, personal communication, 7 November 2007). Table 3.2-1 shows acreage designations for each subregion.

Table 3.2-1. CPNM Subregions, with Acreage Designations

Subregion	Total	BLM	CDFG	Private	Core area
Carrizo Plain North	15,969	14,775	1,117	77	1,684
Carrizo Plain Central	39,794	31,217	2,378	6,199	21,071
Soda Lake Sink	20,254	18,785	493	976	0
Panorama Hills – Elkhorn Plain	33,795	26,803	265	6,727	11,039
Temblor Range	28,758	22,074	160	6,524	0
Caliente Foothills North	18,938	13,845	4,425	668	0
Caliente Foothills South	21,756	15,816	0	5,940	123
Caliente Mountains North	29,887	28,553	451	883	0
Caliente Mountains South	37,493	34,543	12	2,938	0

Use of Subregions in the RMP

The ecological subregions are referenced in both the Alternatives (Chapter 2) and Environmental Impacts (Chapter 4) sections of the plan. The subregions provide a context for describing management actions and assessing their impacts.

Carrizo Plain North

The Carrizo Plain North subregion includes the area of the northern Carrizo Plain between Soda Lake and the foothills of the Caliente Range. A small portion of the California Department of Fish and Game (CDFG) American unit is within this subregion. The topography is generally flat, but dissected by shallow drainage courses. Elevations range from 1,950 to 2,300 feet and soils are generally deep, sandy, and derived by erosion from the adjacent Caliente Range. The Carrizo Plain North receives slightly more precipitation and its vegetation is generally more lush than its southern counterparts (the Carrizo Plain Central and the Panorama Hills-Elkhorn Plain subregions). Virtually the entire area has been altered by activities associated with agriculture: over 75 percent of the subregion was previously tilled and most, if

not all, grazed at one time or another. Plant communities include extensive wild oat (*Avena* spp.) dominated nonnative grassland, especially well-developed in the previously cultivated fields. In the drainage systems where slightly more water is available, interior Coast Range saltbush scrub is present.

The Carrizo Plain North subregion includes foraging and fawning habitat for pronghorn as well as generalized habitat for elk, kit foxes, various bats, ground-nesting birds, and burrowing owls. The subregion also includes a number of vernal pools that provide a home for fairy shrimp and breeding habitat for spadefoot toads.

As part of ongoing restoration efforts, about 500 acres in the Carrizo Plain North subregion have been planted with native bunchgrasses, shrubs, and wildflowers. Prescribed burns have been used as a tool to prepare sites for seeding with native species. The goal has been to replace the impoverished nonnative grasslands with a diverse native bunchgrass and herb community, with shrub elements where appropriate. Approximately 8,000 acres are managed for the benefit of elk and pronghorn. There are about 2,000 acres of giant kangaroo rat habitat; however, most of the subregion appears to be at the northern edge of their range. The subregion includes a small portion of the central core area for the San Joaquin suite of sensitive species. Much of this subregion has been grazed in the last 15 years for the purpose of vegetation management and includes plots from the Carrizo grazing study (Christian et al. in prep). All livestock grazing has been excluded from specific cultural sites.

Carrizo Plain Central

The Carrizo Plain Central subregion consists of the central Carrizo Plain and the area between Soda Lake and the Panorama Hills. Almost the entire area of the CDFG Panorama unit is within this subregion. Bounded by the foothills of the Temblor and Caliente Ranges, the topography is flat to gently rolling and intersected by drainages from the surrounding hills. Elevations range from 1,950 to 2,600 feet. Overall, the area is drier than the plains in the northern portion of the Monument. Like the Carrizo Plain North, much of this subregion was previously cultivated, was subjected to livestock grazing at one time or another, and now consists predominately of nonnative grassland. Since the area receives less precipitation, the grasslands tend to be sparser and are dominated by bromes instead of wild oats. Valley saltbush scrub is found at the northern edge of the subregion along the border with the Soda Lake Sink subregion and in patches south and east of the KCL Campground. Two other shrub communities, interior Coast Range saltbush scrub and upper Sonoran subshrub scrub, enter the grasslands along drainages from the surrounding foothills. Two federally listed endangered plants, San Joaquin woolly-threads and California jewelflower, are found in this subregion. Stands of *Ephedra* are an important shrub component within this subregion.

The sparse vegetation of the Carrizo Plain Central subregion provides important core habitat for the suite of San Joaquin Valley sensitive species (blunt-nosed leopard lizard, giant kangaroo rat, San Joaquin kit fox, and San Joaquin antelope squirrel) as well as for mountain plovers. Saltbush scrub supports the northern-most distribution of the Le Conte's thrashers on the Monument. The subregion's vernal pools are breeding habitat for spadefoot toads and support populations of fairy shrimp. Within sandy drainage bottoms are sun cups (*Camissonia* spp.), wildflowers that provide forage for the caterpillars of the endangered Kern primrose sphinx moth. The area also includes important roosting habitat for bats.

The Carrizo Plain Central subregion contains the majority of the San Joaquin Valley sensitive species core area. Much of the area has been grazed in the last 15 years to provide low structure habitat thought optimum for the San Joaquin Valley core species and for the purpose of general vegetation management. This subregion also includes plots from the Carrizo grazing study (Christian et al. in prep). Livestock grazing is excluded from a small area on the extreme northern end of the subregion. Approximately 35

percent of the subregion was previously tilled and is targeted for restoration with native perennial grasses, shrubs, and herbs.

Soda Lake Sink

The Soda Lake Sink subregion forms the valley center in the northern half of the Monument, a predominantly flat area with minor topographic relief provided by the drainage system, which ends at the lake, and by an ancient clay dune system. Elevations range from 1,950 to 2,000 feet. The subregion is mainly alkali playa, a system of shallow basins with characteristic white salt deposits and associated surrounding saltbush communities. In years with adequate precipitation, the lake and playas fill with water, eventually drying out as the season progresses. Usually the lake dries with the cessation of rains and the onset of summer heat, but occasionally, as with the record rainfall in 1998, standing water can persist until the following rainy season. No vegetation grows within the playas, but they are edged by valley sink scrub, which itself is surrounded by valley saltbush scrub in the slightly less-saline soils. Six rare plants are found within this subregion: Jared's peppergrass, Munz's tidy tips, Lost Hills crowscale, recurved larkspur, spiny-sepaled button-celery, and Hoover's button-celery.

With sufficient rain, temporary pools fill and, depending on the salinity, support brine shrimp and/or several fairy shrimp species (longhorn fairy shrimp, vernal pool fairy shrimp, alkali fairy shrimp, and pouch-pocketed fairy shrimp). Spadefoot toads breed in the less-saline pools. Soda Lake also provides important migratory bird habitat, most notably for long billed curlews, American avocets, and black-necked stilts. Occasionally sandhill cranes, which historically fed among the surrounding grain fields, return to the lake for short periods of time. Flood-prone areas of deeply cracked brown soil provide habitat for wintering mountain plovers. The shrub areas surrounding the playas provide pronghorn fawning habitat. The area is also important habitat for a variety of shrub- and ground-nesting birds.

Current management focuses on Soda Lake, its playa system and associated shrub communities, its vernal pools, and its six rare plants. The subregion includes approximately 16,000 acres of pronghorn habitat. Most of the subregion is closed to livestock grazing; however, about 10 percent of the Soda Lake subregion was grazed for the purpose of vegetation management and includes plots from the Carrizo grazing study (Christian et al. in prep).

Panorama Hills-Elkhorn Plain

The Panorama Hills-Elkhorn Plain subregion, sandwiched between the Carrizo Plain proper and the Temblor Range, includes the Panorama and Elkhorn Hills and adjoining regions. The San Andreas Fault forms the western boundary. All of the CDFG Elkhorn unit and part of the Panorama unit are within this subregion. The topography includes several broad plains within a series of ridges and intervening drainages in a northeast to southwest orientation. Elevations range from 1,950 to 3,250 feet. The southern Elkhorn Plain tends to be among the driest habitat in the Monument. Because of the past history of cultivation and heavy livestock grazing, much of the subregion is expected to need restoration with native perennial grass, shrubs, and herbs. Control of Russian thistle is an ongoing concern.

Much of the vegetation is nonnative grassland, shifting in the drainages and higher elevations to interior Coast Range saltbush scrub. In the area where the Elkhorn and Panorama Hills join, upper Sonoran subshrub scrub occurs. The Temblor Mountain foothills, which form the southeast border of the subregion, are a mix of interior Coast Range saltbush scrub and spiny saltbush scrub. A few small patches of juniper woodland are evident in the upper elevations of the Temblor Range and in the lower Elkhorn Hills. Although much of the grasslands are dominated by introduced species, native bunchgrasses can be found on north-facing slopes and within some shrub communities. Heavy rains in March 1991, the so-called "March miracle," appeared to promote saltbush establishment in the Carrizo Plain and western San

Joaquin Valley. Among other areas, new populations of common saltbush (*Atriplex polycarpa*) appeared in the drainages extending into the Elkhorn Plain from the Temblor Range. Although some plants have since died out, the saltbush seems to have reestablished populations thought extirpated by the historical practice of year-round grazing. The subregion is home to the endangered San Joaquin woolly-threads, and the rare Temblor buckwheat and forked fiddleneck.

The area is noteworthy for having the highest known density of blunt-nosed leopard lizards (Germano and Williams 2005) and among the highest density of giant kangaroo rats, and includes two large areas of core habitat. The subregion also supports other arid land species once common in the San Joaquin Valley, such as short-nosed kangaroo rat, San Joaquin kit fox, San Joaquin antelope squirrel, and mountain plover. Some areas of common saltbush and, to a lesser extent, ephedra found within this subregion provide habitat for Le Conte's thrasher. Virtually all of the subregion has recently been grazed: the northern 1/3 as part of Section 15 allotments and the southern 2/3 for the purpose of vegetation management, including plots from the Carrizo grazing study (Christian et al., in prep).

Temblor Range

The Temblor Range subregion contains the upper elevations on the eastern border of the Monument. The terrain is steep and eroded, with an aspect trending generally to the southwest. Elevations range from 1,950 feet to 4,250 feet. Overall, the area is quite dry, with only a few springs present. Vegetation is primarily upper Sonoran subshrub scrub dissected by interior Coast Range saltbush scrub in the drainages and north-facing slopes, where one encounters native bunchgrasses as well. Some of the more mesic (moist) sites on the northwest end support juniper oak cismontane woodland and cismontane juniper woodland and scrub, and there are a few small meadows of nonnative grassland. In the southern end of the subregion, spiny saltbush scrub is present and there are patches of large Alvord oaks in some canyons. The Temblor Mountains are home to upland game species such as California quail, chukar, and mule deer.

The northern 1/3 of the Temblor Range subregion is within Section 15 grazing allotments, as is a small area at the south end. The rest of the subregion has been grazed in the recent past in an effort to achieve vegetation management goals. The subregion is considered marginal habitat for kangaroo rats; however, during favorable conditions in the recent past, the species has expanded along the ridgetops and spread to the crest of the Temblor Range. It is better habitat for antelope ground squirrels and kit fox and provides important linkage between Carrizo Plain and San Joaquin Valley populations. Habitat management in this subregion is focused on preserving and restoring the Alvord oak populations, protecting the linkage between the Carrizo and the Valley, and ensuring the long-term survival of the subshrub scrub, bunchgrass, and yucca communities.

Caliente Foothills North

The Caliente Foothills North subregion lies along the northeast flanks of the Caliente Mountains, from the Monument's northern boundary, south to the KCL campground. The subregion encompasses the northeast-facing slopes of the Caliente Mountains between the Carrizo Valley floor and their upper elevations. Most of the CDFG American unit is within this subregion. The terrain is relatively gentle to steep, from 1,900 to 3,200 feet in elevation. This subregion tends to get more precipitation than many other areas of the Monument. Because of this, the vegetation is primarily *Avena* (wild oat) dominated nonnative grassland with patches of upper Sonoran subshrub scrub, interior Coast Range saltbush scrub, and Diablan sage scrub in the upper elevations and more mesic sites. Some of these shrub communities in the upper elevations areas also have scattered juniper. A small amount of juniper oak woodland is present along the border with the Caliente Mountains. In the southern portion of the subregion are stringers and patches of valley saltbush scrub. Springs and their associated riparian vegetation can be found in many of

the canyons. Areas of native bunchgrasses, primarily needle grass (*Nassella* spp.) and one-sided bluegrass (*Poa secunda* ssp. *secunda*) are encountered throughout the subregion, most commonly on north-facing slopes. Much of the lower elevation lands were previously tilled and most, if not all, of the subregion was grazed at one time or another; the original vegetation probably tended to be shrub-dominated communities. Rare plants associated with vertisol clay belts in the Caliente foothills include oval-leaved snapdragon, heart-leaved thornmint, and pale-yellow layia. Other rare plants in the subregion include forked fiddleneck and San Joaquin woolly-threads.

The North Caliente Foothills subregion includes habitat for pronghorn foraging and fawning, for elk calving, and for upland birds, especially quail. Scattered throughout the subregion are rock outcrops that provide habitat for bats and birds and occasional temporary pools for fairy shrimp.

Current management focuses on native bunchgrass, shrub communities, native herbs, rare plants, bats, ground-nesting birds, pronghorn, and elk. Over half of the Caliente Foothills North has been grazed for the purpose of vegetation management and includes plots from the Carrizo grazing study (Christian et al. in prep). The subregion also includes a small area where grazing is excluded and the northern portion of a large Section 15 grazing allotment.

Caliente Foothills South

The Caliente Foothills South subregion lies along the northeast flanks of the Caliente Mountains, from the KCL campground to the Monument's southern boundary. The subregion encompasses the northeast-facing slopes of the Caliente Mountains between the Carrizo Valley floor and their upper elevations. The terrain ranges from relatively gentle to steep, from 2,100 to 3,500 feet in elevation. This subregion is drier than the Caliente Foothills North, but more mesic than the valley floor. Vegetation is mostly upper Sonoran subshrub scrub transitioning to *Bromus*-dominated nonnative grassland in the southern end of the subregion. The Sonoran scrub is often dominated by *Ephedra*. Interspersed in the northern end are pockets of interior Coast Range saltbush scrub, valley saltbush scrub, juniper woodland, and nonnative grassland. Areas of native bunchgrasses, primarily needle grass (*Nassella* spp.) and one-sided bluegrass (*P. secunda* ssp. *secunda*) are encountered throughout the subregion, most commonly on north-facing slopes. Introduced annual grasses are common and especially abundant in previously cultivated areas. Much of the lower elevation lands were previously tilled and most, if not all, of the subregion was grazed at one time or another. Rare plants associated with vertisol clay belts in the Caliente foothills include oval-leaved snapdragon, heart-leaved thornmint, and pale-yellow layia. Federally listed plants in the subregion include California jewelflower, San Joaquin woolly-threads, and the recently delisted Hoover's woolly-star.

The Caliente Foothills South subregion provides a little pronghorn foraging habitat as well as some habitat for kangaroo rats and other San Joaquin sensitive species. Some of the dry washes support sun cups (*Camissonia* spp.), larval food for Kern primrose sphinx moth. Vernal pools in the subregion provide habitat for longhorn and versatile fairy shrimp and breeding sites for spadefoot toads. Sag ponds, formed by irregular ground movement associated with the San Andreas Fault, tend to have higher alkalinity and support pouch-pocketed fairy shrimp and brine shrimp. Scattered throughout the foothills are rock outcrops that provide habitat for bats and birds.

Management focus is on California jewelflower and other rare plants, native bunchgrass, shrub communities (especially *Ephedra*), native herbs, Kern primrose sphinx moth, fairy shrimp, spadefoot toads, and bats. Over 80 percent of the Caliente Foothills South subregion has been grazed for the purpose of vegetation management and includes plots from the Carrizo grazing study (Christian et al. in prep). The southern end of the subregion also includes a small portion of a Section 15 grazing allotment. There has been no authorization of livestock grazing by BLM in a large portion of the northern end due to sensitive

resources and the large number of private inholdings; however, trespass grazing by sheep has been a recurring issue.

Caliente Mountains North

The Caliente Mountains North subregion contains the northeast-facing side of the Caliente Range. A small parcel of California State Schools land is within this subregion. The topography is one of relatively steep ridges and drainages, from 2,600 to 5,100 feet in elevation. This subregion generally has the highest precipitation in the Monument. Vegetation is mostly juniper oak woodland and juniper woodland, with the former better represented in the more mesic northwest end of the subregion. In addition, Diablan sage scrub is found interspersed within the woodland communities. Stands of native bunchgrasses are fairly common, especially in the more mesic sites. Several important springs and their associated vegetation are present. About 2/3 of the subregion is part of Section 15 grazing allotments. The remaining 1/3 has been grazed for vegetation management and includes plots from the Carrizo grazing study (Christian et al. in prep). Most livestock activity appears to have been concentrated in the lower elevations.

Sufficient cover is available for upland birds such as California quail and chukar, and habitat is appropriate for deer and elk. Bears are also present. Nonnative wild pigs can be encountered, in higher numbers during wet years. The numerous rock outcrops and cliff faces provide habitat for raptors, other birds, and bats.

Management focus is on oval-leaved snapdragon, native bunchgrass, scrub oak and manzanita scrub, and blue and/or Alvord oak populations.

Caliente Mountains South

The Caliente Mountains South subregion contains the southwest-facing side of the Caliente Range and extends to the southern Monument boundary. The topography is one of steep ridges and drainages, from 1,650 to 5,100 feet in elevation. The region is quite arid; the vegetation a mosaic of Diablan sage scrub, upper Sonoran subshrub scrub, interior Coast Range saltbush scrub, and occasional patches of nonnative grassland. Stands of native bunchgrasses occur in some of the more mesic sites. A few springs and their associated vegetation are present and a few populations of oval-leaved snapdragon can be found in the far western portion,

Within the shrub communities are upland game species such as California quail and chukar and occasional deer are seen. The numerous rock outcrops and cliff faces provide habitat for raptors, other birds, and bats.

On the southern boundary of the subregion, the flatlands and associated canyons bordering the Cuyama Valley could be considered a separate subregion, but this area is included in this document as part of the mapped Caliente Mountains South subregion. Vegetation is primarily saltbush scrub and nonnative grassland that provides habitat for blunt-nosed leopard lizard, giant kangaroo rat, antelope squirrel, and populations of San Joaquin woolly-threads and Hoover's woolly-star.

The northern ¾ of the subregion is within Section 15 grazing allotments. The southern ¼ has been grazed for vegetation management. Most of the livestock activity appears to be concentrated in the lower elevations where reliable water resources are present.

Management concerns include yucca colonies, saltbush vegetation, springs and riparian vegetation, and biological crusts. In the lower saltbush vegetation, focus is on the two rare plants and the giant kangaroo rat, antelope squirrel, and blunt-nosed leopard lizard.

3.2.2 Wildlife

3.2.2.1 Introduction and Habitat Types

The Monument Proclamation that established the CPNM recognized the importance of the area as a large remnant of habitat for many wildlife species endemic to the nearby San Joaquin Valley, and as a refuge for the dwindling flora and fauna of the valley. While over 90 percent of the San Joaquin Valley has been converted from grassland, scrubland, and wetland to intensive agricultural, urban, and energy/industrial land uses (USFWS 1998), the CPNM has remained largely intact as a large landscape of native wildlife. The importance of the area is highlighted by the role that the CPNM plays in the conservation and recovery of several San Joaquin Valley animals listed as threatened or endangered. The CPNM has also been designated by the National Audubon Society as a Globally Important Bird Area that is “an internationally important site that if degraded or lost would leave a lasting negative impact on bird populations.”

Management of the Monument has focused on maintaining or enhancing the native plant communities to serve as high-quality wildlife habitat. Over the past 20 years, more than 40,000 acres of previously dryland farmed fields have reverted to grasslands and shrublands that now provide more functional wildlife habitats. Monitoring and research studies have been initiated to determine how the habitats should be managed to meet the Monument Proclamation and management plan goals.

The wildlife found within the Monument is characteristic of the San Joaquin Valley and inner Coast Range Mountains. The Monument Wildlife List (see Appendix K) includes 4 species of amphibians, 22 species of reptiles, 47 species of mammals, and 183 species of birds, of which 41 are special status species (BLM 2007a, 2007b, 2007c). The most common wildlife likely to be seen by visitors include desert cottontail, black-tailed hare, California ground squirrel, San Joaquin antelope squirrel, coyote, San Joaquin kit fox, tule elk, pronghorn, northern harrier, red-tailed hawk, American kestrel, prairie falcon, California quail, long-billed curlew, mourning dove, greater roadrunner, burrowing owl, western kingbird, horned lark, scrub jay, common raven, mountain bluebird, loggerhead shrike, lark sparrow, sage sparrow, savannah sparrow, white-crowned sparrow, western meadowlark, house finch, western fence lizard, side-blotched lizard, western whiptail, San Joaquin coachwhip, gopher snake, and western rattlesnake.

Wildlife habitats within the Monument include annual grassland (92,644 acres), alkali desert scrub (52,370 acres), mixed chaparral (58,236 acres), and piñon-juniper woodland (38,509 acres) (Mayer and Laudenslayer 1988). Other habitats include the Soda Lake playa (4,827 acres) and small unmapped aquatic habitats, riparian habitats, and small patches of oak woodland (see Section 3.2.3 Vegetation for further descriptions of these habitats). Across the landscape, the variety or richness of animals is most often related to the diversity of vegetation structure and the variety of these habitats found within an area (Ronan and Rosenberg 2002). Increased diversity in plant communities provides an increasing number of habitat niches that, in turn, support more animal species (Thomas and Maser 1983). Thus, grasslands generally have lower animal species richness than shrublands. Woodlands support more species than shrublands due to the greater variety of feeding, nesting, resting, and escape cover and food or prey items provided by the more diverse vegetative structure. Riparian and aquatic habitats often have even higher numbers of species due to the availability of water, insects, and more diverse vegetation. A rangeland with a high diversity of communities and successional stages provides habitat for a wide variety of wildlife (Thomas and Maser 1983). This is often applied in habitat management by managing for a mosaic of habitat types and seral stages (structure) across the landscape.

3.2.2.2 Special Status Animals

Over 40 special status animals inhabit the CPNM (Table 3.2-2). The CPNM has been identified as a core recovery area of natural lands targeted for protection in the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998). Note that the term “core area” identified on Map 3-2, Special Status Animals and discussed in Chapter 2 of this RMP, refers to CPNM-specific core areas identified for management under this RMP and not to the broader core recovery area identified in the San Joaquin Valley Recovery Plan referenced above. Wildlife species targeted for conservation and recovery in the Monument include blunt-nosed leopard lizard, giant kangaroo rat, San Joaquin antelope squirrel, San Joaquin kit fox, short-nosed kangaroo rat, Tulare grasshopper mouse, and San Joaquin LeConte’s thrasher. There are a variety of recovery tasks in the Recovery Plan to be implemented in the Monument. The animal species recovery tasks include studies on the effects of fire, the effects of grazing, competition among kangaroo rats, social systems of the giant kangaroo rat, and monitoring and documenting reproduction and demography. The Recovery Plan also identifies the importance of maintaining linkages between the Monument and the Cuyama Valley, Salinas Valley, and Western Kern County. The Monument plays an important role in meeting delisting and downlisting criteria for giant kangaroo rat, blunt-nosed leopard lizard, and San Joaquin kit fox. Since the Bureau of Land Management (BLM) is obligated under Section 7(a)(1) of the *Endangered Species Act* to carry out programs for the conservation of endangered species and threatened species, the recovery tasks identified for the Monument are a focus of management actions.

Three species listed in the Recovery Plan (short-nosed kangaroo rat, Tulare grasshopper mouse, and San Joaquin Le Conte’s thrasher), though not treated separately in the sections below, have populations occurring within the Monument that receive protection from current and future threats that exist for much of the remainder of the San Joaquin Valley, namely agriculture, development, and energy production. While little is known regarding the habitat requirements of short-nosed kangaroo rat, Tulare grasshopper mouse occupies the same habitat as other listed species such as giant kangaroo rat, blunt-nosed leopard lizard, and San Joaquin kit fox, and it is therefore believed that management actions to protect these species will also provide protection for the grasshopper mouse (USFWS 1998). Habitat needs of Le Conte’s thrasher are more specialized, requiring mature, appropriately spaced saltbush stands for roosting, nesting, and dispersal. The ground is usually bare or has low-growing vegetation but there must also be sufficient foraging litter beneath or near shrubs to provide adequate insects for food (Fitton, 2008). Management objectives and actions as defined in the Conservation Target Table, such as mapping areas of suitable habitat, annual monitoring, and protecting saltbush stands from fire and summer grazing by livestock, will be carried out to ensure ecological requirements are met.

Giant Kangaroo Rat (*Dipodomys ingens*)

Federal status: endangered.

State status: endangered.

Regional Context

The giant kangaroo rat is listed as endangered by the CDFG and the U.S. Fish and Wildlife Service (USFWS 1987). Population numbers of the giant kangaroo rat plummeted during the 20th century, mainly as a result of habitat loss as desert areas were converted to agriculture. Over 95 percent of the former range has been lost due to cultivation, overgrazing, mining operations, and invasive weeds (USFWS 1998). The CPNM provides the greatest expanse of occupied giant kangaroo rat habitat remaining within the range of this species. As such, the Monument has been identified as a critical element in the conservation and recovery of this species (USFWS 1998).

Table 3.2-2. Special Status Animals in the Carrizo Plain National Monument

Common Name	Scientific Name	Federal Status	California Status
Longhorn fairy shrimp	<i>Branchinecta longiantenna</i>	FE	
Vernal pool fairy shrimp	<i>Branchinecta lynchi</i>	FT	
Kern primrose sphinx moth	<i>Euproserpinus euterpe</i>	FT	
Western spadefoot toad	<i>Spea (Scaphiopus) hammondi</i>	BS	SSC
Blunt-nosed leopard lizard	<i>Gambelia sila</i>	FE	SE, SFP
California horned lizard	<i>Phrynosoma coronatum frontale</i>	BS	SSC
Silvery legless lizard	<i>Anniella pulchra pulchra</i>		SSC
San Joaquin coachwhip	<i>Masticophis flagellum ruddocki</i>		SSC
Western small-footed myotis	<i>Myotis ciliolabrum</i>	BS	
Long-eared myotis	<i>Myotis evotis</i>	BS	
Fringed myotis	<i>Myotis thysanodes</i>	BS	
Yuma myotis	<i>Myotis yumanensis</i>	BS	
Townsend's big-eared bat	<i>Corynorhinus townsendii</i>	BS	SSC
Pallid bat	<i>Antrozous pallidus</i>	BS	SSC
Brazilian free-tailed bat	<i>Tadarida brasiliensis</i>	BS	
Big free-tailed bat	<i>Nyctinomops macrotis</i>		SSC
Western mastiff bat	<i>Eumops perotis californicus</i>	BS	SSC
San Joaquin antelope squirrel	<i>Ammospermophilus nelsoni</i>		ST
Giant kangaroo rat	<i>Dipodomys ingens</i>	FE	SE
Short-nosed kangaroo rat	<i>Dipodomys nitratooides brevinasus</i>	BS	SSC
Tulare grasshopper mouse	<i>Onychomys torridus tularensis</i>	BS	SSC
San Joaquin pocket mouse	<i>Perognathus inornatus inornatus</i>	BS	
San Joaquin kit fox	<i>Vulpes macrotis mutica</i>	FE	ST
California condor	<i>Gymnogyps californianus</i>	FE	SE, SFP
White-tailed kite	<i>Elanus leucurus</i>		SFP
Bald eagle	<i>Haliaeetus leucocephalus</i>	FD	SE, SFP
Northern harrier	<i>Circus cyaneus</i>		SSC-breed
Swainson's hawk	<i>Buteo swainsonii</i>		ST
Golden eagle	<i>Aquila chrysaetos</i>		SFP
Peregrine falcon	<i>Falco peregrinus</i>	FD	SCD, SFP
Greater sandhill crane	<i>Grus canadensis tabida</i>		ST
Lesser sandhill crane	<i>Grus canadensis canadensis</i>		SSC
Mountain plover	<i>Charadrius montanus</i>	BS	SSC
Burrowing owl	<i>Athene cunicularia</i>	BS	SSC-breed
Long-eared owl	<i>Asio otus</i>		SSC-breed
Short-eared owl	<i>Asio flammeus</i>		SSC-breed
Vaux's swift	<i>Chaetura vauxi</i>		SSC-breed
Willow flycatcher	<i>Empidonax trailii</i>		SE
Loggerhead shrike	<i>Lanius ludovicianus</i>		SSC-breed
Le Conte's thrasher (San Joaquin population)	<i>Toxostoma lecontei</i>	BS	SSC-breed
Yellow warbler	<i>Dendroica petechia</i>		SSC-breed
Oregon vesper sparrow	<i>Pooecetes gramineus affinis</i>		SSC-winter
Grasshopper sparrow	<i>Ammodramus savannarum</i>		SSC-breed
Tricolored blackbird	<i>Agelaius tricolor</i>	BS	SSC-breed
Yellow-headed blackbird	<i>Xanthocephalus xanthocephalus</i>		SSC-breed

FE: federal, endangered
 FT: federal, threatened
 FD: federal, delisted,
 BS: BLM sensitive
 SE: California, endangered

ST: California, threatened
 SSC: California species of special concern
 breed: known to breed on the CPNM

winter: status applies to CPNM wintering populations
 SCD: California candidate for delisting (recovered)
 SFP: California fully protected

Present Condition and Trends

Populations of giant kangaroo rats have been documented to occur from near Soda Lake to the extreme southern end of the Monument, in the foothills of the Caliente Range, throughout the Panorama Hills and Elkhorn Plain, and along the upper ridgelines of the Temblor Range (see Map 3-2, Special Status Animals). Populations are more robust and persistent in the dryer Elkhorn Plain and in the southern-central portion of the Carrizo Plain where rainfall is generally lower and where vegetative cover is sparser than at the northern end of the Monument. Giant kangaroo rats are most abundant in the Carrizo Central and Panorama Hills-Elkhorn Plain subregions. They are found to a lesser extent in the Carrizo Plain North, Caliente Foothills North, Caliente Foothills South, and Soda Lake Sink subregions. They occasionally occur on the ridgelines of the Temblor Range. They have been observed in some of the flat-bottom arroyos at the base of the Caliente Mountains South adjacent to the floor of the Cuyama Valley.

Giant kangaroo rats are the most abundant and dominant small mammal over the Elkhorn Plain and Carrizo Plains. In many instances, they are the only kangaroo rat in the community (Prugh and Brashares 2007; Germano and Saslaw 1996; Kelly et al. 2004) and have been found to dominate the community to the exclusion of other rodent species (Williams and Kilburn 1991). Occasionally, smaller Heermann's kangaroo rats and short-nosed kangaroo rats may co-occur with giant kangaroo rats, but the larger giant kangaroo rats are found in greater numbers and seem to persist as the dominant species over time (Germano and Saslaw 2007; Kelly et al. 2004). Giant kangaroo rat distributions expand and decline with changing weather patterns (USFWS 1998). Population monitoring data in the Carrizo Plain and Lokern Area in western Kern County indicate that populations have declined in prolonged drought periods as well as in a series of above-average rainfall years (Williams and Germano 1994; Germano and Saslaw 2007; ESRP 2005).

Observations of giant kangaroo rats within the Monument have indicated periods of occupation and extirpation of occupied sites over time. Williams (1985) observed substantial decreases and complete extirpation of giant kangaroo rats at several sites on the Elkhorn scarp and on the Carrizo Plain between 1979 and 1985. More recent monitoring studies have recorded similar decreases and increases in numbers and the distributions of kangaroo rats in the Monument (Christian et al. 2007; Germano and Saslaw 1996; Bidlack 2007). A significant and widespread decline occurred in the 1994 to 1996 period when giant kangaroo rats were absent from many areas of the Carrizo Plain. Populations were generally maintained on the Elkhorn Plain (ESRP 2005; Germano and Saslaw 1996).

During the course of the grazing study on the Monument (1997-2002), the density of giant kangaroo rat burrow systems (precincts) increased by nearly 50% (1997: 1.73 precincts/ha; 2002: 3.57 precincts/ha). Similarly, the percentage of sampling locations with giant kangaroo rat precincts increased from 21% to 35% during this same period, suggesting an overall increase in abundance of this species. However, the density of giant kangaroo rat precincts was significantly lower in grazed areas than ungrazed ones ($F_{1,1429} = 4.47$; $P = 0.035$). In addition, there was a significant year X grazing interaction term, indicating that the negative effects of grazing were significantly greater in some years (1998, 1999, 2000, 2002; $F_{5,1429}$, $P < 0.0009$).

Studies conducted by the Endangered Species Recovery Program at the Elkhorn Plain Ecological Reserve (ESRP 2005) best illustrate the long-term population fluctuations of giant kangaroo rats since 1987. The largest population decline occurred in 1991 following several years of drought. The record-setting rains of March 1991 probably resulted in flooding that resulted in a population of only two animals per hectare in April 1991. Subsequently, densities increased to 120 to 140 animals per hectare in 1992 and remained at 60 to 120 animals per hectare through 1997. A record El Niño rainfall year in 1998 resulted in a significant decrease to 20 animals per hectare on an ungrazed plot while remaining at 100 animals per

hectare on the adjacent grazed plot (USFWS 2007a). The ungrazed plot numbers increased between 1998 and 2001 to equal the numbers on the grazed plot. During the dry years of 2001 to 2004, the numbers of individuals on the plots remained relatively high at 70 to 130 animals per hectare (USFWS 2007a).

The reasons for the population fluctuations are not well understood. The 1994 and 1995 population declines occurred throughout the San Joaquin Valley in the fifth wettest winter on record, which was also much cooler than normal (Single et al. 1996). Vegetation cover and biomass increased markedly during this period. During this period, Cypher (2001) found negative relationships between vegetation cover and Heermann's and short-nosed kangaroo rats in western Kern County, indicating that dense cover constituted less favorable conditions for these species. He also noted that kangaroo rats, in general, are hampered by dense vegetation (Bartholomew and Caswell 1951) that impedes their ability to detect and elude predators (Rosenzweig and Winakur 1969) and they prefer to forage in area of open bare ground. Recent monitoring of giant kangaroo rats in the Panoche region of western Fresno County found declining numbers of giant kangaroo rat precincts with increasing amounts of residual dry matter (BLM 2007d). Monitoring data from the Carrizo Plain detected a possible threshold of approximately 1,100 pounds per acre residual dry matter, above which precinct densities remain low (Holmes 2004). In most years, giant kangaroo rats are able to remove vegetation cover to meet their needs, but it appears that vegetation can occasionally become too dense to meet their habitat requirements. Focused studies are currently underway to evaluate the effects of cattle grazing on giant kangaroo rat populations, habitat structure, and how both cattle and giant kangaroo rats affect vegetation structure and composition (Prugh 2007).

The CDFG conducted mapping of giant kangaroo rat distributions on the Carrizo Plain and Elkhorn Plain during aerial surveys in 2001 and 2006 (see Map 3-2, Special Status Animals). During the intervening years, the distributions of giant kangaroo rats increased in area by 83 percent. BLM monitoring studies that counted active giant kangaroo rat burrow systems between 1997 and 2005 recorded increases in the numbers averaging from 0.92 animals per acre in 1997 to 28.3 animals per acre in 2005 in 12 pastures where giant kangaroo rats commonly occurred (Christian et al. 2007). It appears that the Elkhorn Plain and the south-central portion of the Carrizo Plain have had the most persistent populations of giant kangaroo rats in both drought and wet periods to serve as source populations for population expansions. Some of the lower foothills of the Caliente Range may also serve this purpose.

Current Management Program

The giant kangaroo rat is considered a keystone species in the ecological function of the annual grassland and alkali desert scrub wildlife habitats in the Monument. As a keystone species, this animal contributes disproportionately to biotic and abiotic factors in the ecosystem (Goldingay et al. 1997). Kangaroo rats consume and distribute seeds of many plants, clip vegetation, and modify soil properties through their extensive burrowing and precinct maintenance activities (Brown and Heske 1990; Schiffman 1994). For example, several other endangered animals and plants depend on giant kangaroo rat vegetation clipping above their burrow systems, called precincts, for habitat structure, food, and cover (Goldingay et al. 1997; USFWS 1998). As a keystone species, management objectives try to maintain populations of giant kangaroo rats across the landscape, where appropriate, to maintain ecological function within the natural range of variation. Thus, the distribution and abundance of giant kangaroo rats are considered to be indicators of ecosystem health and are important in determining vegetation management objectives. Monitoring has focused on management effects and on population trends of giant kangaroo rats. BLM and the managing partners have provided financial and logistical support to several research projects focused on this species. A more focused giant kangaroo rat study was initiated in 2006 by the managing partners and the University of California, Berkeley, to evaluate livestock grazing between grazed and ungrazed plots in the central Carrizo core area. This study is researching the interactions of cattle grazing and giant

kangaroo rat grazing on vegetation composition and structure and on giant kangaroo rat populations in paired grazed and ungrazed (cattle excluded) plots (Prugh and Brashares 2007).

Monitoring data suggest that giant kangaroo rats have been able to successfully manipulate the amount of nonnative grass and forbs in most years to maintain their distributions and abundance across the Monument landscape. In average rainfall periods when there are ample openings in nonnative grass cover, and in low rainfall periods when little vegetation structure is produced, they are generally abundant across the landscape of the plains. In periods of prolonged drought (such as the 1989 to 2001 period), the populations decline, but there are few management options to reverse these declines. In occasional wet periods, vegetation management may be required to minimize a landscape-wide dense cover of grass that could result in extensive giant kangaroo rat population declines. Such wet periods may have only occurred about six times over the past 118 years, based on Bakersfield rainfall records (NOAA 2008). Over the past 15 years, BLM and the Nature Conservancy (TNC) have occasionally applied prescribed fire and have more generally used livestock grazing as management tools to maintain habitat conditions favorable to giant kangaroo rats in periods of high nonnative grass growth and cover. Monitoring studies are conducted to evaluate these management tools and determine under what conditions and intervals vegetation management may be required to maintain giant kangaroo rat populations.

The giant kangaroo rat recovery strategy (USFWS 1998) stated that the highest priority recovery action is proper land use and management of the publicly owned and conservation lands in the Carrizo Plain Natural Area and several other areas. This strategy considered that historic land uses that maintained giant kangaroo rat populations, such as livestock grazing, should be reestablished where appropriate. The strategy places equal importance on research that focuses on the effects of livestock grazing on habitat quality. BLM plans to implement this conservation recovery strategy through managing viable populations with livestock grazing and/or prescribed fire, and through population and habitat monitoring.

San Joaquin Kit Fox (*Vulpes macrotis mutica*)

Federal status: endangered.

State status: threatened.

Regional Context

The San Joaquin kit fox is a subspecies of kit fox that inhabits much of the valley floor and foothills of both the Carrizo and Elkhorn Plains within the Monument. This species was listed by the federal government as endangered in 1967 and is included in the USFWS *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998). The San Joaquin kit fox was listed as threatened by the State of California in 1971.

Based on Grinnell et al. (1937), the historical range for the San Joaquin kit fox is believed to have once included nearly the entire San Joaquin Valley. Current distribution includes the southern tip of the San Joaquin Valley to Contra Costa County but the kit fox is largely absent from the east side of the San Joaquin Valley. Furthermore, agriculture throughout the San Joaquin Valley makes distribution spotty (CDFG 2008a) and has caused habitat to become highly fragmented (Cypher et al. 2005). Three core populations of foxes now exist within their remaining range. The largest of the three is found in the CPNM, making this area vital for the recovery of the species (USFWS 1998). A management plan that includes the survival of kit foxes as a management goal is an important downlisting criteria (USFWS 2007b). The kit fox is considered an umbrella species (USFWS 1998) since its habitat requirements and occurrence overlaps many other imperiled San Joaquin Valley species. The USFWS and CDFG consider efforts to protect and conserve the San Joaquin kit fox to also benefit other San Joaquin Valley listed species.

Present Condition and Trends

Approximately 150,000 acres within the Monument are considered suitable habitat for the San Joaquin kit fox (see Map 3-2, Special Status Animals). The openness of the valley floor, as well as the gentle topography of nearby foothills, provides the necessary prey base and the ability to see and avoid predators such as coyotes and bobcats (Nelson 2005). Plant communities associated with kit fox habitat on the Carrizo Plain are valley sink scrub, valley saltbush scrub, upper Sonoran subshrub scrub, and nonnative grassland. The Carrizo Plain Central, Carrizo Plain North, and the Panorama Hills-Elkhorn Plain subregions contain the highest percentage of kit fox habitat in the Monument. The Soda Lake Sink is used to a lesser extent and is likely avoided because of the dense shrub cover. The lower elevation and gentle drainages of the Caliente Mountains South may provide important remnants for kit foxes living in the Cuyama Valley, but no recent observations have been recorded.

Population estimates of foxes within the Monument are not well known. Quarterly spotlighting surveys have been conducted by the CDFG since 1970 and have averaged 22 kit foxes along Elkhorn Road and 16 along Soda Lake Road. Survey numbers ranged from 4 to 66 along Elkhorn Road and from 0 to 64 along Soda Lake Road (Bidlack 2007). There has been a shift in kit fox distributions along Soda Lake Road, with fewer foxes observed in the southern portion of the survey route and a higher proportion of foxes observed in the northern half of the route. In contrast, the Elkhorn Road observations were relatively constant through the 35 years. The distributions of kit foxes were strongly correlated to the distribution of giant kangaroo rats. As kangaroo rats expanded their distributions between 2001 and 2006 by 83 percent (see Map 3-2, Special Status Animals), kit fox observations also expanded with the giant kangaroo rat range. In addition, kit fox observations were higher in the middle portions of the routes than at the ends near the Monument boundary. Kit fox numbers were quite variable over time, and the populations did not correlate to rainfall or the land cover of grasslands or shrubs.

Within the Monument, the availability of large tracts of relatively natural, wild lands where rodenticides are prohibited is important for the continued survival of kit foxes. Threats to kit fox in the CPNM include natural phenomena such as drought and predators, and human-caused impacts including vehicle strikes and shootings. Fluctuations in prey populations due to drought or other factors affect kit fox reproduction in that many pups do not survive (USFWS 1998). Natural predators include coyote (*Canis latrans*), bobcat (*Felis rufus*), red fox (*Vulpes vulpes*), golden eagle (*Aquila chrysaetos*), and other large raptors. Except for coyotes, kit foxes are a food source for these animals. Coyotes, more often than not, do not eat kit foxes but kill them because they are in direct competition for the same food sources (B. Cypher, personal communication, 2007; Nelson 2005). Red foxes are known to occur just north of the Monument and have not been considered a major threat.

Vehicle strikes occur occasionally on Soda Lake Road, the main road through the Monument that receives the highest amount of vehicle use. Strikes have occurred along paved and unpaved sections of road but foxes are especially vulnerable when dens are located close to the edge of the road (BLM staff, personal observation, 2004-2007). There is a concern that kit fox are mistaken for young coyotes and as a result, killed as varmints, though this has not been documented.

Intense livestock grazing that reduces shrub cover may negatively affect prey abundance but, in relation to the large range kit foxes travel for food, coupled with the vast shrubless areas found within the CPNM, the effect is likely to be minimal (USFWS 1998). In addition, livestock grazing, as practiced in the Monument, is not at such an intensive level. While some shrub damage has been observed at a site-specific level, extensive stands of shrubs have been in generally good condition on the Monument.

Current Management Program

BLM and the managing partners have provided funding and logistical support for kit fox research on the Monument. The CDFG continues to conduct quarterly spotlighting surveys and the 35 years of data were recently analyzed by Bidlack (2007). A number of recent studies conducted outside the Monument in western Kern County have provided information pertaining to road effects, effects of habitat and competition with coyotes, and survey methods (Cypher et al. 2005).

Management of prey populations and an open low grass structure of vegetation have been the primary focus of kit fox management. Management has generally been applied to reduce the amount of nonnative grass to improve conditions for prey species. Studies have found that small nocturnal mammals comprise over 30 to 50 percent of kit fox diets, with California ground squirrels, black-tailed jackrabbits, desert cottontails, ground-nesting birds, reptiles, and insects making up the remainder (White et al. 1996; White and Ralls 1993). Cypher et al. (2000) noted that food availability appears to be the primary factor influencing kit fox population dynamics. Therefore, management strategies that create more abundant food supplies would potentially benefit kit foxes. They also noted that vegetation management tools such as controlled grazing or burning might increase kangaroo rat abundance. Habitat management has aimed to create a variety of grassland and shrubland conditions that favor this wide array of species across the landscape.

Livestock grazing and prescribed fire are used to reduce vegetation biomass. While monitoring studies indicated a lower abundance of giant kangaroo rat precincts in grazed relative to ungrazed pastures between 1997 and 2003, there was a substantial increase (from 1 precinct per acre to 40 per acre) of the overall abundance of giant kangaroo rats in both grazed and ungrazed pastures from 1997 to 2005. Livestock grazing did appear to maintain a higher abundance in the grazed pasture relative to the ungrazed enclosure at the Elkhorn Plain Ecological reserve during the extremely high biomass production in 1998 and 1999. Similarly, a prescribed burn in the West Well pasture in 1995 appeared to maintain giant kangaroo rat abundance relative to the unburned area for one year during the widespread declines of 1995. Since giant kangaroo rats are able to maintain abundant populations and modify the vegetation biomass to meet their needs in most years, prescribed burning or grazing is generally being employed to maintain kit fox prey populations in the occasional years of high vegetation biomass.

Two educational videos are currently being produced about the Carrizo Plain and San Joaquin Valley grasslands to inform the public of the importance of the preservation and protection of annual grasslands. The CPNM website currently informs hunters about the visual similarities between kit fox and young coyote and advises caution when hunting varmints to avoid shooting kit foxes. Roadside signage is in the design phase to alert drivers of the need for caution in areas of high kit fox densities along the higher speed County roads. Enforcement of speed limit laws, when possible, helps prevent vehicle casualties of all wildlife. Also, to prevent possible vehicle strikes, tall grasses and weeds along these areas are mowed each year to allow drivers to more easily see kit fox along the road and to allow animals to cross safely.

Blunt-Nosed Leopard Lizard (*Gambelia sila*)

Federal status: endangered.

State status: endangered, fully protected.

Regional Context

The blunt-nosed leopard lizard was listed as endangered by the U.S. Department of the Interior in 1967 and the State of California in 1971. This species is also included for protection under the California *Fully Protected Species Act* that prohibits the lawful take of this species.

The Monument is one of largest remaining population centers for the blunt-nosed leopard lizard and has been identified as one of five key areas for their conservation and recovery (USFWS 1998). The Elkhorn Plain may represent one of the best remaining habitats for this species when environmental conditions are favorable (Germano and Williams 2005). The Monument offers a large-scale ecosystem where many of the research and monitoring tasks identified in the Recovery Plan can be conducted.

Present Condition and Trends

Blunt-nosed leopard lizards are closely associated with the distributions of giant kangaroo rats due to the kangaroo rat's vegetation clearing and burrowing activities (see Map 3-2, Special Status Animals). Blunt-nosed leopard lizards are most abundant on the Elkhorn Plain, in the south-central portion of the Carrizo Plain, and in the foothills area where the vegetation structure tends to be more open with less dense and persistent grass cover. The number of blunt-nosed leopard lizards occupying a site appears to be quite variable between years and may be correlated to weather, rainfall, vegetative cover, and prey availability (such as grasshoppers, coleopteran beetles, bees, wasps, and ants) (Germano et al. 2007). Studies conducted on two 20-acre plots on the Elkhorn Plain estimated populations ranging from 20 above-ground adults in the drought year of 1990 to more than 164 in 1993. Hatchlings were even more variable in numbers, ranging from 0 in 1990 to 273 in 1993 (Germano and Williams 2005). Between the years 1993 and 2005, the number of blunt-nosed leopard lizards at the Elkhorn Plain Ecological Reserve ranged from a high of 187 in 1993, to a low of 3 in 1999, then back to a high of 30 in 2005. The numbers on the nearby grazed plot were 54 in 1993, 0 in 1999, and 19 in 2005. Over the years of study, the Elkhorn Plain Ecological Reserve had 1.5 to nearly 5 times the number of blunt-nosed leopard lizards as the plot subject to grazing.

In 2007 the CDFG re-sampled a number of quarter sections (160 acres) previously surveyed for blunt-nosed leopard lizard by California Energy Commission biologists (under BLM contract) in 1988. Using similar one-day walking transects, the CDFG survey found blunt-nosed leopard lizard in 13 of the 15 quarter sections. This survey suggests that the overall distribution of blunt-nosed leopard lizards appears to be similar to those seen in the late 1980s when the managing partners began acquisitions and management.

Current Management Program

The acquisition of private lands on the Carrizo and Elkhorn Plains has made substantial contributions toward the recovery of this species. Monitoring of blunt-nosed leopard populations and habitat conditions has been conducted by the Endangered Species Recovery Program at the Elkhorn Plain Ecological Reserve and adjacent BLM plots since 1989. The CDFG has conducted periodic walkover surveys of several locations within the Monument to monitor general distribution. Habitat management has focused on providing suitable habitat of open ground cover, low grass structure, and scattered shrubs in the south-central Carrizo Plain, Elkhorn Plain, and Panorama Hills areas. Landscape-level habitat monitoring has been focused on giant kangaroo rats as the keystone species that provides habitat for blunt-nosed leopard lizard. However, there are limitations to this approach since blunt-nosed leopard lizards are hindered by the thick grass cover that occurs during their breeding and foraging activities, before the giant kangaroo rats begin clipping the grass later in the spring.

San Joaquin Antelope Squirrel (*Ammospermophilus nelsoni*)

Federal status: BLM sensitive.

State status: threatened.

Regional Context

The San Joaquin antelope squirrel was listed by the State of California as a threatened species in 1980 (CDFG 1980). The CPNM is known to support two of four substantial populations of San Joaquin antelope squirrels remaining within its historic range (USFWS 1998). Both the Carrizo and Elkhorn Plains are important population centers where they are often found in association with giant kangaroo rats. Harris (in Williams et al. 1988) stated that the Carrizo and Elkhorn Plains and the Elk Hills and Buena Vista Valley are the heart of the San Joaquin antelope squirrel range. He also stated that BLM lands on the margin of the Caliente Range and Cuyama Valley are critical for maintenance of the species in the southwestern end of its range.

Present Condition and Trends

Antelope squirrels are most abundant in the central, eastern, and southern regions of the CPNM, with fewer observations in the northern area west of Soda Lake. They also occur at the ridgeline and slopes of the Temblor Range. San Joaquin antelope squirrels are most abundant in areas of sparse to moderate shrub cover, but may occur in shrub-free areas where giant kangaroo rat burrows are abundant or where they can easily excavate their own burrows in friable soils (USFWS 1998). Populations on the Monument have experienced fluctuations similar to those seen for giant kangaroo rats. They were commonly seen following the 1990 drought, but less abundant during the 1995 and 1998 El Niño period. Populations appear to have been more widespread and abundant since 2003. However, no Monument-wide surveys have been conducted to evaluate population trends or determine detailed distributions.

Current Management Program

As described for the previous San Joaquin Valley species, acquisition of habitat by TNC, BLM, and CDFG have made substantial contributions to the conservation and recovery of this species. Ecological studies of antelope squirrels were conducted at the Elkhorn Plain Ecological Reserve and showed some of the highest numbers within their range to occur there (Williams et al. 1988). A radio tracking study was conducted by the U.S. Geological Survey (USGS) on the Carrizo Plain between 1995 and 1997 (Rathbun 1997). During that study, antelope squirrel declined from 15 animals captured in 1995 to 2 in 1996 and none in 1997. Burrows were found to be on the edge of giant kangaroo rat precincts, often just beyond the clipped grass. Burrows were only rarely found in the area between precincts (Langtimm and Rathbun 1995). Currently, antelope squirrel habitat use is being studied by Prugh and Brashares (2007) in an evaluation of livestock grazing as a vegetation management tool.

Habitat management has focused on providing suitable habitat of open ground cover, low grass structure, and scattered shrubs in the south-central Carrizo Plain, Elkhorn Plain, and Panorama Hills areas. Several prescribed burns have been conducted to improve habitat conditions for this species. Landscape-level habitat monitoring has been focused on giant kangaroo rats as the keystone species that provides habitat for San Joaquin antelope squirrels.

Pallid Bat (*Antrozous pallidus*), Western Mastiff Bat (*Eumops perotis*), and Other Bats

Federal status: BLM sensitive species

State status: species of special concern.

Regional Context

Population declines have resulted in 12 of the 26 species of California bats being designated as BLM-California sensitive species or California species of special concern. Four of these species (pallid bat,

western mastiff bat, fringed myotis, and big free-tailed bat) have been documented in the CPNM. Three additional species (Townsend's big-eared bat, Yuma myotis, and long-eared myotis) may also occur on the CPNM. Of the 26 bat species known from California, the CPNM provides documented or potential habitat for 12 of these species (Johnston 1998, 2007; P. Kelly, California State University-Stanislaus personal communication, 2000; C. Johnson, California Department of Transportation, personal communication, 2000; D. Williams, California State University-Stanislaus, personal communication, 2002).

The regional importance of the Monument to bat conservation is largely unknown. However, pallid bats appear to be relatively common throughout the western side of the CPNM. As this species is more scarce and declining substantially in other parts of California, the relative abundance of pallid bats in the CPNM is of regional significance (Johnston 1998).

Present Condition and Trends

Loss of roosts and direct persecution by humans are thought to be the primary cause of bat population declines (Tuttle 1988). The presence of water also influences bat distributions. Upon emerging, most bats take a drink of fresh water from a pond, water trough, or other source of surface water, and then set off to forage. The proximity to available water and foraging areas can influence the use of roosts by bats.

Known bat roosts in the CPNM include structures, rock formations, and hollow trees. Structures in several ranch complexes have been documented as bat roosts. Structures known to be used by bats include Saucito Ranch house (Johnston 1998), several structures at the Washburn Ranch (J. Hummel, BLM, personal communication, 1996; D. Williams, California State University-Stanislaus, personal communication, 1998), several structures at the KCL Ranch, L.E. Traver Ranch house, and the Van Matre Ranch metal shed. Rock formations known to be used as roosts include the series of rocks between Painted Rock and Selby Rocks (Johnston 1998), rock outcrops and slabs on the eastern flank of the Caliente Mountains, and the occasional outcrop on the Elkhorn Plain and Panorama Hills (D. Christian, BLM, personal communication, 1999; K. Cuevas, BLM, personal communication, 1999).

Several structures are consistently well-used pallid bat roosts. The abandoned cinder block house at the L.E. Traver Ranch, the metal shed at the Van Matre Ranch, the Washburn Ranch bunkhouse, and the structures at the KCL Ranch area have been long used by pallid bats. The L.E. Traver Ranch house is used as a pallid bat night roost and a maternity colony was documented in the garage wall in 1998. The hollow cinderblock walls of the L.E. Traver Ranch house may also be used as day roosts. The Van Matre Ranch, Washburn Ranch, and KCL Ranch structures are used as night roosts.

Two of the CPNM bat species, the pallid bat and the western mastiff bat, are considered imperiled or at high risk. The number of pallid bats occurring in coastal California has continued to decline substantially in recent years (Johnston 1998). Individuals and maternity colonies are sensitive to human disturbances at roost sites, and coastal populations are threatened by the loss of oaks (Johnston 1998). Other possible causes for the decline include loss of habitat, pesticides, and eviction from human-made structures.

Current Management Program

Natural bat roosts receive little impact from visitors and are unaffected by Monument activities. However, many of the uninhabited human-made features that have provided roosting habitat for bats have been subject to deterioration, vandalism, or removal. Several structures documented to be used as bat roosts have been stabilized or are managed in a state of arrested decay to maintain bat habitat. Several of these sites are used for visitor education about bats and bat conservation. Several surveys and assessments for bats have been completed.

California Condor (*Gymnogyps californianus*)

Federal status: endangered.

State status: endangered, fully protected.

Regional Context

The California condor was listed by the State of California as a fully protected species in 1954 and was federally listed as endangered in 1967 (USFWS 1996). Prior to their capture in 1987, foraging California condors commonly used the Carrizo Plains, Panorama Hills, and the Elkhorn Plain (USFWS 1984a). These areas were used by condors year-round with the heaviest use recorded in late winter and spring (USFWS 1996). Between 1982 and 1987, condor sightings were most common on the southern portion of the Monument, which is adjacent to the Bittercreek National Wildlife Refuge. The CPNM is recognized in the Condor Recovery Plan as a key foraging area that is fairly close to traditional nesting sites (USFWS 1996).

Present Condition and Trends

In the past, condors would routinely travel between the La Panza Range, located just north and west of the CPNM, and the Sespe Condor Sanctuary, located near Fillmore. A common flight path cuts across the Los Padres National Forest in Santa Barbara County and follows the Cuyama Valley and Caliente Range ridgeline. At the northern extreme of the Caliente Range, the path crosses over Highway 166 and continues to Freeborn Mountain and Hubbard Hills and the La Panza Range. Foraging condors have not used the Monument in recent years. The availability of large carrion such as cattle, sheep, tule elk, pronghorn, and mule deer is believed to be an important factor in future condor use of the Monument. Implementing management recommendations and strategies to minimize contaminant-related mortality and provide lead-free and pesticide-free carcasses is identified as a Priority 1 task in the Condor Recovery Plan. Priority 1 tasks are actions that must be taken to prevent extinction or to prevent the species from declining irreversibly.

Currently, the most serious sources of human-related mortality are lead poisoning, shooting, collisions with power lines, and the ingestion of small pieces of garbage. With the passage of AB 821, the *Ridley-Tree Condor Preservation Act* in August 2007, lead ammunition will be regulated within the present and historic range of the California condor, including the Monument.

Current Management Program

The USFWS still intends to utilize the CPNM as a supplemental feeding location for condors. In the future, use of the CPNM by condors may resume either as the wild condor population increases or due to use as a supplemental feeding site. Maintenance of foraging habitat and potential sources of food on the CPNM is identified as a Priority 1 task in the Condor Recovery Plan.

Condor biologists use the Elkhorn Hills to monitor the movements of radio-tagged condors. From a spur road leading off Elkhorn Hills Road, USFWS biologists are able to pick up radio signals from as far away as the Sierra foothills.

Greater Sandhill Crane (*Grus canadensis tabida*) and Lesser Sandhill Crane (*Grus canadensis canadensis*)

Greater Sandhill Crane:

Federal status: none.
State status: threatened.

Lesser Sandhill Crane:

Federal status: none.
State status: species of special concern.

Regional Context

Sandhill cranes (*Grus canadensis*) are winter visitors to the Monument that have been closely associated with the occurrence of standing water in Soda Lake and the cultivation of grain crops in adjacent farm fields. The most common subspecies inhabiting the Monument are lesser sandhill cranes (*G. canadensis canadensis*) with 5 to 10 percent of the population estimated to be greater sandhill cranes (*G. canadensis tabida*), a California-listed threatened species (Gernon 1978). Flocks of cranes may arrive as early as October before the fall rains create standing water on the lakebed, but the largest numbers are seen after substantial rains form the shallow lake on the dry Soda Lake playa. Cranes have been observed flying between the Soda Lake habitats and the San Joaquin Valley during the winter season. The birds often depart the Soda Lake wintering range in mid March.

Present Condition and Trends

The number of sandhill cranes wintering in the Monument has been declining over the past 19 years (Audubon 2008). Crane numbers have dropped from a high of 5,768, counted during the 1986 Christmas Bird Count, to a low of 0 in the 2001 count. In the 2004 and 2005 counts, there were 46 and 12 birds, respectively. No cranes have been observed since 2005. This decline is probably due to the elimination of 40,000 acres of grain crops that were cultivated by dryland farming in the Monument prior to TNC acquisitions in 1988 and the overall decline of cultivated grain fields in California Valley and the foothills adjacent to the Monument. The decline in crane numbers has not been consistent with fall precipitation, and has occurred while the numbers of sandhill cranes counted in California during the Christmas Bird Counts has remained high (above 20,000 birds in 2001). It appears that the availability of wheat directly adjacent to Soda Lake may have been important for cranes, since use of the CPNM by cranes has declined to very low numbers without such food supplies.

Historically, the activities of sandhill cranes wintering on the Monument have centered around roosting sites in or near Soda Lake, where large flocks gathered to spend the night. Preferred sites are associated with shallow water, an open shoreline, level terrain, and isolated locations away from human disturbance (Lewis 1976). Gernon (1978) observed cranes using sink habitats adjacent to Soda Lake as alternate roosting sites. However, during very wet periods, when Soda Lake and adjacent sink habitats became too deep in water for the cranes to use, the cranes used open grassland sites with ephemeral ponds further south of Soda Lake. As water depths decreased, the sink habitat with many small sinkholes became the primary roosting site, but Soda Lake was probably still too deep to use.

Current Management Program

The prospect of seeing sandhill cranes in the Soda Lake area attracts many bird watchers in the winter season. The boardwalk constructed on the west side of Soda Lake provides an opportunity to see these birds on the lake. The managing partners discourage human activities around other portions of the lake during the winter season, to provide secure roosting habitat. No grain crops have been planted in the Monument since the land acquisitions by the managing partners in 1987, and the amount of grain cultivation has also decreased on the adjacent private lands over the past 20 years.

Mountain Plover (*Charadrius montanus*)

Federal status: BLM sensitive.

State status: species of special concern.

Regional Context

Mountain plovers are winter visitors to the Monument from October through March, migrating from their summer breeding range in the western Great Plains and Colorado Plateau regions of New Mexico, Colorado, Wyoming, Montana, and the panhandles of Texas and Oklahoma. On their wintering grounds, they use open grasslands, which historically supported tule elk, pronghorn, and kangaroo rats. They prefer open, flat tablelands with local aridity, disturbance, or, when found in prairies, short intensively grazed grass (Knopf 1996).

On their winter ranges on the CPNM, mountain plovers prefer very open habitats created by recent fires, heavily grazed areas, and naturally unvegetated barrens (Knopf and Rupert 1995). Clipping of vegetation by extensive numbers of giant kangaroo rats across large areas also provides plover habitat in most years. Based on repeated Carrizo Plain roadside surveys, vegetative structure can greatly influence plover use and distribution; however, prey abundance is equally important but less directly influenced by vegetation management. Vegetation management decisions (such as graze or no graze, burn or no burn decisions) and various stochastic events, such as tall and thick vegetation growth after rainfall events, can influence whether a potentially suitable area is available for plover use or not. When few sites are available on the CPNM, the birds likely move to farmed fields in the San Joaquin Valley (Knopf and Ruppert 1995). Species experts are concerned about this movement since the birds are then more likely to be exposed to pesticides used in agricultural farm fields.

Present Condition and Trends

On the Monument, mountain plover population numbers are variable between years. Roadside surveys have ranged from a high of over 500 to a low of 10 detections. During the 1980 to 2007 Christmas Bird Counts, the average count was 57 plovers; there was a high of 176 in 1980, 142 in 1986, 125 in 2004, 99 in 2005, 0 in 2006, and 18 in the 2007 (Audubon 2008). Winter surveys conducted in 2005 through 2007 resulted in 41 birds in 2005, 247 in 2006, and 91 in 2007 (BLM 2005-2006-2007). While habitat suitability within the Monument may have an influence on the number of wintering plovers, it is more likely that factors such as the breeding ranges, food resources, environmental contaminants, and availability of alternate wintering areas determine the number and trends of mountain plovers on the Monument.

In dry years with little vegetative production, most of the grasslands with sparse shrub and herbaceous cover are used in the fall and winter until spring growth of annual vegetation exceeds the bird's tolerance for height and cover. In wet periods of high vegetative growth and cover, only the natural barrens or disturbed sites are used, but the barrens have been unavailable in wet years due to standing water. Foraging generally occurs in habitats with less than one inch of vegetation; bare ground, including disturbed patches on kangaroo rat precincts; sites of heavy sheep or cattle grazing; or around water facilities, dirt or gravel roads, and plowed or fallowed fields.

The maximum theoretical extent of mountain plover habitat within the Monument is approximately 69,000 acres. This habitat may be reduced depending on the density and height of residual dry matter present, which fluctuates dramatically from year to year and even within the period between October and March when mountain plovers are most likely to be found in the Monument. Plovers first arriving at the Monument in fall could find either near maximum potential habitat or very few acres, depending on the

amount and height of the remaining standing vegetation. The increase in new plant growth in the late winter can eventually make suitable areas unsuitable. In addition, the brown colored playas are some of the most frequently used habitats in the CPNM, but with sufficient rainfall they become shallow lakes, unsuitable for this bare-ground plover. Occasionally, the spring green season is advanced enough and in such abundance that mountain plovers have few areas of suitable habitat prior to their normal departure date of mid March.

Current Management Program

Management of mountain plover habitat has focused on maintaining an open habitat structure within traditional use areas of the Monument. It appears that giant kangaroo rat clipping provides adequate low vegetation structure in the fall and early winter in most years. Both prescribed fires and livestock grazing have been used to reduce standing biomass for the fall season when plovers arrive. Livestock grazing has also been used to reduce grass growth and maintain suitable low structure throughout the winter. Since the upland areas managed for plovers overlap with the distributions of giant kangaroo rats, blunt-nosed leopard lizards, and San Joaquin antelope squirrels, management prescriptions for these species also serve the habitat needs of the mountain plover. Surveys of wintering mountain plovers in the Monument are held annually.

Western Burrowing Owl (*Athene cunicularia hypugea*)

Federal status: BLM sensitive species, protected under *Migratory Bird Treaty Act*.
State status: species of special concern.

Regional Context

In California, the burrowing owl is a state species of special concern and a BLM sensitive species. California supports one of the largest resident (year-round) and winter migrant populations of burrowing owls in the United States (Klute et al. 2003). The Carrizo Plain is one of the largest areas of undeveloped grassland habitat left for burrowing owls in California (Rosenberg et al. 1998). The Carrizo Plain has served as a study site that is part of a California-wide program that includes study sites representing the four major habitat types used by burrowing owls in California:

- small patches of remnant grassland surrounded by agriculture (Lemoore Naval Air Station),
- large expanses of grassland (Carrizo Plain),
- agricultural systems where owls nest along irrigation banks (Imperial Valley), and
- remnant grasslands surrounded by urban or suburban development (South San Francisco Bay Area).

Present Condition and Trends

Our understanding of burrowing owls on the CPNM is due largely to the work conducted by Dr. Daniel Rosenberg and his team of field researchers. Dr. Rosenberg and his team have prepared a number of reports that detail their work on the Carrizo Plain (Gervais et al. 1997; Rosenberg and DeSante 1997; Rosenberg et al. 1998; Ronan and Rosenberg 1999, 2000; Ronan 2002; Catlin 2004; Rosenberg et al. 2007).

Burrowing owls are widely distributed in the CPNM. Most nests are found on the flat plains, with the exception of a few found in low, rolling hills (Ronan 2002; Rosier et al. 2001). On the CPNM, owls use burrows created primarily by California ground squirrels. Burrowing owls prefer areas of short, sparse, and open vegetation. Rosenberg et al. (2007) found overwhelming selection for grassland rather than

almost equally available scrub vegetation types. Owls also favored sites with greater numbers of large-diameter burrows and burrows near vegetation that acts as a short perch (Rosenberg et al. 2007).

A total of 186 nests were located on the Carrizo Plain between 1997 and 2002 (Rosenberg 1998; Ronan and Rosenberg 1999, 2000; Tice and Rosenberg 2002). During the 1997, 1998, 1999, 2000, and 2002 nesting seasons, researchers located 37, 32, 40, 46, and 31 active nests, respectively, on the Carrizo Plain. Researchers considered this to be a small subset of the owls within the Carrizo Plain (D. Rosenberg, Oregon State University, personal communication, 2004).

The continuing research has allowed documentation of the temporal dynamics of burrowing owl populations and their environment on the Carrizo Plain. In their 2000 progress report, Ronan and Rosenberg noted the following:

The 1998 season was characterized by heavy rains, extensive vegetation growth, low numbers of burrowing owls and low nest success. The 1999 season was characterized by more normal precipitation, lower vegetation density and height, a “boom” in rodent numbers, higher numbers of burrowing owls and higher nest success. The 2000 season was characterized by much drier conditions, very low vegetation density and height, and a moderate level of nest success.

Ronan and Rosenberg (2000) also commented that the 2000 season was notable in that many of the historic nest sites that had been active for several years were inactive in 2000.

Burrowing owls have been consistently observed during the Carrizo Breeding Bird Survey and Carrizo Christmas Bird Count since the early 1990s. During this period, each survey had only two years where no owls were observed. Commonly, 1 to 4 owls are observed and occasionally large numbers of owls (for example, 8, 13, 17) are observed.

Prey items on the CPNM include a variety of insects and small mammals. Based on casual observation, the majority of pellets collected during the 2002 field season were composed almost solely of insect exoskeletons (Tice and Rosenberg 2002). Occasionally a small bone or some fur was found in the pellets. Prey items found at nest burrow entrances during the 2002 field season included crickets, tarantulas, and two unidentified insects (Tice and Rosenberg 2002). Ronan (2002) observed that when burrowing owl nests were successful on the Carrizo Plain between 1998 and 2000, productivity appeared to be positively influenced by a higher proportion of rodents in the diet, a pattern that may hold generally through California (Rosenberg and Haley 2004; Gervais and Anthony 2003). Prey caches observed inside burrows occasionally included giant kangaroo rats (Tice and Rosenberg 2002). Some evidence was found in 2002 suggesting that burrowing owls may prey on young burrowing owl chicks (Tice and Rosenberg 2002), which is believed to occur frequently in response to food shortages (Haley 2002). Two older dead chicks were found in the tunnel of a nest while a clutch of young downy chicks was found in the nest chamber. The dead chicks were of the same approximate age as the chick in a neighboring burrow 50 meters away (Tice and Rosenberg 2002).

The reproductive success of burrowing owls inhabiting the Monument has been associated with prey abundance. Ronan (2002) observed that when burrowing owl nests were successful on the Carrizo Plain between 1998 and 2000, productivity appeared to be positively influenced by a higher proportion of rodents in the diet, a pattern that may hold generally throughout California (Rosenberg and Haley 2004; Gervais and Anthony 2003).

Current Management Program

Beginning in 1996, the Carrizo Plain has been a study site for the Burrowing Owl Research Program. This program, coordinated by the Institute for Bird Populations, was initiated to provide a scientific basis for developing a California-wide conservation strategy for the burrowing owl. Toxicological studies were conducted from 1996 to 1997 and demographic studies were conducted from 1996 to 2000. A telemetry study was initiated in 2002 to learn about dispersal habits of owls. A draft monograph synthesizing the demographic and space use studies was completed in March 2007 (Rosenberg et al. 2007). The burrowing owl research is integrated into the Monument's environmental education and outreach materials.

Western Spadefoot Toad (*Spea hammondi*)

Federal status: BLM sensitive species.

State status: species of special concern.

Regional Context

Western spadefoot toads are nearly endemic to California and at one time could be found throughout the Central Valley, coastal ranges, and lowlands. *Spea hammondi* is currently extirpated from much of its former range (Stebbins 1985), and continues to be threatened by urban development and intensive agriculture (USFWS 2005a). The CPNM provides a large expanse of protected grassland habitats with seasonal ponds and vernal pools which are critical for reproduction. The western spadefoot toad co-occurs with *Branchinecta longiantenna*, a federally listed species of fairy shrimp, currently found in ponds and pools within the Monument and north of Seven Mile Road, outside the Monument boundary on private property. Pools located on private property lie within designated critical habitat for vernal pool ecosystems (see Longhorn and Vernal Pool Fairy Shrimp discussion, below). Both *B. longiantenna* and *S. hammondi* are covered in the USFWS Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon (USFWS 2005a). Because they share much of the same habitat, both are afforded protection.

Present Condition and Trends

Spadefoot toads are almost completely terrestrial except for breeding, egg laying, and larval development, all of which occur in ephemeral or temporary pools (Jennings and Hayes 1994; Morey 1998). Little is known of the terrestrial activities of adult toads, but more is known about their breeding and reproduction. Currently known breeding sites occur primarily at the northern and southern ends of the CPNM, both in and outside of the Monument boundary, on private, federal, and state lands. These breeding sites are located in the Caliente Range, its foothills, and the valley floor. There are currently no known pools that support spadefoot toads on the Elkhorn Plain or in the Temblor Range but more breeding sites are expected adjacent to Soda Lake and in additional rock outcroppings.

Adult toads have been known to breed in a variety of pool types within the Monument including vernal pools, sag ponds, roadside puddles, sandstone outcroppings, and man-made stock ponds (BLM staff, personal observation, 2003). On the northern end of the Carrizo Plain, spadefoot tadpoles have been observed in four vernal pools located just north of the Monument on private property. Adult toads have been observed near Painted Rock Ranch. Numerous pools and sag ponds are located in the southwestern half of the Carrizo Plain, all within the Monument boundary. All ponds do not support tadpoles each year that water is present, most likely due to the amount of water and/or the water chemistry of the pools. Duration of breeding ponds varies with rainfall and pool type and directly affects reproductive success (Morey 1998). From 1998 to present, spadefoot toad tadpoles have been observed in 27 different ponds and pools within and adjacent to the CPNM. During the El Niño year of 1998, an irruption (rapid

increase) occurred, resulting in thousands of juvenile toads across the southern end of the monument (BLM staff, personal observation, 1998).

While several small monitoring studies have been initiated, long-term population trends are unknown.

Current Management Program

Ponds and vernal pools within the Monument are generally managed to maintain current conditions of hydrology and livestock use until new information identifies the need for a change in management or protection. Management on the Monument for spadefoot toads includes monitoring for presence or absence in ponds during years of sufficient rainfall. Ponds where *B. longiantenna* co-occur are a priority. Other data are collected including the presence of other species, mostly invertebrates. In favorable years, other information is documented, including size, depth, turbidity estimates, and water temperature. Factors affecting toad mortality, pond chemistry, and longevity are taken into consideration when deciding whether to use livestock grazing as a tool in any particular year.

Kern Primrose Sphinx Moth (*Euproserpinus euterpe*)

Federal status: threatened.

State status: none.

Regional Context

In February 2002, lepidopterist Peter Jump observed several Kern primrose sphinx moths (*E. euterpe*) on the Carrizo Plain. New locations outside the Monument, in the Cuyama Valley near the town of Ventucopa, were also discovered in 2004 and 2005. Prior to these discoveries, the Kern primrose sphinx moth was known only from the Walker Basin area of Kern County. The Kern primrose sphinx moth was thought to be extinct until its rediscovery in Walker Basin in 1974 (USFWS 1984b). From 1975 to 1978, the moth was present in low numbers and very restricted in distribution at the Walker Basin site (USFWS 1980). In 1979, many more moths were present and they ranged more widely over the Walker Basin, but were abundant only at one site. The discovery of Kern primrose sphinx moth in the CPNM and Cuyama Valley substantially extends the distribution.

Present Condition and Trends

Since the 2002 discovery, annual surveys for the Kern primrose sphinx moth have been conducted on the Carrizo Plain. These surveys provide preliminary information about the ecology and distribution of the CPNM population (Jump et al. 2006). Moths have been observed in at least five sandy washes on the western side of the Carrizo Plain. Two unconfirmed sites also occur on the Elkhorn Scarp. Adult moths were observed on the Monument in 2002, 2003, 2004, 2005, and 2007. Although moths were not observed on the Monument in 2006, they were observed in the Cuyama Valley.

Current Management Program

BLM has funded several monitoring efforts to determine Kern primrose sphinx moth distributions and habitat relationships. Most of the moth locations are on private inholdings adjacent to BLM lands. BLM has made an effort to contact the landowners and inquire if BLM acquisition is a possibility. Several washes and arroyos supporting the Kern primrose sphinx moths have been barricaded and signed to restrict unauthorized off-highway vehicle (OHV) use. Livestock grazing (sheep and cattle) occurs at several of the moth locations (private and BLM). The BLM sites are monitored to prevent habitat disturbance of the occupied sites.

Longhorn and Vernal Pool Fairy Shrimp (*Branchinecta longiantenna* and *Branchinecta lynchi*)

Longhorn fairy shrimp

Federal status: endangered.
State status: none.

Vernal pool fairy shrimp

Federal status: threatened.
State status: none.

Regional Context

Five species of fairy shrimp are found within the Monument: longhorn fairy shrimp (*B. longiantenna*), vernal pool fairy shrimp (*B. lynchi*), versatile fairy shrimp (*B. lindahli*), alkali fairy shrimp (*B. mackini*), pouch-pocketed fairy shrimp (*B. campestris*), and brine shrimp (*Artemia franciscana*).

The longhorn fairy shrimp is endemic to California and restricted to three general areas: the foothill grasslands near Tracy, Kesterson National Wildlife Refuge, and the Carrizo Plain (USFWS 1994; Eng et al. 1990). The species was federally listed as endangered in 1994 (USFWS 1994). The vernal pool fairy shrimp was federally listed as threatened in 1994 (USFWS 1994). At the time of listing, the vernal pool fairy shrimp was only known from California. At least two sites outside California (in Jackson County in southern Oregon) have been discovered since publication of the 1994 final rule (USFWS 2005a). The vernal pool fairy shrimp is the least observed and most restricted species within the CPNM region. This species has only been found twice in the CPNM region, in 1985 from three pools near Cambria Road (CDFG 2008b) and in 1995 off Gorman Road. Both of these locations are north of Seven Mile Road, placing them outside the Monument boundary, and located on private property. The vernal pool fairy shrimp is found relatively widely in the southern and Central Valley of California, but is generally not abundant anywhere (Eng et al. 1990).

The alkali fairy shrimp, versatile fairy shrimp, pouch-pocketed fairy shrimp, and brine shrimp are widely distributed in the western United States and Canada. However, the only two California locations for the pouch-pocketed fairy shrimp occur at Soda Lake and at a private sag pond on the southern end of the Carrizo Plain.

Critical habitat for the longhorn fairy shrimp and vernal pool fairy shrimp occurs immediately north of the Monument boundary. The original critical habitat designation on August 6, 2003 (USFWS 2003a), included approximately 15,549 acres of BLM land and 234 acres of CDFG land inside the Monument boundary. On August 11, 2005, USFWS revised the critical habitat boundary by excluding the portion within the Monument (USFWS 2005b). The USFWS concluded that the benefits of exclusion exceeded the benefits of inclusion (USFWS 2005b).

Present Condition and Trends

Within the vicinity of the CPNM, the longhorn fairy shrimp has been observed at 21 locations clustered at the north and south ends of the plain. The 14 northern locations occur from California Valley, south to the northern shore of Soda Lake, and along Soda Lake Road to the American Ranch cattle guard. Four of these are within the Monument boundary. The sites include small and large pools and roadside ditches. The southern cluster begins at Padrone Road and continues south to the vicinity of the Hanline Ranch. All seven of these sites are within the Monument boundary. The sites at this southern end include shallow depressions and deeper ponds.

Current Management Program

Known locations of federally listed fairy shrimp are sampled for species occurrence during periods when the ponds support fairy shrimp populations. In favorable years, additional inventories are conducted to identify occupied sites, species composition, and pond characteristics. Naturally occurring ponds are protected from vehicle use and disturbance. In general, current livestock use is similar to past use in order to maintain current conditions supporting fairy shrimp. If information is obtained to show that altered livestock use patterns can improve shrimp habitat, such changes would be implemented.

3.2.2.3 Featured Species

In addition to the special status species listed in the previous section, BLM has specific management programs in place for raptors and three additional wildlife species: pronghorn, tule elk, and long-billed curlew. These have been termed “featured species” for the purposes of this planning effort. Pronghorn and tule elk have historical associations with the regional ecology and generate a high level of visitor interest. The Monument provides habitat important for the long-term conservation of long-billed curlew and numerous raptor species.

Pronghorn (*Antilocapra americana*)

Regional Context

Pronghorn were historically present in the Carrizo Plain, but were extirpated from San Luis Obispo and Kern Counties around 1910. Extensive agricultural land conversion, poaching, livestock competition, land use changes, and market hunting of pronghorn during early settlement eliminated most of the pronghorn herds in the region by the 1870s. Between 1985 and 1990, the CDFG translocated 239 animals from northeastern California back onto the Carrizo Plain and several adjacent private lands. The CPNM supports the only population of free-ranging pronghorn on public lands in the Central Coast and Central Valley regions.

Present Condition and Trends

Pronghorn are commonly observed in the northern valley portion of the Monument (see Map 3-3 Pronghorn and Elk Habitat), and on adjacent private rangelands and farm fields. A separate subherd is found at the southern end of the Monument and adjacent farm fields in the Cuyama Valley.

Of the 239 animals translocated to the area, approximately 142 pronghorn were released within the CPNM (Bob Stafford, CDFG, personal communication, 2007; Longshore and Lowrey 2007). Between 1990 and 2002 the population of the herd unit experienced a steady decline from the original 142 animals to 44 animals. There has been a recent increase of the herd to 84 animals in 2007.

A study of pronghorn habitat suitability, fawn bed site selection, and food habitats was conducted in the CPNM in 2003 and 2004 (Longshore and Lowrey 2007). This study evaluated the suitability of grassland and grassland/scrub habitats occupied by pronghorn in the Monument and determined that the best available habitat in the CPNM to be of moderate quality. The study indicated that topography and distance to water indicated high quality pronghorn habitat. Most pastures ranked high or moderate for herbaceous cover, moderate for herb and grass diversity, and high to moderate for vegetation height. Shrub cover ranked moderate to low, and shrub diversity ranked low. The best pastures within the grassland habitats were the East American, Painted Rock, and Ranch pastures. The best pastures within the grassland/scrub habitat (but rated as moderate quality) were Airstrip, Brumley, East American, East Painted Rock, Painted Rock, Ranch, Selby, Sheep Camp, Shipping, Silver Gate, Soda Lake, South

Cousins, Swain, West Painted Rock, and Windmill pastures. The remaining 31 pastures were evaluated as having low quality habitat for pronghorn.

The study found few areas greater than five square kilometers with a vegetation height considered necessary for pronghorn fawn bed-site concealment. Only the Ranch, Brumley, Painted Rock, and Sheep Camp pastures contain the habitat factors of 30- to 50-centimeter vegetation height and long-range visibility considered necessary for pronghorn fawn concealment. These pastures comprised 26 of the 30 bed sites located in the Monument during the study.

The pronghorn study also evaluated diets and forage availability. Pronghorn on the Monument ate forbs for the majority of their diet, followed by grasses and shrubs in equal amounts. During the spring of 2003 and 2004, forbs and grasses made up 93.9 percent and 92.8 percent of their diet, respectively. It is somewhat unusual that grasses comprised a higher percentage than shrubs, but this may be due to a lack of shrubs in the study site.

Overall, the study suggests that without habitat rehabilitation, the present-day CPNM may not contain enough suitable habitat to support a viable population of pronghorn antelope. Restoration of native bunchgrasses and shrubs are considered important to improve habitat suitability.

Current Management Program

Following the translocations into the Carrizo Plain, CDFG delineated a herd management unit with a boundary of State Route 166 on the south, State Route 46 on the north, the Temblor Range on the East, and State Route 101 on the west. CDFG is managing the herd unit to double the number of translocated animals to about 500 in total, with 250 to 300 within the Monument. The population was hunted between 1996 and 2001 with a harvest of 18 bucks. However, population monitoring in 2000 and 2001 indicated a decline in the herd that warranted suspending the hunting seasons.

Since 1998, CDFG and BLM have modified or removed over 150 miles of fence in the Monument to meet pronghorn passage standards. Fence removal/retrofit efforts have been primarily directed to areas considered the best pronghorn habitat. In addition, efforts have been made to maintain water troughs to provide water for pronghorn during the summer months (out of the livestock grazing season). Livestock grazing management prescriptions have also been modified to maintain greater vegetative cover in pronghorn fawning areas. BLM, in conjunction with CDFG and TNC, initiated a pronghorn population/habitat study in the Monument with the USGS starting in 2003 to determine possible reasons for population declines and to recommend management prescriptions.

Tule Elk (*Cervus elaphus nanodes*)

Regional Context

Prior to European settlement in the mid 1800s, tule elk were the most abundant game animal in California (Burcham 1981) and approximately 500,000 tule elk inhabited the state (CDFG 2002). By the late 1860s, tule elk were extirpated from all but one small locale in the southern San Joaquin Valley and genetic studies indicate that fewer than 5 animals persisted (Matocq et al. 2002; Meredith et al. 2007). However, with protection of the herds from hunting and the translocation of excess animals into several suitable habitats, the populations increased. The population that currently exists on the CPNM is the result of translocations to adjacent areas in 1983 and 1985. The Monument is one of several public reserves that support tule elk in Central California, including the Tule Elk Reserve in Kern County and the San Luis National Wildlife Refuge in Merced County, both of which are confined in fenced paddocks less than 3,000 acres in size. However, the Carrizo Plain and adjacent CDFG Chimineas Ranch herd contain the

largest free-ranging tule elk in the Central Coast region and this herd has the potential to be the largest tule elk herd in the state.

Present Condition and Trends

The tule elk found on the Monument are the result of a translocation of 20 animals to the Chimineas Ranch in 1983 and another 120 animals to various locations in San Luis Obispo County in 1985. Since that time, the herd has increased to a minimum of 630 in 2007 (CDFG 2007a). These animals are managed as the La Panza Elk Management Unit, which ranges north from San Luis Obispo and western Kern Counties into Monterey and San Benito Counties. There are two groups of elk that use small portions of the Monument. The largest group of 165 elk is found in the American Ranch and Painted Rock areas, moving back and forth to the northern Chimineas Ranch (see Map 3-3 Pronghorn and Elk Habitat). The second group of about 75 animals ranges from Sycamore Canyon in the Los Padres National Forest to Morales Canyon on the CPNM. Approximately 2,000 acres of this area is located within the boundaries of the Monument.

Prior to 2004, the north CPNM group generally resided in the remote hilly country where they were rarely seen by visitors. In recent years, this group has ventured out onto the flatlands and lower foothills around Painted Rock and the Washburn Ranch. These elk most often use the ungrazed CDFG lands and ungrazed BLM pastures in the Monument and tend to segregate themselves from cattle when using private ranch lands (B. Stafford, CDFG, personal communication, 2007).

The south CPNM group is found in the juniper woodlands, grasslands, and scrub habitats of the southwestern foothills of the Caliente Range. They tend to move east-west to the Chimineas Ranch and lower slopes of the Cuyama Valley oak woodlands. In the Monument, they may be found on the lower ridgelines and upper reaches of Morales Canyon.

Current Management Program

Tule elk management in the Monument has been focused on improving forage quality on the Carrizo Plain North and Caliente Foothills North subregions through a number of prescribed fires and native grass seedings. The CDFG has initiated studies to determine distributions and habitat use. In early 2005, female elk were fitted with Global Positioning System (GPS) radio collars in four separate subherds in eastern San Luis Obispo County, including the two subherds on the CPNM. The collars were retrieved at the end of 2006. Interestingly, these studies showed no movements of female elk between any of these subherds (B. Stafford, CDFG, personal communication, 2007). This may have ramifications regarding long-term management strategies for all of these subherds. Nine additional GPS collars were placed on both male and female elk in the CPNM subherds in 2008 to help determine to what extent the subherds interact.

Tule elk routinely conflict with private ranching operations due to damage to fences, crops, and reduction in livestock forage (Koch 1994). Additionally, many of the existing herds in other portions of the state have grown beyond their carrying capacity or are contained within fenced areas. Military bases, which once were important areas for elk conservation, increasingly desire that elk herds on their lands either be reduced or in some cases, entirely removed. In all of these cases, excess elk are captured and relocated to other herds within their range. Translocations have also been recommended as a way to maintain and increase the limited genetic diversity in tule elk (Williams et al. 2004; Meredith et al. 2007). CPNM and the surrounding public lands are considered one of the best areas for relocation since the CPNM herds are free ranging, there are comparatively few conflicts, and the area is well below carrying capacity. The combined population objective for the CPNM herds is a minimum population of 500 (Hobbs 2007).

The BLM and CDFG lands of the Monument provide a large area of public lands for hunter access to the elk. Since 1993, there have been annual hunting seasons in the La Panza Management Unit with an allocation of 6 to 12 bull elk and 6 to 12 cow elk per year. Hunter success is quite variable, depending on whether the animals are found on the public lands or have moved onto the adjacent private lands where hunter access is restricted. Harvest objectives are to maintain at least 25 bulls per 100 cows. In 2001, there were 49 bulls per 100 cows and 28 calves per 100 cows (CDFG 2002). Population modeling by the CDFG for the projected harvest of 18 bull elk and 19 cow elk within the herd unit indicates that there would not be a reduction of herd size, the bull-to-cow ratio objective would be met, and the calf-to-cow ratio would increase (CDFG 2002).

Long-Billed Curlew (*Numenius americanus*)

Regional Context

Long-billed curlews are both a shorebird and a grassland species. Curlews, on the CPNM, forage in the grasslands and roost in ponds near Soda Lake at night. In California, long-billed curlews are known to winter along the coast and in the Central Valley. They are a bird with highly migratory habits that require many interconnected stops (Sibley 2001). This suggests that a reliable protected area such as the Monument may play an important role for wintering.

Long-billed curlews are also a very popular bird for both birdwatchers and the general public who visit the Monument. This bird has been on the logo for both the Natural Area and Monument for over 10 years.

Present Condition and Trends

Long-billed curlews arrive in the Monument in the fall and leave for summer breeding ranges in the interior Great Basin in April (a few can be found in early May). Some nonbreeding birds summer on the Central California coast. Small numbers of long-billed curlews have been observed in the CPNM during the summer (S. Fitton, BLM, personal communication, 2008; BLM staff, personal observation). Winter survey numbers for curlews in early 2006 – 2008 ranged from 21 to 850 birds. Roost counts for 2007 and 2008 had 679 and 763 birds, respectively. Christmas Bird Counts on the Carrizo Plain since 1983 have ranged from 3 to over 2,500 birds, with an average of 375 birds (Audubon 2008). While there is no apparent trend in the winter birds, the 1999 and 2000 counts were very low (30 and 3, respectively), and the 2004 to 2005 counts showed some rebound (58 and 155, respectively). Flocks numbering as high as 3,000 have been observed outside of counts. These numbers likely reflect a variety of factors both within the Monument and across the western populations.

Curlews are most often seen using large flat grasslands with suitable openings in shrub cover to avoid predators and obtain takeoff and landings. On breeding ranges in the Great Basin, long-billed curlews were negatively correlated with vegetation height and percent vertical coverage (Bicak et al. 1981). Very little information about curlew use of non-wetland habitats in the Central Valley has been recorded (Dugger and Dugger 2002). Long-billed curlews on the Monument have been observed foraging in habitats ranging from bare ground (including burned areas), to grasses taller than the curlews. In 2007 the Point Reyes Bird Observatory and Museum of Natural History of Los Angeles County initiated a census of long-billed curlews in the Carrizo Plain, Central Valley, and Imperial Valley to evaluate distributions and habitat use in these areas.

Current Management Program

Management for long-billed curlews includes several monitoring efforts in the fall and winter when birds are most prevalent. Livestock grazing has been used to attain a low vegetation structure for other species,

while prescribed fire has been used for restoration purposes. These tools may also be beneficial for curlew foraging areas by affecting structure and increasing the prey base.

The effects of various tools and the natural variation in vegetation height across the Monument, including short structure created by giant kangaroo rats, are likely to be favorable for curlews.

Long-billed curlews are monitored during annual fall raptor surveys, focused winter surveys, and Christmas Bird Counts.

Raptors

Regional Context

The Carrizo and Elkhorn Plains contain some of the largest contiguous grasslands in California, providing habitat for numerous grassland avian species including raptors. The plains provide an abundance of prey that is free of rodenticide or other chemicals that may be present in food items found elsewhere in the San Joaquin Valley and state.

Over 20 different species of raptors including eagles, hawks, falcons, and owls can be found within the CPNM. Some inhabit the plains and surrounding mountains year-round, while others winter here, make brief stops during spring and fall migration periods, or arrive to breed and nest in one of the varied types of habitats that make up the Monument. The Carrizo Plain has been described as an area with extremely high raptor habitat values (Olendorff et al. 1989). Some of these values include rock outcroppings, dry washes with steep, vertical banks, Soda Lake and other ephemeral ponds, and large rodent and other prey populations.

The Swainson's hawk is listed by California as a threatened species and the northern harrier, long-eared owl, short-eared owl, burrowing owl, and loggerhead shrike are listed by the state as species of special concern. With the loss of habitat occurring for many grassland species such as the ferruginous hawk and northern harrier, the CPNM becomes increasingly important for wintering and nesting.

Present Condition and Trends

The largest number of raptor species occurs during the months of October through April when the birds use the CPNM for their wintering grounds. The fewest species occur during the summer months (Fitton 1998). Common fall and winter birds include the ferruginous hawk, rough-legged hawk, merlin, and long-eared owl. Less commonly seen migrants have included the white-tailed kite, Swainson's hawk, and bald eagle. Some of the more common raptors that are found throughout the year on the CPNM are the northern harrier, red-tailed hawk, golden eagle, American kestrel, prairie falcon, great horned owl, short-eared owl, burrowing owl, and barn owl.

In general, the diversity of migratory raptor species increases in the northwest part of the Monument, with more overall species found in the foothills of the Caliente Mountains (Fitton 1998). Several species choose rock outcroppings or vertical faces in large gullies or man-made structures for nesting. The grasslands provide many food sources for raptors including passerines, giant and other species of kangaroo rats, ground squirrels and other rodents, lagomorphs, and many reptile species. Six power lines that traverse the CPNM in varying locations are used predominantly by red-tailed hawks, ravens, and prairie falcons as nesting and roosting sites. Fences and ornamental trees also serve as perches, roosts, and nest sites. Burrows created by ground squirrels, kit fox, or badgers provide homes for burrowing owls, while areas of tall grass and shrubs serve as nest habitat for northern harrier and short-eared owls.

Current Management Program

BLM, along with the managing partners and dedicated volunteers, conducts a variety of surveys and monitoring studies of raptors and their nesting or roosting sites either seasonally or annually. Raptor and sensitive species surveys take place annually during the months of October through April utilizing routes along Soda Lake and Elkhorn Roads. Some communal roosting sites for long-eared owls have been documented, but little is known about how many owls winter on the CPNM. A Christmas Bird Count has been held on the Carrizo Plain since 1971 and breeding bird surveys have been conducted for over 20 years.

Two of the more well-known rock outcroppings, the Selby Rocks and Painted Rock, are monitored during the breeding and nesting season to protect nest sites from visitor impacts. Both have been nesting sites for prairie falcons, golden eagles, and several owl species. Selby Rocks are posted to remind visitors of the sensitive nature of nesting birds. Painted Rock is closed each year during the nesting season with access allowed by guided tour only. Tour guides are instructed in how to conduct tours in a minimally invasive manner that protects the nest site(s). Nest sites at other locations are recorded and monitored periodically. Though many raptor nest sites have been located since the 1980s, little is known about the nesting locations on much of the Monument, especially in the Temblor and Caliente Ranges, or how many nesting sites there are for any one species.

3.2.3 Vegetation

The Monument Proclamation identifies vegetation resources as objects to be protected. Specifically:

Since the mid-1800s, large portions of the grasslands that once spanned the entire four hundred mile expanse of California's nearby San Joaquin Valley and other valleys in the vicinity have been eliminated by extensive land conversion to agricultural, industrial, and urban land uses. The Carrizo Plain National Monument, which is dramatically bisected by the San Andreas Fault zone, is the largest undeveloped remnant of this ecosystem, providing crucial habitat for the long-term conservation of the many endemic plant and animal species that still inhabit the area.

3.2.3.1 General Botanical Setting

The Carrizo Plain is at the interface between the Coast Range and the drier, more desert-like San Joaquin Valley. The Carrizo Plain's valley floor contains the closed-basin Soda Lake system, surrounded by alkali-tolerant shrub communities and grasslands, now dominated by nonnative annual species. The grasslands of CPNM's higher elevations (2,300 to 3,250 feet) support a higher proportion of native perennial grasses not characteristic of the southern San Joaquin Valley floor (Wester 1981; Hamilton 1997; Holstein 2001) and include shrub and woodland communities with more overall affinity to the Coast Ranges than to the San Joaquin Valley (Holland 1988). The upper Sonoran subshrub scrub vegetation is common to both the Carrizo Plain and the San Joaquin Valley. In general, the distribution of species and natural communities within the Monument reflect the gradation of wetter to drier climate from north to south and from west to east. The northern end of the CPNM averages 10 to 12 inches of annual precipitation and is dominated by annual grasses, while the southern Carrizo Plain and the Elkhorn Plain average 5 to 8 inches annual precipitation and tend to have a more open vegetation of annual plants and shrubs, a mixture of coastal, San Joaquin Valley, and Mojave Desert species. The vegetation of the northern slopes of the Temblor and Caliente Ranges, which receive more moisture than the plains, consists of abundant native perennial grasses, shrubs, and woodlands. In contrast, the extremely dry south sides of the Caliente and Temblor Ranges receive less precipitation than the plains and are characterized by more xeric (dry) shrub communities. Similar effects of north and south slopes can be seen throughout the Monument on a much smaller scale, wherever there is varied topography. This variation in plant

community and topography has resulted in a species-rich flora (Appendix W, CPNM Flora) of close to 700 species.

During the mid- to late-19th century throughout California, and including the Carrizo Plain area, there occurred widespread displacement of native plants by Mediterranean species. California grasslands and other arid communities were particularly affected. It is thought that introduction of and intensive grazing by livestock during and after the gold rush, combined with widespread cultivation and a series of droughts, provided the opportunity for these nonnative species to get established and ultimately dominate California's grasslands. This wholesale conversion of California's grasslands is thought to have occurred in less than 40 years and has had widespread and long-lasting effects. In addition to displacement of native species, the productivity of the landscape has changed in both amount and timing and the resulting fire regime has been drastically altered (Burcham 1957).

The ecological landscape of the CPNM is a product of a generally dry, Mediterranean climate, as modified by variation in the timing, geographical pattern, and amount of each year's precipitation, and as influenced by the interspecific competition between native and exotic species. Vegetation production and composition are highly influenced by the amount of water available and can change radically between years. In very dry years, there is little to no growth of annual vegetation and perennial shrubs die back. Animal populations respond by having little to no reproduction. If the drought persists, the landscape in the valley floor can shift from grassland to bare dirt. In contrast, a wet year, especially an El Niño event, can result in knee- to thigh-deep lush grasslands and spectacular wildflower displays. In every year, the pattern and amount of precipitation tend to favor one guild or species over another. Early and regular rains tend to favor the introduced Mediterranean species and good rains following a few years of drought seem to be best for native forbs and wildflowers.

The native habitat on the Monument has been influenced by past human activity. Much of the valley floor was dry-farmed, primarily for grain. Grazing by cattle and sheep was widespread and not always in balance with vegetative production. Springs were altered to provide water for livestock and for human use. Some trees may have been cut for firewood. In other areas, particularly around homesteads, nonnative trees were planted in this largely treeless landscape. As a consequence of human activities, weeds were introduced and spread. There was also extensive poisoning of native rodents to control losses in grain fields, as well as control of predators such as coyotes and foxes. These activities resulted in a shift in herbivore levels that undoubtedly affected native vegetation. Changes in natural hydrologic patterns due to the construction of roads and stock ponds also impacted native vegetation.

Prior to the invasion of the Mediterranean grasses, fire did not appear to be a frequent environmental factor in the desert-like scrub communities common in the southern Carrizo Plain. It is not known whether pre-contact Native Americans set fires in the Monument area, but the only source of natural ignitions, lightning strikes, were probably very rare events and, in the recent history, none have resulted in substantial fires (the few were extinguished by the accompanying precipitation). Fifty years of records from the Pinnacles National Monument to the north indicate a single lightning-ignited fire. There are none from 60 years of records from the Santa Monica National Monument to the south. In addition, the CPNM scrub communities include fire-sensitive, non-sprouting dominant species such as *Atriplex* spp., *Arctostaphylos glauca*, and *Juniperus californica*, but not fire-adapted, sprouting species like *Arctostaphylos glandulosa*, *Ceanothus* spp., *Adenostoma fasciculata*, or *Rhus* spp. (Keeley and Keeley 1977; USDA 2008). The only fire-adapted species common in the CPNM are *Quercus john-tuckeri* and possibly *Yucca whipplei* (populations vary as to their response to fire). Based on the time scale developed by Eigenbrode (1999), the four charcoal layers present in a recent core of Soda Lake (Davis 1990) suggest a pre-contact fire return interval of about 300 years, with no discernable events in the last 600 years. It is to be expected that the Carrizo Plain did occasionally experience large Santa Ana-driven fires, but these appear to have been rare exceptions, not the norm.

Prior to European contact, in most years, fuel loads in what are now nonnative dominated grasslands were probably not sufficient to generate extensive fires; however, the introduction and dominance of exotic annual grasses has altered fire regimes in the Carrizo Plain as well as in much of the west (Brooks 1999; D'Antonio and Vitousek 1992; Keeley et al. 2005). Currently, in wet years, introduced annual grasses can create persistent fuel loads that facilitate the ignition and spread of fire. Populations of native saltbush, a species not adapted to recurring fires, may be diminished or lost altogether (E. Cypher, ESRP, personal communication, 2003; Germano et al. 2001). When there are recurring fires with a shorter than natural return interval in southern California, the previously open scrub and desert-like communities have been replaced by nonnative annual grasslands (Keeler-Wolf 1995; Keeley 2001).

Livestock grazing may also contribute to the conversion of shrublands to grasslands. During dry summers and drought years, when little annual forage is available, livestock focus on shrub species like saltbush, which is excellent forage (Twisselmann 1967). Shrub communities are especially vulnerable in areas where stock levels are not in balance with annual forage production. Paradoxically, livestock grazing may benefit some shrub communities by removing fine flashy fuels (mostly nonnative annual grasses) and thus affecting ignition, spread, and fire return interval (Germano et al. 2001).

3.2.3.2 Vegetation Management

Two main issues are responsible for the large-scale vegetation management actions taken in the recent past by the Carrizo's managing partners. One is the objective to restore native vegetation in degraded areas, with the focus on previously cultivated fields. The second is the concern that if grassland vegetation gets too tall, habitat for a suite of listed and sensitive San Joaquin Valley species would be compromised. There was also the idea that the application of specific management tools would increase the amount of native plants in the vegetation and lessen the non-native component. The primary management tool has been grazing by cattle, with lesser acreage treated by prescribed burns and/or active restoration by seeding.

Livestock grazing during the green season has been employed under the assumption that it was "an effective tool to remove standing biomass, reduce the dominance of nonnative species, and enhance the reestablishment of native species" (BLM 1996). Because of this idea, much of the Monument was available for grazing, either as part of Section 15 allotment or under a free use grazing permit where grazing was applied for the purpose of vegetation management (Map 2-8). The hypothesis was that livestock grazing would diminish the biomass of non-native plants to the benefit of native plants and animals. In 1996, the Carrizo's managing partners initiated a study to test the effectiveness of livestock grazing as a tool. Data collected included elements such as the abundance and diversity of native and non-native plants, the presence of kangaroo rats, and the amount of precipitation. Recent analyses of these data (see summary below) indicate that, contrary to the working hypothesis, green season grazing would not be an effective tool for reducing the dominance of nonnative species and would have detrimental effects on native annual plants.

Prescribed burns have been used to remove accumulations of dead annual vegetation (primarily non-native grasses). Goals included improving habitat for the San Joaquin Valley suite of species, to provide bare areas for visiting mountain plovers, to improve forb production for native ungulates, and to benefit native plants. Initial response by the native flora is promising, but no long-term studies have been done.

Active restoration has involved pretreatments by burning, followed by planting native species using tractor-driven seeding machinery. Observations by BLM personnel suggest initial success; however, it remains to be seen if seeded populations will persist. The first plantings utilized a variety of wildflowers and native bunchgrasses. More recent restoration has focused on two major bunchgrass species, one-sided

bluegrass (*P. secunda* ssp. *secunda*) and nodding needlegrass (*Nassella cernua*). Seed for planting these two species comes from farmed plants grown from seed originally collected on the Monument.

3.2.3.3 Summary of the Carrizo Plain Grazing Monitoring Study

Background

Livestock grazing is embraced increasingly by land managers as a tool for preserving and restoring grassland ecosystems in California and elsewhere. Although often implicated in the original demise of California's grasslands, livestock grazing is thought to provide a number of ecological benefits to grasslands, especially those degraded by exotic plant species. Indeed, some studies done in the more productive grasslands (for example, those found on the California coast and in the Central Valley) have found that cattle grazing helps to encourage native plant species – especially annual forbs and perennial grasses – by reducing competition with exotic plants and the build-up of thatch (that is, leaf litter) from invasive grasses. Grazing by livestock may also mimic disturbances caused by native grazers now gone from many grassland systems and help to create and maintain habitat for native plant and animal species.

Although livestock grazing may serve as a promising tool for managing certain types of grasslands, it may also have unintended negative consequences, including facilitating the invasion and spread of exotic plants, impacting soil health and water quality and otherwise degrading native species habitat. Different types of grassland communities – especially more arid ones like the Carrizo Plain – have shown widely variable responses to livestock grazing, suggesting that one management tool does not fit all when it comes to grasslands management. Given the uncertainty of how Carrizo Plain grasslands might respond to livestock grazing over the long run, successful management requires thoughtful implementation and monitoring of any grazing activities.

Assessing the Ecological Effects of Grazing at Carrizo Plain

As with most grasslands found throughout California, one of the greatest perceived threats facing native grassland diversity at Carrizo Plain is invasion by exotic plant species. To better understand the effects of cattle grazing on both native and exotic species, BLM, TNC, and CDFG (hereafter Managing Partners) initiated a long-term grazing study at Carrizo Plain in 1991 designed to evaluate several hypotheses concerning the effects of grazing on native plant communities and giant kangaroo rats. In the study, a total of 25 pastures were included, with 19 pastures available for livestock grazing and six pastures excluded from grazing. Pastures that were available to livestock were grazed seasonally in the winter and spring months (November - May) when criteria for turning out cattle were met (for example, sufficient rainfall and forage). Within these pastures, several locations and variables were monitored annually from 1997-2003, including percent cover of all plant species, native bunch grass frequency, the abundance of giant kangaroo rat precincts (that is, burrow systems), and plant biomass.

Results from the Grazing Study

Plant Community

Drawing on previous research across California grassland ecosystems, the Managing Partners tested the hypothesis that a winter-spring (November to May) livestock grazing regime would benefit the native annual flora by reducing the biomass and cover of non-native annual grasses, including *Avena*, *Bromus*, *Lolium*, and *Hordeum* spp. The assumption is that native annual species are limited by competition with exotic annual grasses, and that properly timed grazing would decrease exotic annual grass cover and biomass and increase native annual grass and forb richness and cover. Similarly, by this same mechanism, native perennial bunchgrass cover and abundance would increase.

As with most livestock grazing studies conducted in California grasslands, the results from the Carrizo study are complex. However, unlike findings from previous studies done elsewhere in the state, the cover and richness of native annual forb species – by far the most diverse group of plants at Carrizo Plain – was significantly lower in grazed areas compared to ungrazed ones. However, the magnitude of the grazing effects depended on vegetation type: the negative effects of grazing were greatest in scrub and annual grassland communities and grazing had less impact on the areas more recently cultivated. These results suggest that the more disturbed areas lack a sufficient native seed bank. In contrast, the cover of exotic annual grasses increased with greater levels of cattle grazing; however, this effect was most pronounced in certain soil types, such as those found on alluvial flats and fans. Thus, two of the primary management objectives for using grazing as a vegetation management tool – to enhance native plant species and to decrease exotic ones – are not supported by this study.

The effects of livestock grazing on native perennial grasses were also complex, and depended on a number of factors, including grass species, soil type, vegetation type, and cultivation history. For example, overall the frequency of *Poa secunda* was lower in grazed areas relative to ungrazed ones, especially in areas with annual grassland. In contrast, there was little difference in the frequency of *Poa secunda* between grazed and ungrazed areas in the scrub communities. For *Nassella* spp., there was no overall effect of grazing on frequency, but this species did respond differently to grazing depending on soil type and vegetation community: there was a negative relationship between cattle density and the frequency of *Nassella* spp. in annual grassland and scrub communities in the foothills (that is, Soil Types 7 and 8), but a positive effect in soils on alluvial flats and fans (that is, Soil Type 3). These varied results underscore the idea that native perennial grasses are an ecologically diverse group that may have different management requirements that depend on ecological factors such as soil type and disturbance history.

Giant Kangaroo Rats

The study was also designed to monitor the effects of livestock grazing on giant kangaroo rat abundance (as measured by precinct density), a likely keystone species in the Carrizo Plain ecosystem. Based on work done on kangaroo rats in similar grassland ecosystems, managers at Carrizo Plain hypothesized that livestock grazing would have a positive effect on giant kangaroo rat precinct density by removing built-up dead biomass (thatch) from exotic annual grasses. Even though giant kangaroo rat can remove a significant amount of biomass through clipping plants to harvest seeds, the dominant hypothesis in the literature is that increased dead plant biomass decreases the suitability of giant kangaroo rat habitat.

The results of the monitoring study revealed that, overall, the density of giant kangaroo rat precincts was significantly lower in grazed areas than ungrazed areas. In addition, there was a significant interaction between grazing and year, indicating that the negative effects of grazing were significantly greater in some years (1998, 1999, 2000, 2002). Despite differences between grazed and ungrazed areas, during the course of the grazing study (1997-2002), the density of giant kangaroo rat precincts increased by nearly 50%. Similarly, the percentage of sampling locations with giant kangaroo rat precincts increased from 21% to 35% during this same period, suggesting an over all increase in abundance of this species at Carrizo Plain during the period.

Implications of Grazing Study for Management

Contrary to many other recent grazing studies done in California, the results from the Carrizo grazing study do not support the general hypothesis that livestock grazing is beneficial for native plant communities, nor is there support for the hypothesis that grazing is important for maintaining giant kangaroo rat habitat. This finding is similar to results from a small-scale study at Carrizo Plain involving a comparison of vegetation in adjacent grazed and ungrazed pastures (Kimball and Schiffman 2003). Despite this general conclusion, results from this study emphasize the conditional nature of grazing

impacts. Factors other than grazing, especially soil and vegetation type, play a strong role in determining the outcome of grazing effects, suggesting that a mosaic of management regimes will be necessary to meet the varied goals and objectives outlined in the RMP.

As with any study, it is critical to point out limitations. First, the results from the Carrizo grazing study cover only a seven-year period from 1997-2003. However, during this time, a major rainfall event occurred (1998), and despite dramatic increases in plant biomass during this period, no benefits of livestock grazing were detected for the plant community or giant kangaroo rat. Indeed, results indicate that grazing during the high-rainfall years had adverse effects on native plants and giant kangaroo rat. Another limitation is that this study does not address grazing impacts on other sensitive species found at CPNM, especially blunt-nosed leopard lizard and other federally listed endangered species. Thus, caution must be applied when extrapolating results from this study to other taxa. Similarly, the study was conducted only on plant communities found on the valley floor and lower foothills. The effects of grazing have not been assessed for the more mountainous regions found in the Caliente and Temblor Mountains. Finally, although the results from the study indicate that grazing has negative effects on native plants and giant kangaroo rat, the ecological mechanisms underlying these results were not assessed.

3.2.3.4 Plant Communities

Plant community designations in the following pages are based on an existing Carrizo Plain vegetation map (see Map 3-4, Vegetation Types) using an older classification system (Holland 1988). Currently under development is a more precise vegetation map based on the classification in *A Manual of California Vegetation* (Sawyer and Keeler-Wolf 1995), with a revision in progress that will not be ready for inclusion in this document (T. Keeler-Wolf, personal communication, 7 November 2007). This new mapping is part of a larger effort by the CDFG to map vegetation throughout California. Table 3.2-3 outlines the relationship between the Holland (1988) system used here and the vegetation designations from Sawyer and Keeler-Wolf (1995), focusing on the vegetation series and associations present on the Monument. A few Holland vegetation types listed in the table and present on the Monument are not mapped as separate entities on the vegetation map, but are treated as part of another mapped community (see vegetation descriptions below for details). The distribution of vegetation communities on the south side of the Caliente Mountains is much more complex than shown on the map. Current mapping within this region is at a very rough and approximate scale.

Nonnative Grassland

Nonnative grassland is the most abundant vegetation type on the Monument, covering extensive areas of the central valley and foothills, as well as forming understory for the scrub and woodland vegetation. Nonnative grassland is abundant throughout many parts of California, especially in the Central Valley and in Southern California. Some of the grasslands in the Monument could be characterized under the Holland system as valley and foothill grassland or valley needlegrass grassland, depending on their relative proportions of the native bunchgrasses, one-sided bluegrass (*Poa secunda* ssp. *secunda*), and nodding needlegrass (*Nasella cernua*). The height and density of this primarily annual vegetation is determined by the interaction of the yearly precipitation patterns with the composition of the seed bank. Nonnative annual grasses are not as prevalent after drought years since their seeds are relatively short-lived and do not persist in the seed bank. Native species that in most years are minor components of the grasslands may produce massive displays when weather patterns match their germination and growth requirements. In 2008, *Tropidocarpum gracile* (a small native mustard) carpeted the valley floor, indicating that the species had been present in great numbers in the seed bank, a fact not obvious from its presence in most years. Usually, the grassland tends to be dominated by introduced Mediterranean species, especially bromes (*Bromus* spp.), wild oats (*Avena* spp.), and filaree (*Erodium* spp.). Mustards (various genera) may also be common. A varying percent of the Monument's valley grasslands consists of native species,

Table 3.2-3. Relationship between Vegetation Mapping Designations

Holland 1998	Sawyer and Keeler-Wolf 1995 ^a
Grasslands	
Nonnative grassland	California annual grassland series (slender oat/soft brome association, soft brome/rattail fescue association, soft brome/storkbill association)
Valley and foothill grassland ^b	One-sided bluegrass series, nodding needlegrass series
Valley needlegrass grassland ^b	Nodding needlegrass series
Scrub Communities	
Valley sink scrub	Bush seepweed series, iodine bush series (bush seepweed/iodine bush association, saltgrass/iodine bush association)
Spiny saltbush scrub	Spinescale series (often considered part of the chenopod or saltbush scrub, many species shared with bladderpod/California ephedra/narrowleaf goldenbush series)
Valley saltbush scrub	Allscale series (often considered part of the chenopod or saltbush scrub, many species shared with bladderpod/California ephedra/narrowleaf goldenbush series)
Interior Coast Range saltbush scrub	Allscale series (often considered part of the chenopod or saltbush scrub, many species shared with bladderpod/California ephedra/narrowleaf goldenbush series)
Diablan sage scrub	Black sage series, California buckwheat series, California sagebrush series (black sage/California buckwheat association, California buckwheat association, California sagebrush association, California sagebrush/deer weed association)
Subshrub scrubs (Upper Sonoran subshrub scrub)	Bladderpod/California ephedra/narrowleaf goldenbush series (shares species with the allscale series in Northern California)
Woodlands	
Juniper oak cismontane woodland	Blue oak series (blue oak/linear leaf goldenbush association, blue oak/understory oak/grass association, blue oak/grass association)
Alvord oak woodland	Blue oak series (blue oak/grass association)
Cismontane juniper woodland and scrub	California juniper series
Chaparral	
Upper Sonoran manzanita chaparral ^b	Bigberry manzanita series (bigberry manzanita association)
Scrub oak chaparral ^b	Mixed scrub oak series (scrub oak/bigberry manzanita association)

^a See also CNPS 2008.^b Vegetation type not mapped but present on the CPNM.

depending on location, cultivation history, and precipitation patterns. Native grass species present include one-sided bluegrass (*Poa secunda* ssp. *secunda*), needlegrass (*Nasella* spp.), alkali wildrye (*Leymus triticoides*), and saltgrass (*Distichlis spicata*). The native forb component includes species such as fiddleneck (*Amsinckia* spp.), pepperweed (*Lepidium* spp.), tidy tips (*Layia* spp.), hillside daisy (*Monolopia* spp.), goldfields (*Lasthenia* spp.), popcorn flower (*Plagiobotrys* spp.), lupines (*Lupinus* spp.), clover (*Trifolium* spp.), and locoweed (*Astragalus* spp.). Rare plants found in the Carrizo grasslands include San Joaquin woolly-threads (*Monolopia congdonii*), California jewelflower (*Caulanthus californicus*), Jared's peppergrass (*Lepidium jaredii* ssp. *jaredii*), San Joaquin bluecurls (*Trichostema ovatum*), and gypsum-loving larkspur (*Delphinium gypsophilum* ssp. *gypsophilum*). Weedy species can be especially noticeable in some years. Prickly lettuce (*Lactuca serriola*) has formed dense stands up to six to eight feet tall in wetter years. Russian thistle (*Salsola tragus*) can infest large expanses of grassland and adjacent scrub communities in years with late rainfall, especially following a drought. Species of the native genus *Amsinckia* (fiddleneck or fireweed) were very abundant in the Carrizo valley floor during spring 2005. Considered by many as a wildflower and an important food plant for Lawrence's goldfinch (Martin et al. 1951), *Amsinckia* is listed as an agricultural weed in some parts of California and is a

problem in South America and Australia (DiTomaso and Healy 2007). This native has traits shared with annual weedy exotics: early germination, vigorous and indeterminate growth habit, the ability to produce seeds at a variety of plant sizes, and high seed production.

Native grassland species face significant competition from introduced weedy species. The weedy nonnative grasses and forbs usually germinate earlier and compete with native species for habitat, water, and nutrients (Heady 1977; Bartolome 1979). In years with adequate rainfall, weedy nonnative species produce huge amounts of seed, flooding the seed bank. With the onset of fall germinating rains, residue of the previous year's growth can influence seedling success and the overall grassland species composition the following spring. Thatch from introduced annual grasses can build up following successive years of heavy rainfall and tends to be a barrier to the open and branching growth pattern of native forbs. Instead, thatch tends to favor a grass type of architecture and thus perpetuates grasslands dominated by exotic weedy annual grasses (Bently and Talbot 1951; Bartolome et al. 1980; Bartolome and Betts 2001; Jackson and Bartolome 2002). A series of dry or drought years seems to lessen the dominance of the introduced grasses, possibly by depleting the seed bank. Some of the best native wildflower displays have occurred when a wet year follows a series of dry years.

Much of the valley floor, now covered by nonnative grasslands, was previously cultivated. All dryland farming ended in 1988 and with the elimination of this yearly disturbance, the agricultural fields are returning to a more natural condition. As plow lines disappear, natural drainage contours reform, native plants return, and microtopographical relief is generated by the activities of kangaroo rats and other fossorial (digging) mammals. This has occurred primarily through natural ecological processes; however, the managing partners have an ongoing restoration program and are planting selected areas with native shrubs, bluegrass, needlegrass, wild rye, and a variety of wildflower species. The goal has been to increase the native component of the Monument grassland communities and to restore native shrubs and bunchgrasses to areas where they were thought to occur prior to the dryland farming period. Livestock grazing during the green season has been the primary management tool used in the Monument's grasslands, however, analysis of the grazing study data (Christian et al. in prep) indicate that this method of grazing is detrimental to native annual plants and tends to promote non-native grasses.

Valley Sink Scrub

Valley sink scrub is restricted to the alkali flats surrounding and southeast of Soda Lake. This vegetation was once widespread in the Central Valley, but is now rare due to the alteration of natural hydrological patterns and conversion of lands to agriculture. The Monument contains one of the best and largest examples of this now rare vegetation. The community is relatively open, consisting of moderately spaced shrubs up to three feet tall with an understory primarily of native grasses and forbs. The vegetation is dominated by alkali-tolerant chenopod shrubs such as iodine bush (*Allenrolfea occidentalis*), spiny saltbush (*Atriplex spinifera*), and bush seepweed (*Suaeda moquinii*, also known as *S. fruticosa*). Alkali heath (*Frankenia salina*) and native saltgrass (*Distichlis spicata*) are both common and patches of one-sided bluegrass (*Poa secunda* ssp. *secunda*) are also present, especially near the boardwalk along upper Soda Lake. Growing interspersed with the grasses are native forbs such as goldfields (*Lasthenia* spp.), tidy tips (*Layia* spp.), and peppergrass (*Lepidium* spp.). Sensitive species found within this vegetation include Lost Hills crownscale (*Atriplex vallicola*), recurved larkspur (*Delphinium recurvatum*), Jared's peppergrass (*Lepidium. jaredii* ssp. *jaredii*), Munz's tidy tips (*Layia munzii*), and pale-yellow layia (*Layia heterotricha*). Sites with valley sink scrub are intermittently flooded and have saturated, hypersaline soils. Because of this, introduced annuals are not as common here as in other vegetation communities.

Valley Saltbush Scrub

In the Monument, the major expanse of valley saltbush scrub can be found in the central plain, where it surrounds Soda Lake and the adjacent valley sink scrub vegetation. Like the valley sink scrub, the valley saltbush scrub vegetation was once more widespread in the San Joaquin Valley, but is now much restricted and loss of this habitat continues as agriculture expands into new territories. Valley saltbush scrub soils are saline and alkaline, but not as much as those closer to Soda Lake, and they lack the surface depositions of salts. Topography ranges from relatively flat to hummocky and dissected by drainages. A few small patches of valley saltbush occur in the KCL drainage and along the south end of Soda Lake Road, but they tend not to be accompanied by the other species associated with typical valley saltbush scrub. The community structure is relatively open, consisting of moderately spaced, grayish shrubs approximately four feet tall, with an understory of grasses and forbs. Characteristic plants include spiny saltbush (*A. spinifera*), common saltbush (*A. polycarpa*), alkali heath (*F. salina*), and alkali goldenbush (*Isocoma acradenia* var. *bracteosa*). Sensitive species found within this vegetation are similar to those in valley sink scrub: Lost Hills crownscale (*A. vallicola*), recurved larkspur (*D. recurvatum*), Jared's peppergrass (*L. jaredii*), and Munz's tidy tips (*L. munzii*). In wet years, the understory can become quite dense, with the introduced prickly lettuce (*L. serriola*) forming extensive stands overtopping the native shrubs. The placement of some CPNM roads has disrupted the natural flow of water (which was sheetflow) across the landscape and now forms barriers to the spread of saltbush populations. Saltbush scrub may be particularly vulnerable to fire, especially in areas where the proliferation of nonnative annual grasses has increased fire intensity. A wildfire in 1997 burned over 4,000 acres of saltbush in the western part of the San Joaquin Valley and regeneration of saltbush has been virtually nonexistent. Acreage treated at the same time in the Lokern area, with a cooler-burning prescribed fire, has been recolonized by spiny saltbush, but common saltbush has been slow to return.

Spiny Saltbush Scrub

This distinctive vegetation is found from the southwestern flanks of the southern Temblor Range down into the floor of the nearby Elkhorn Plain. Spiny saltbush scrub is also found in the interior central coast, the San Joaquin Valley (now mostly lost to agriculture), and the Mojave Desert. Characterized by a strong dominance of spiny saltbush (*Atriplex spinifera*), it shares elements of the adjacent interior Coast Range saltbush scrub (dominated by *A. polycarpa*) and upper Sonoran subshrub scrub (co-dominated by a number of species). The community consists of moderately spaced shrubs with an understory generally of grasses and forbs. In some areas, especially those on the Elkhorn Plain, spiny saltbush is the only shrub species present. Currently, spiny saltbush populations are expanding from the Temblor Range's drainages down into the Elkhorn Plain; many seedlings and small plants can be found near established shrubs and population boundaries that are beyond previously recorded limits (Kakiba-Russell et al. 1991). The precipitation generated during the "March miracle" of 1991 seemed to provide optimum conditions for spiny saltbush recruitment on the Monument, although there has been subsequent dieback in some areas of apparently marginal habitat. In some years, the annual introduced Russian thistle (*Salsola tragus*) forms a conspicuous element in these valley saltbush populations and dominates the adjacent grasslands; however, the 2003 infestation of Russian thistle on the Elkhorn Plain does not appear to have depressed recent saltbush recruitment.

Upper Sonoran Subshrub Scrub

Upper Sonoran subshrub scrub is the most common shrub vegetation on the Monument. It is especially well developed on the arid, moderate to steep ridges of the southern flanks of the central Temblor Mountains and in the foothills of the southern Caliente Mountains. The community also appears in small pockets along the northern foothills of the upper Caliente Range, where it may have been more extensive prior to conversion of the area to agriculture. Upper Sonoran subshrub scrub can also be found in the

interior central coast, on the margins and foothills of the San Joaquin Valley, and in the western Mojave Desert. The community consists of several species of soft-wooded, relatively low shrubs (one to four feet tall), co-dominant in a very open structure and with an understory of grasses and herbs. Characteristic shrubs include interior goldenbush (*Ericameria linearifolia*), desert tea (*Ephedra californica*), California buckwheat (*Eriogonum fasciculatum* var. *polifolium*), alkali goldenbush (*Isocoma acradenia* var. *bracteosa*), bladderpod (*Isomeris arborea*), Eastwoodia (*Eastwoodia elegans*), and snakeweed (*Gutierrezia californica*). Representative forbs include fiddleneck (*Amsinckia* spp.), Mojave sun cup (*Camissonia campestris*), and farewell to spring (*Clarkia cylindrica*). In addition, the upper Sonoran subshrub scrub community on the CPNM contains many rare forb species including San Joaquin woolly-threads (*M. congdonii*), California jewelflower (*C. californicus*), Hoover's woolly-star (*Eriastrum hooveri*), forked fiddleneck (*Amsinckia vernicosa* var. *furcata*), oval-leaved snapdragon (*Antirrhinum ovatum*), gypsum-loving larkspur (*D. gypsophilum* ssp. *gypsophilum*), cottony buckwheat (*Eriogonum gossypinum*), Temblor buckwheat (*E. temblorense*), stinkbells (*Fritillaria agrestis*), and San Joaquin bluecurls (*Trichostemmon ovatum*). Recent vegetation management has focused on livestock grazing during the green season as a method to remove standing biomass and benefit native species. Recent analysis of the Carrizo grazing study, however, indicates that this method of grazing has strong negative impacts on the native annual flora in the upper Sonoran subshrub scrub community (Christian et al. in prep).

Interior Coast Range Saltbush Scrub

Interior Coast Range saltbush scrub can be found along the drainages of the Temblor Range, in the Elkhorn and Panorama Hills, along the San Andreas rift escarpment, in the hill north of KCL campground, and in scattered locations in the southern Caliente Range. As is the situation with the upper Sonoran subshrub scrub community, conversion of the northern Caliente foothills to cultivated fields probably eliminated stands of interior Coast Range saltbush scrub vegetation. The community, in one form or another, can be found in the drier areas and deserts of central and southern California. On the CPNM, interior Coast Range saltbush scrub is closely associated with upper Sonoran subshrub scrub. The two vegetation types are similar and share many elements; however, interior Coast Range saltbush scrub tends to be taller and denser in terms of vegetation structure. The major distinction in terms of species composition is that common saltbush (*A. polycarpa*) dominates in interior Coast Range saltbush scrub, and, in upper Sonoran subshrub scrub, several species share dominance, including interior goldenbush (*Ericameria linearifolia*). Shared characteristic shrub species include desert tea (*Ephedra californica*), California buckwheat (*Eriogonum fasciculatum* var. *polifolium*), alkali goldenbush (*Isocoma acradenia* var. *bracteosa*), and sometimes bladderpod (*Isomeris arborea*) and snakeweed (*Gutierrezia californica*). Many of the herbs and sensitive plants in upper Sonoran subshrub scrub are also found in the interior Coast Range saltbush scrub. Two distinctive characteristic species are the locoweeds, freckled milkvetch (*Astragalus lentiginosus* var. *nigricalycis*) and Diablo locoweed (*Astragalus oxyphysus*). Understory for interior Coast Range saltbush scrub also includes grasses and forbs.

Diablan Sage Scrub

Diablan sage scrub occurs in the steep upper ridges of the Caliente Range, occupying drier sites within the juniper and juniper oak woodlands, where it often forms the understory. In the lower, drier elevations on the south side of the Caliente Range, this shrub vegetation tends to be found on the north-facing slopes. Vegetation similar to Diablan sage scrub occurs from central California to Baja California. The community is one of low shrubs, moderately spaced, with an understory composed of native forbs, native bunchgrasses such as one-sided bluegrass (*P. secunda* ssp. *secunda*), other grasses, and the introduced filaree (*Erodium cicutarium*). Species composition of the Carrizo Plain's Diablan sage scrub community is slightly different from the standard mix as reported by Holland (1988) and the intergrades with Venturan sage scrub (D. Hillyard, CDFG, personal communication, January 2008). Within the

Monument, the community dominants include purple sage (*Salvia leucophylla*) (instead of black sage [*S. mellifera*]), interior goldenbush (*E. linearifolia*), and California buckwheat (*E. fasciculatum* var. *polifolium*). Other shrubs encountered include California sagebrush (*Artemisia californica*), golden yarrow (*Eriophyllum confertiflorum* var. *confertiflorum*), snakeweed (*G. californica*), common saltbush (*A. polycarpa*), four-winged saltbush (*A. canescens*), rubber rabbitbush (*Chrysothamnus nauseosus* ssp. *mojavensis*), deerweed (*Lotus scoparius* var. *scoparius*), and silver bush lupine (*Lupinus albifrons* var. *albifrons*). A rhizomatous yucca, our Lord's candle (*Yucca whipplei*), also occurs in this vegetation type. The specific shrub mixture varies with changes in slope, aspect, and other environmental variables. In contrast to the standard composition, the Carrizo Plain's Diablan sage scrub community contains no monkey flower (*Mimulus aurantiacus*). Rare plants to be encountered in this vegetation include oval-leaved snapdragon (*A. ovatum*) and Hoover's woolly-star (*E. hooveri*).

Juniper Oak Cismontane Woodland

Juniper oak cismontane woodland is well developed on the upper elevations of the Caliente Range and can also be found in a few patches in the more mesic sites of the northern Temblor Range. The topography is moderate to steep and the community density and extent often depend on slope aspect (more robust on north-facing slopes). Juniper oak woodland occurs in upland locations from central California to the Mojave Desert and Baja California. The vegetation consists primarily of large shrub-like California juniper (*Juniperus californica*) and scrubby blue oak (*Quercus douglasii*) and/or Tucker's oak (*Q. john-tuckeri*) with an assortment of smaller shrubs such as interior goldenbush (*Ericameria linearifolia*), desert tea (*Ephedra californica*), green ephedra (*E. viridus*), California buckwheat (*Eriogonum fasciculatum* var. *polifolium*), bigberry manzanita (*Arctostaphylos glauca*), alkali goldenbush (*Isocoma acradenia* var. *bracteosa*), yucca (*Yucca whipplei*), golden yarrow (*Eriophyllum confertifolium*), and snakeweed (*Gutierrezia californica*). In some areas of the Caliente Mountains, an occasional singleleaf piñon (*Pinus monophylla*) can be encountered within this vegetation. The sensitive species hollisteria (*Hollisteria lanata*) may also be present. Grassland elements present include introduced bromes as well as native grasses such as one-sided bluegrass (*P. secunda* ssp. *secunda*) and nodding needlegrass (*Nassella cernua*).

Cismontane Juniper Woodland and Scrub

Cismontane juniper woodland and scrub occurs in the upper elevations of the Caliente Range and in patches in the Temblor Range. In the Caliente Range, it is found adjacent to, and in slightly drier sites than, the juniper oak cismontane woodland. In the more xeric Temblor Range, the juniper woodland is less abundant and restricted to the relatively more mesic sites. Cismontane juniper woodland and scrub vegetation is essentially the same as juniper oak cismontane woodland, but without the oak element and with a greater percentage of arid-adapted shrubs. The overall distribution outside the Monument is also similar. The understory tends to consist of elements of the adjacent Diablan sage scrub.

Blue Oak Woodland and Alvord Oak Woodland

These two species are present as small populations within the Monument. Vegetation in both consists of small to large oak trees, with an understory of shrubs such as oak gooseberry (*Ribes quercetorum*), elements of the Diablan sage scrub, mesic herbs, and some weedy nonnative grassland elements. Juniper is often present or nearby. Blue oaks are encountered near the top of the Temblor Mountains and in the Caliente Mountains, where the species are present as small patches on some mesic, north-facing canyons. Blue oak woodland occurs in upland areas from northern Los Angeles County to the head of the Sacramento Valley. As a community, blue oak woodland is much better developed in the CDFG's Chimineas unit, farther north in the Caliente Mountains. Alvord oak (*Quercus x alvordiana*), a hybrid of blue and scrub oak, occurs sporadically in the upper reaches of the Temblor Mountains and as small

populations in the steep canyons dissecting the south end of the Monument. Some Temblor Mountain oak populations display more blue oak characteristics and some specimens are difficult to clearly place as Alvord or blue oak. Given the ease with which blue and scrub oak hybridize, it is expected that most, if not all, of the blue oak trees in the Temblor Range contain at least some scrub oak genes. Vegetation under the Alvord oaks is sparse to nonexistent, possibly as a result of grazing by livestock in the past. The Alvord oaks in the canyons on the southern end of the Monument are much larger than is reported in the Jepson Manual (Hickman 1993). As elsewhere in California, oak regeneration appears depressed. Causal factors identified for the general decline in oaks include grazing effects, competition and fires associated with introduced annual grasses, and predation by pigs and gophers (Bartolome 1987; Borchert et al. 1989; Dahlgren et al. 1997; Hall et al. 1992; Pavlik et al. 1991; Rousset and Lepart 2000). Deer have also been shown to depress the growth of small oaks.

Although not strictly considered to be vegetation communities, the following populations, features, and habitats are ecologically important.

Biological Soil Crusts

In the upper layers of soil, microbial activity creates a specialized microenvironment called a biological soil crust. Microorganisms that may comprise a soil crust ecosystem include visible elements such as cyanobacteria, green algae, lichens, and bryophytes, as well as less-evident fungi, bacteria, and slimemolds. Small invertebrates may also be present. The upper layers of soil are modified and stabilized by the interactions between these organisms and by their direct alteration of soil chemistry and physical structure. Soil crusts act to prevent erosion, modify water absorption and evaporation, recycle and make nutrients available, and provide microsites for seed germination and seedling establishment. Certain cyanobacteria (and lichens with those cyanobacteria as a component) are particularly important because they convert atmospheric nitrogen into a form that vascular plants can utilize (Belnap et al. 2001). Biological soil crusts are very important in maintaining soil health.

As with many communities, soil crust species composition depends on site stability, edaphic features of the soil, local physical properties (such as slope, aspect, and others), weather, and interactions between the biota. Crusts are found below or between vegetation as well as in vegetation-free areas, where they are particularly noticeable. A number of bare areas supporting crust communities are found within the Monument. The “balds,” located on ridge tops in the central Caliente foothills and among the vernal pools near the Hanline Ranch, have well-developed crust communities with cyanobacteria, lichens, and bryophytes (both mosses and liverworts). On the Cuyama side of the Caliente Range are bare south-facing ridge slopes with diverse lichen assemblages. On the more mesic north-facing slopes of these same ridges are shrub communities with a moss-dominated crust understory. Some seasonally disturbed drainages of the Caliente foothills support colonizing crust communities of early successional mosses and cyanobacteria.

Biological soil crusts can be easily damaged and, in arid environments, may take hundreds of years (or more) to regenerate completely (Belnap et al. 2001). As a general rule, most crusts are vulnerable when soils are saturated and easily deformed, or when the soils are completely dry and crust organisms are brittle, easily fragmented, and susceptible to subsequent wind erosion. Crust damage can be the result of OHV activity, grazing, mountain biking, and hiking. The extent of the damage depends on the nature of the underlying soils and topography, the timing and extent of disturbance, and the specific crust organisms present. Crust communities can repair some disturbance during the growing season, when soils are moist and organisms are biologically active.

Lichens and Bryophytes

Besides forming a major part of the crust biota, lichens, mosses, and liverworts are important in other Monument habitats. Springs, seeps, and seasonally mesic sites often harbor well-developed moss and liverwort communities. Bryophytes are also common on moist north-facing rocks and steep slopes. Although rock outcrops can have severe environments in terms of nutrient availability, temperature fluctuations, and moisture regime, they can support diverse assemblages of crustose lichens and xeric mosses. Good examples are the sandstone outcrops within the Caliente Mountains. Habitat for foliose and fruticose lichens occurs on the ridgeline of the Caliente Range, where moisture from clouds intersecting the ridge condenses on the scrub oaks and other shrubs. Here, many of the dead and older branches are completely covered by colorful lichens.

Vernal Pools and Other Ephemeral Aquatic Habitats

Vernal pools are small, shallow, ephemeral ponds that develop in areas of hardpan following winter rains. In the Monument, they occur on the valley floor and in depressions within the foothills of the Caliente Range. Water quality ranges from fresh to saline and alkaline, depending on the location; those near Soda Lake tend to be more saline and alkaline, while those in the southern Caliente foothills are usually of fresh water. The vernal pools on the Carrizo Plain are not as complex as the vernal pools of the Central Valley, nor do they produce the spectacular floral displays typical of other California vernal pools. They are, however, home to endangered fairy shrimp and aquatic insects, utilized by resident and migrating birds, and provide breeding habitat for fairy shrimp and spadefoot toads (see Section 3.2.2, Wildlife). In addition, two sensitive plant species, the spiny-sepaled button-celery (*Eryngium spinosepalum*) and Hoover's button-celery (*E. aristulatum* var. *hooveri*), have been reported from freshwater pools in the Soda Lake area. Aside from the normal type of vernal pool, ephemeral aquatic habitat on the Carrizo Plain colonized by fairy shrimp includes sag ponds, depressions in sandstone outcrops, roadside ditches, and stock ponds. Management of these vernal pools has been to continue past management in regards to livestock grazing. Those pools that were previously grazed continue to be so and ungrazed pools remain ungrazed. This course of action was suggested by fairy shrimp expert, Denton Belk, to maintain water conditions for the listed shrimp. Livestock grazing may be beneficial for the Monument's vernal pool habitat, as has been documented in some San Joaquin Valley systems (Marty 2005). Some pools systems on the Carrizo, however, are surrounded by scalds containing biological soil crusts and do not have the extensive grasslands abutting the pools as in the Valley systems. Currently, the pools appear relatively healthy and expected shrimp populations continue to be encountered.

Soda Lake and Associated Playas

Soda Lake is one of the largest undisturbed alkali wetlands in California. The water is too saline and alkaline for vascular plants, but does support algae, which serve as food for the pouched-pocketed shrimp, alkali fairy shrimp, and brine shrimp. Associated with Soda Lake are clay dunes, which are now stabilized and covered by vegetation (USGS 2004). Also in the vicinity of Soda Lake are barren areas, or scalds, which are so salt affected that little grows there; however, it is habitat for the rare Jared's peppergrass (*Lepidium jaredii* ssp. *jaredii*). The scalds also provide wintering habitat for mountain plover. Soda Lake is surrounded by two salt-tolerant vegetation types: valley sink scrub and valley saltbush scrub. Salt cedar (*Tamarix ramosissima*), present in a few spots along the shoreline, is targeted for eradication.

Riparian: Springs, Seeps, and the Cuyama River

Vegetation in a specific spring area depends on the amount of water available, but can include typical riparian species such as willows (*Salix laevigata*), mule fat (*Baccharis salicifolia*), cattails (*Typha domingensis*), sedges (various *Cyperaceae*), rushes (*Juncus* spp.), common monkeyflower (*Mimulus*

guttatus), willow herb (*Epilobium* spp.), and maiden-hair fern (*Adiantum jordanii*). In some riparian areas, saltgrass (*D. spicata*) is present, and one spring on the south side of the Caliente Mountains supports common reed (*Phragmites communis*). Invasive exotic weeds include saltcedar (*Tamarix ramosissima*), bull thistle (*Cirsium vulgare*), and annual beard grass (*Polypogon monspeliensis*). Some springs have been fenced to eliminate trampling by livestock and most have been altered at some time in the past to provide water for grazing. Damage by wild pigs is an ongoing problem and a few springs have been impacted by elk.

The far southwest corner of the Monument incorporates approximately 200 meters of the Cuyama River at its confluence with Cottonwood Canyon. Here, water primarily flows below surface level, unless there has been recent rainfall. In the main channel, vegetation includes willows (*Salix* spp.), mule fat (*Baccharis salicifolia*), sedges (various *Cyperaceae*), rushes (*Juncus* spp.), and saltgrass (*Distichlis spicata*). Cottonwoods (*Populus fremontii*) are present in the Cottonwood Canyon drainage. Saltcedar (*Tamarix ramosissima*) and perennial pepperweed (*Lepidium latifolium*) are present in the Cuyama stream channel, both up and downstream from this site.

3.2.3.5 Rare Plants (Including Threatened and Endangered Species)

There are two federally listed endangered plants within the Monument: California jewelflower and San Joaquin woolly-threads. The recently delisted Hoover's woolly-star, will, according to an agreement between BLM and USFWS, continue to be treated on BLM lands as if it were still listed (USFWS 2003b). See Map 3-5, Special Status Plants, for the distribution of these species within the Monument. In addition, there are 16 other rare plants (see Table 3.2-4): 9 BLM sensitive plant species and 7 species on the California Native Plant Society (CNPS) (2001) watch list, considered as potentially rare. These additional rare plants are mostly small annual herbs. The exceptions, two larkspur species and stinkbells, are small perennial herbs whose above ground parts die back each year with the onset of the dry season. Approximately half of these rare plants occur in the alkaline communities of Soda Lake and its associated playas. The remaining eight are found within the shrub and woodland communities in the surrounding hills. More information is needed on the distributions, habitat requirements, pollinators, and general biology of these rare species.

California Jewelflower (*Caulanthus californicus*)

Federal status: endangered.

State status: endangered.

CNPS category: 1B (rare, threatened, or endangered throughout range).

The California jewelflower is a small annual mustard now restricted to three areas: Santa Barbara Canyon near Cuyama Valley, the Carrizo Plain, and the Kreyenhagen Hills in Fresno County. Its historical distribution included the San Joaquin Valley floor and foothills, the Carrizo Plain, and Cuyama Valley—seven counties in all. Today, most populations have been eliminated from the San Joaquin Valley by agricultural and urban and industrial development (USFWS 1998).

A similar situation existed in the Monument, where jewelflower populations once ranged from Painted Rock to the southern end of the Carrizo Plain (Hubert and Kakiba-Russell 1991). Much of the habitat was impacted by dryland farming and heavy grazing, and the Carrizo Plain populations were thought to be extinct (Taylor and Davilla 1986). Starting in 1988, additional plants were located (Hubert and Kakiba-Russell 1991; USFWS 1998) and the Carrizo Plain population in 2003 was calculated to be around 9,000 plants (BLM 2003), extending from the vicinity of KCL campground southeast to near Lawson Spring.

Table 3.2-4. Additional Rare Plants in or near the Monument

Species	CNPS listing ^a	Location in Monument	Associated Communities
<i>Acanthomintha obovata</i> ssp. <i>cordata</i> (heart-leaved thornmint)	4	Caliente foothills, Caliente Mountains, on clay	Diablan sage association, juniper oak woodland
<i>Amsinckia vernicosa</i> var. <i>furcata</i> (forked fiddleneck)	4	Foothills of the upper southern Elkhorn Plain, on fine soils	Diablan sage association
<i>Antirrhinum ovatum</i> (oval-leaved snapdragon)	4	Caliente foothills, Caliente Mountains, on clay	Diablan sage association, juniper oak woodland
<i>Atriplex vallicola</i> (Lost Hills crownscale)	1B	Soda Lake and associated playas, on saline/alkaline soils	Valley sink scrub
<i>Delphinium gypsophilum</i> ssp. <i>gypsophilum</i> (gypsum-loving larkspur)	4	Caliente foothills, Elkhorn Plain	Upper Sonoran subshrub scrub, nonnative grassland
<i>Delphinium recurvatum</i> (recurved larkspur)	1B	Soda Lake and associated playas, on saline/alkaline soils	Valley saltbush scrub
<i>Eriogonum gossypinum</i> (cottony buckwheat)	4	Caliente foothills, Elkhorn Plain, on gypsum soils	Upper Sonoran subshrub scrub
<i>Eriogonum temblorense</i> (Temblor buckwheat)	1B	Foothills of the upper southern Elkhorn Plain	Diablan sage association
<i>Eryngium aristulatum</i> var. <i>hooveri</i> (Hoover's button-celery)	1B	Soda Lake and associated playas, on saline/alkaline soils	Vernal pools, nonnative grassland
<i>Eryngium spinosepalum</i> (spiny-sepaled button-celery)	1B	Soda Lake and associated playas, on saline/alkaline soils	Vernal pools, nonnative grassland
<i>Eschscholzia rhombipetala</i> (diamond-petaled California poppy)	1B	Currently not recorded on CPNM but found 3 miles north of Seven Mile Road	Vernal pools, nonnative grassland
<i>Fritillaria agrestis</i> (stinkbells)	4	Temblor Range	Upper Sonoran subshrub scrub
<i>Layia heterotricha</i> (pale-yellow layia)	1B	Soda Lake and associated playas, on saline/alkaline soils	Valley sink scrub
<i>Layia munzii</i> (Munz's tidy tips)	1B	Soda Lake and associated playas, on saline/alkaline soils	Valley saltbush scrub, nonnative grassland
<i>Lepidium jaredii</i> ssp. <i>jaredii</i> (Jared's peppergrass)	1B	Soda Lake and associated playas, on saline/alkaline soils	Valley sink scrub
<i>Trichostema ovatum</i> (San Joaquin bluecurls)	4	Caliente foothills	Upper Sonoran subshrub scrub, nonnative grassland

^a CNPS Listing 1B = rare, threatened, or endangered throughout range; List 4 = watch list, potentially rare, see CNPS 2001 for additional details.

California jewelflower has been found in nonnative grassland, upper Sonoran subshrub scrub, and cismontane juniper woodland and scrub; and historical collections have possibly been in valley saltbush scrub (USFWS 1998). In the Carrizo Plain, the species is associated with the precincts (burrow systems) of giant kangaroo rats (Mazer and Hendrickson 1993a; Cypher 1994; USFWS 1998). However, kangaroo rats clip jewelflower inflorescences and thus may depress seed production (Mazer and Hendrickson 1993a). Jewelflower seeds germinate with the onset of winter rains, and plants flower from February to May (USFWS 1998). Like many annual species, jewelflower population numbers vary widely from year to year; relatively high rainfall appears to favor germination (Taylor and Davilla 1986; BLM 2003).

Currently, most CPNM jewelflower populations are protected from livestock grazing as the species is considered palatable to livestock and appears to do poorly under normal grazing regimes. Some CPNM populations can be impacted by unauthorized sheep grazing (BLM 2003). Another population in the southern Caliente foothills has occasionally been subjected to livestock grazing, but not in recent years. The reasons behind the success of this population may be due to the fact that the pasture has not been

grazed for the last three years, some other undetermined factor, or the population's location within the upland shrub community.

San Joaquin Woolly-Threads (*Monolopia congdonii*)

Federal status: endangered (federally listed under the name *Lembertia congdonii*).

State status: not listed.

CNPS category: 1B (rare, threatened, or endangered throughout range).

San Joaquin woolly-threads is a small annual composite which historically ranged throughout the southern San Joaquin Valley, the Carrizo Plain, and the upper Cuyama Valley (Taylor 1989). Current distribution includes four metapopulations and several small isolated populations, the largest being in the Carrizo Plain (USFWS 1998). In 1993, which was a favorable year for San Joaquin woolly-threads, the occupied habitat in the CPNM totaled over 2,800 acres across the central and southern Carrizo Plain and the Elkhorn Plain (BLM 1993).

San Joaquin woolly-threads occur in nonnative grassland, valley saltbush scrub, interior Coast Range saltbush scrub, and upper Sonoran subshrub scrub (USFWS 1998). On the Monument, it occurs on silty soils derived primarily from the Saltos Shale, Santa Margarita, and Temblor geologic formations (BLM 1993). Seeds of San Joaquin woolly-threads typically germinate in early winter and plants flower between late February and early April. In years with low rainfall, few seeds will germinate (USFWS 1998). San Joaquin woolly-threads has been found in areas that were previously plowed or disturbed within the Monument but that had been rested for at least five years (BLM 1993).

Most of the CPNM metapopulation occurs within currently grazed areas. Taylor (1989) suggested that the decumbent habit of the woolly-threads plants protected it from most livestock grazing and noted that the populations in the Carrizo Plain appeared to be doing well under a regime of moderate grazing. Mazer and Hendrickson (1993b) indicated that the populations they studied did not seem to be impacted by livestock grazing; however, the cattle were removed prior to woolly-threads flowering and the recommendation was that plant populations be monitored if subjected to grazing. BLM (1993) noted only minor grazing damage to plants and suggested that early grazing may benefit woolly-threads by the removal of competitors, but also recommended that cattle be removed before flowering starts in April.

Herbivory by giant kangaroo rats has been shown to reduce the reproductive capacity of individual woolly-threads plants by up to 30 percent, with the intensity of damage correlated with the distance from a burrow (Mazer and Hendrickson 1993b). Woolly-threads' preference for growing on kangaroo rat precincts has been noted and attributed to the suggestion that the species is a poor competitor with introduced annual grasses (Taylor 1989). On the Carrizo Plain, greater woolly-threads plant size and flower head production have been associated with giant kangaroo rat activity (Mazer and Hendrickson 1993b), as have earlier seed germination and maturation (Cypher 1994).

Hoover's Woolly-Star (*Eriastrum hooveri*)

Federal status: previously threatened, now delisted.

State status: none.

CNPS category: List 4 (watch list, potentially rare).

Hoover's woolly-star is a small annual phlox that is much more common and widespread than originally thought. The species was delisted on October 7, 2003 (Federal Register 68:57829-57837), but BLM will continue to treat it as a sensitive species per agreement with the USFWS, and conduct post-delisting monitoring for this species (USFWS 2003b).

Hoover's woolly-star populations are known from northern Santa Barbara County to central San Benito County, with more recently discovered large populations more than 140 kilometers (87 miles) to the southeast in the Mojave Desert and the Antelope Valley (USFWS 2003b). In addition, populations of this species in the Los Padres National Forest were discovered at higher elevations (2,700 to 3,000 feet) than the ones previously known (USFWS 2003b). The Monument's plants form part of the Carrizo Plain-Elkhorn Plain-Temblor Range-Caliente Mountains-Cuyama Valley-Sierra Madre Mountains metapopulation (USFWS 1998). Within the Monument, known locations of Hoover's woolly-star occur from the middle and higher portions of the Caliente Mountains between Horse and Padrone Canyons and in the lower portions of the Caliente Mountains bordering the Carrizo Plain north of Lawson Spring (BLM 1992, 1994a).

In the Monument, Hoover's woolly-star is associated with interior Coast Range saltbush scrub and upper Sonoran subshrub scrub. Elsewhere, it also occurs in valley saltbush scrub (USFWS 1998). Hoover's woolly-star is usually found in areas with little competing vegetation and is often found on previously disturbed areas such as lightly used roads, old firebreaks, and abandoned oil well pads (BLM 1994a). Although this species does better in sparsely vegetated areas, it can also be found in areas of dense vegetation (E. Cypher, CDFG, personal communication, 2005). Hoover's woolly-star seed germinates from January to mid-April and the plants typically flower between March and June (USFWS 1998). As is the case with other annuals, population numbers vary widely in response to precipitation patterns.

3.2.3.6 Invasive Nonnative Species

Nonnative plants comprise approximately 15 percent of the CPNM's flora and include widespread naturalized species, California listed noxious weeds (CDFA 2007), rare adventives, and landscape ornamentals. Weed control on BLM lands is based on integrated pest management principles. Methods include hand pulling, mowing, biological control, prescribed burns, herbicides, and livestock grazing.

Much of the plain and foothill landscapes are dominated by introduced, but now naturalized, annual grasses and some forbs, sometimes referred to as the new natives (Heady 1977). These include common nonnative grasses such as soft chess (*Bromus hordeaceus*), riggut brome (*B. diandrus*), red brome (*B. madritensis* ssp. *rubens*), wild oat (*Avena fatua*), slender wild oat (*A. barbata*), and farmer's foxtail (*Hordeum murinum* ssp. *leporinum*). Nonnative forbs include filaree storksbill (*Erodium cicutarium*) and long-beaked storksbill (*E. botrys*). Control or eradication of these widespread, naturalized exotic species is unrealistic, but current methods used to reduce their localized impact include mowing, controlled burns, flaming, and applied livestock grazing.

Some nonnative species found on or near the Monument are designated as noxious weeds by the California Department of Food and Agriculture (CDFA) (3 California Code of Regulations [CaCR] 4500 4[6]). Depending on the species, the potential for spread, and the circumstances, treatment may be focused and aggressive or only as needed for a specific project (for example, restoration of native habitat). Founder populations of highly invasive weeds are treated as fast as possible when encountered, to minimize their chance of spreading. Table 3.2-5 lists the noxious weeds occurring on or near the Monument.

Some species are targeted for complete eradication from the Monument. Founder populations of Russian knapweed (*Acroptilon repens*) and heart-podded hoary cress (*Cardaria draba*), discovered in 2001, have been treated with herbicides on an annual basis. The extents of both populations are shrinking as underground stem reserves are depleted; complete eradication of existing populations is expected within a few years. Yellow star thistle (*Centaurea solstitialis*) has been found along Soda Lake Road and near the Saucito and American Ranches. Because the seeds can persist in the soil for a period of 10 years (Callihan

Table 3.2-5. Noxious Weeds Reported on or near the Monument

Scientific name	Common name	Origin
<i>Acroptilon repens</i>	Russian knapweed	Central Asia
<i>Ailanthus altissima</i>	Tree of heaven	Eastern China
<i>Cardaria draba</i>	Heart-podded hoary cress	Central Europe, western Asia
<i>Centaurea melitensis</i>	Tocalote	Southern Europe
<i>Centaurea solstitialis</i>	Yellow star-thistle	Southern Europe, western Eurasia
<i>Cirsium vulgare</i>	Bull thistle	Europe, western Asia, northern Africa
<i>Convolvulus arvensis</i>	Field bindweed	Europe
<i>Cynodon dactylon</i>	Bermuda grass	Africa
<i>Lepidium latifolium</i>	Perennial pepperweed	Eurasia
<i>Salsola tragus</i>	Russian thistle	Eurasia
<i>Tamarix chinensis/T. ramosissima</i>	Salt cedar	Central Asia

et al. 1993), an ongoing survey and treatment program has been underway since about 1995. Methods used for control and eradication have included hand pulling, mowing, biological control (hairy weevils [*Eustenopus villosus*]), prescribed burns, and herbicides. Bull thistle (*Cirsium vulgare*) is known at Wells and Goat Springs, and is potentially present in other perennial drainages on the Monument. Current eradication efforts consist of annual removal by hand pulling prior to seed set. Saltcedar (*Tamarix chinensis/T. ramosissima*) infestations are now reduced to scattered plants in the Soda Lake area and at a few isolated seep areas. The remaining populations are targeted for elimination by cutting and stump spraying. Perennial pepperweed (*Lepidium latifolium*) has not been found on the Monument but infestations are nearby in California Valley and its future presence on the Carrizo Plain is expected. Effective control requires repeated applications of herbicide; otherwise the plant readily resprouts from persistent rootstocks. Eradication efforts are underway by the San Luis Obispo County Agricultural Department.

On the Monument, tree of heaven (*Ailanthus altissima*) is managed to maintain the cultural heritage of the planted trees, while keeping the species from spreading. Tree of heaven was planted as a shade tree near many of the old ranch houses by the previous occupants of the Carrizo Plain. Mature trees and saplings can still be found around the Traver Ranch house, the MU Ranch, the KCL campground, and other old homestead sites, as well as at private residences in inholdings and in the surrounding area. The species spreads aggressively by root sprouts and, to a lesser extent, by seeds. Treatment of unwanted plants is by cutting and stump spraying.

Russian thistle (*Salsola tragus*) occurs occasionally throughout the Monument, usually limited to roadsides and disturbed areas. Since Russian thistle requires disturbance for germination and the seeds are short-lived (Young 1991), it tends to be a temporary, but recurrent, nuisance within the Monument. In 1990, Russian thistle invaded the East Cousins pasture area after the property was acquired by BLM and plowing ceased. Although Russian thistle was the first plant species to occupy the area, it was quickly succeeded by nonnative grasses and more weedy natives such as fiddleneck, and by 1994, comprised only 10 percent of the area by cover (BLM 1994b). Russian thistle coverage, however, seems to be very dependent on precipitation. The late rainfall in 2003 seemed to favor Russian thistle and large acreages were noted, especially in the southern Elkhorn Plain. Controlled burns have been used on some populations and, when necessary, mature plants (such as tumbleweeds) are piled and burned.

The other noxious weeds on the Monument are not currently the focus of active management. Tocalote (*Centaurea melitensis*), a close relative to yellow star-thistle, is fairly widespread and semi-naturalized throughout the Monument, but is not a problem. Twisselmann (1956) reported that field bindweed (*Convolvulus arvensis*) and Bermuda grass (*Cynodon dactylon*) occur within the Monument boundaries.

Currently, field bindweed is known to occur along the access road to Painted Rock and along the edge of Soda Lake Road near the southern end of the Monument. The current distribution of Bermuda grass, if any, is unknown, but may be expected in the vicinity of the old ranch houses.

3.3 Fire and Fuels Management

3.3.1 Introduction and Fire History

The fire and fuels management program is concerned with many aspects of fire on the natural landscape, including suppression of wildland fire, reduction of fuels to reduce wildland fire risk, and the use of fire as a management tool for vegetation and wildlife habitat manipulation.

Fire is a natural disturbance process that influences the development and maintenance of many natural ecosystems. However, as discussed in the General Botanical Setting (Section 3.2.3.1), prior to the invasion of the Mediterranean grasses to the area, fire did not appear to be a frequent environmental factor in the desert-like scrub communities common in the southern Carrizo Plain. The native CPNM scrub communities include fire-sensitive, non-sprouting dominant species, especially *Atriplex* spp., that are sensitive to recurring fires. It is not known whether pre-contact Native Americans set fires in the Monument area. While fire may not have played a significant natural role in the native ecosystem, fire is one management tool that may be useful in restoring native vegetation through seedbed preparation and decreasing cover of non-native species.

Fire history information has been compiled for the Monument (see Map 3-6, Fire History and Prescribed Burns). A fire of 416 acres moved up the east slope of the Caliente Mountains near Washburn Ranch in 1978. Human-caused wildfires burned in the southern Elkhorn Plain in the summers of 1993 and 1995, burning 225 and 1,800 acres, respectively. In May 1996, an escaped prescribed fire burned over 3,000 acres of grassland on the American Ranch. Three wildfires surrounding Soda Lake were sparked by mowers, burning 3,400 acres in 1994, 2,700 acres in 1996, and 530 acres in 1998. The Shell Fire burned over 6,000 acres in the Temblor Mountains in the summer of 2000. Over 2,300 acres burned in 2006, with the largest fire, the Beck Fire (1,666 acres), burning in grasslands on either side of Elkhorn Road in the northern portion of the CPNM.

3.3.2 Regulatory Framework and Current Fire Management Plan Direction

A single interagency policy for the management of wildland fire on federal lands was implemented in 1995 with the adoption of the Federal Wildland Fire Management Policy (FWFMP) (USDI/USDA 1995). The FWFMP was developed by the Secretaries of the Interior and Agriculture to respond to dramatic increases in the frequency, size, and catastrophic nature of wildland fires in the United States. The policy provides direction for suppression of unwanted fires, the use of naturally ignited fire for resource benefit, and the use of intentionally set or prescribed fire, as a management tool. The FWFMP also required all federal agencies to develop fire management plans (FMPs) for all burnable acreage within their jurisdictions. In January 2001, a “Review and Update of the 1995 Federal Wildland Fire Management Policy” was conducted by an interagency group, providing updated national direction (USDI et al. 2001).

The BLM Bakersfield Field Office FMP, approved in September 2004, identifies resource values and conditions pertaining to fire management in the Bakersfield Field Office planning area and recommends strategies for wildland fire suppression, prescribed fire, and non-fire fuels treatment. Classification of lands in the FMP is by fire management unit (FMU), which is any land management area definable by objectives, management constraints, topographic features, access, values to be protected, political boundaries, and other discernable features that set it apart from the management characteristics of an adjacent FMU. The CPNM was identified as a separate FMU in the Bakersfield Field Office FMP and

classified as a special management area as its primary resource management strategy. The special management area classification recognizes the area's National Monument status and indicates that special management techniques may be required to protect objects of interest in the CPNM FMU.

Fire protection priorities on the CPNM follow the national direction from the 2001 FWFMP:

The protection of human life is the single, overriding priority. Setting priorities to protect human communities and community infrastructure, other property and improvements, and natural and cultural resources will be based on the values to be protected, human health and safety, and the costs of protection.

The current FMP wildland fire suppression strategy is to limit individual fire size to 100 acres 80 percent of the time. Fires on the valley floor burning in grassland areas away from sensitive cultural sites and in fire intolerant shrub areas may be managed using a confine strategy, such as burning to the nearest road. It is estimated that approximately 20 percent of fires could meet these conditions, with fire size averaging 500 acres. The FMP sets the target area burned by unplanned wildland fire per decade at 10,000 acres. The decadal target for prescribed fire is 10,000 acres. Up to 4,000 acres per decade are targeted for fuels treatment using non-fire methods, such as mowing or other mechanical treatment. No areas were identified in the CPNM for wildland fire use.

3.3.3 Wildland Fire Suppression

The entire CPNM is within the direct protection area of BLM, with the exception of small inclusions of private land in Kern County, which is a state responsibility area (see Map 3-7, Fire Protection Providers). Cooperative agreements for fire suppression exist with the surrounding county fire departments (Kern, San Luis Obispo, and Santa Barbara), the state of California, and the Forest Service. A BLM fire station was staffed at the Washburn Ranch from 1997 to 1999; however, staffing was removed following administrative, economic, and logistical complications. The closest BLM fire station is the Midway Station, currently located near Shafter, over 50 miles away with a drive time of approximately 1.5 hours. The California Department of Forestry and Fire Protection, which staffs a fire station in California Valley, currently provides the closest source of fire suppression resources to the Monument. BLM meets annually with the Central Coast Operations group, a group consisting of representatives of all the local, state, and federal fire suppression agencies in the area, to discuss fire suppression tactics and special suppression considerations for all lands. The Central Coast Operating Plan includes a modified suppression plan for the CPNM that outlines suppression tactics to be used to minimize effects to sensitive resources. Limitations include using dozers only when necessary to protect life or property or other identified sensitive resources, minimizing new line construction and off-road travel, and restricting aerial retardant drops on rock outcrops and waterways. Minimum impact suppression tactics will be utilized within the Caliente Mountain Wilderness Study Area (WSA) and other areas having wilderness characteristics. The plan also requires that a BLM resource advisor be requested for all fires to advise suppression forces on resource issues.

There are several areas within the CPNM where fire is not desired and where mitigation and suppression are required to prevent direct threats to life or property. These areas include:

- Visitor use or administrative sites;
- Historic buildings;
- Key saltbush areas;
- Fire-sensitive archaeological sites, including, but not limited to, rock art sites; and

- Private structures or inholdings.

The Monument is being managed for the restoration of native species and natural processes to the greatest extent possible. While fire is a natural disturbance agent, there are several factors that must be considered when allowing fire to play its natural role in the ecosystem. Important considerations include potential damage to the sensitive areas listed above. Appropriate fire suppression responses are made considering the resources to be protected and tradeoffs among different suppression techniques. For example, direct, cross-country attack of fires burning in annual grasslands could potentially cause more damage to burrowing animals than the fire itself. Assuming no sensitive resources are at risk, the appropriate management response would be to allow the fire to burn to the nearest road, or backfire from the nearest road. More active suppression actions might be taken to suppress a fire before it reaches a key saltbush area, due to the fire intolerance of this important wildlife habitat community. Resource advisors will be consulted when determining appropriate management response whenever possible, realizing that some suppression decisions will need to be made by responding fire personnel in emergency situations.

3.3.4 Prescribed Fire and Non-Fire Fuels Treatment

Prescribed fire is another vegetation management tool that can alter community structure and composition. Its use as a vegetation management tool is also being studied in the Monument. Fire may be an effective tool to reduce nonnative annual grasses, giving perennial grasses a competitive edge and allowing them to become more widely established. Some communities, such as saltbush, are not fire-tolerant and prescribed burning treatments would be designed to protect these areas.

Several prescribed burns have been implemented in the Monument. In 1993, approximately 130 acres were burned in the West Well and Coyote pastures to benefit mountain plover habitat. TNC conducted a burn in 1996 in the south Goodwin pasture that escaped control, burning into the American Ranch Ecological Reserve. Also in 1996, BLM conducted a prescribed burn of approximately 2,400 acres in the east and west Painted Rock pastures. Approximately 240 acres were burned adjacent to Soda Lake in 1997 for hazardous fuels reduction. Habitat maintenance burns were conducted in the Center Well pasture in 1997 (2,000 acres) and the Selby pasture (1,100 acres) in 1998. A small research burn (21 acres) was completed in the Center Well pasture in 1998. Just over 500 acres were burned in the Saucito area in 1999 for hazardous fuels reduction and exotic species control. In 2006, approximately 800 acres were burned in the vicinity of the Goodwin Ranch. Several areas were seeded with native species following the burn. The area is being monitored to test the effectiveness of this restoration treatment.

Prescribed fire is also used on an annual basis to reduce hazardous fuels around developments and along road corridors. Dead vegetation, often dominated by tumbleweeds, is piled and burned.

Approximately 350 acres are mowed each year to reduce wildfire ignition risks around developments and along main roads. Other than piling vegetation for burning, this is the only non-fire fuels treatment conducted on a regular basis.

3.4 Air Quality

The majority of the CPNM is within San Luis Obispo County, with a very small portion on the eastern boundary in Kern County. San Luis Obispo County falls within the South Central Coast Air Basin, and Kern County is part of the San Joaquin Valley Air Basin. Table 3.4-1 illustrates the attainment levels for air both state and federal quality standards by county.

Under the stricter state standard, San Luis Obispo County is considered in non-attainment for both ozone and PM₁₀. The air quality trend in San Luis Obispo County between 2003 and 2006 has been mixed, with

Table 3.4-1. Air Quality

Standard	State Ambient Air Quality Standard		Federal Ambient Air Quality Standard	
	San Luis Obispo	Kern	San Luis Obispo	Kern
Carbon monoxide	Attainment	Attainment	Attainment	Attainment
Lead	Attainment	Attainment	Attainment	Attainment
Nitrogen dioxide	Attainment	Attainment	Attainment	Attainment
Particulate matter less than 10 micrometers in diameter (PM ₁₀)	Non-attainment	Non-attainment	Unclassifiable	Non-attainment
Particulate matter less than 2.5 micrometers in diameter (PM _{2.5})	Attainment	Non-attainment	Unclassifiable/attainment	Non-attainment
Ozone, 1-hour	Non-attainment	Non-attainment	Not applicable	Not applicable
Ozone, 8-hour	Non-attainment	Non-attainment	Unclassifiable/attainment	Non-attainment
Sulfur dioxide	Attainment	Attainment	Attainment	Attainment
Sulfates	Attainment	Attainment	No federal standard	
Hydrogen sulfide	Attainment	Unclassified	No federal standard	
Visibility reducing particles	Unclassified	Unclassified	No federal standard	

Sources: Cal/EPA 2007a, EPA 2007.

ozone levels being reclassified from attainment to non-attainment, and PM_{2.5} moving from unclassified to attainment. Currently, there are insufficient air quality monitoring data available to classify attainment status for federal standards for San Luis Obispo County for ozone, PM₁₀, and PM_{2.5}. Kern County is considered in non-attainment for ozone, PM₁₀, and PM_{2.5} at both the federal and state levels.

Neither county regards the CPNM as a source or concentration area for air pollution, due to its extremely low population density, little industry, and few major transportation corridors. BLM does not have any ongoing operations in the CPNM that require air quality permits from the state or federal government. The two primary unregulated sources of air pollution that can originate on public lands in the CPNM are smoke from fires and dust generated from road use, maintenance, and rehabilitation.

Prescribed fires are permitted by both the San Luis Obispo Air Pollution Control District and the San Joaquin Valley Air Pollution Control District. Under current management procedures, BLM submits a smoke management plan to the applicable air district to request a permit to conduct prescribed burns. Smoke management plans vary in the amount of information required based on the size of the proposed burn and its location to smoke-sensitive areas. Very basic information on location and timing is required for small projects (under 10 acres), while more detailed plans that include smoke mitigation procedures and methods of informing the public are required for larger projects. BLM maintains close communication with both air pollution control districts so smoke management plans are generally readily approved and burn day authorization is coordinated smoothly. In some instances, the San Luis Obispo Air Pollution Control District has been willing to authorize burning in the CPNM on a designated no-burn day due to the generally good air quality in the CPNM and the air district's understanding of the need to conduct prescribed burns for restoration purposes. Prescribed burning prescriptions require specific wind direction so that smoke is not funneled into the more populated California Valley area, especially when school is in session. Smoke monitoring is conducted during the burn, and burning is suspended if smoke impacts occur. The predominantly lighter fuels that comprise the grass and forb vegetation type produce less smoke than heavier fuels such as shrubs or trees. Smoke emissions from prescribed burning have intermittent effects on the visual resources of the CPNM and surrounding communities, but are usually of limited duration.

Dusty roads have minor localized effects on air quality since there are no asbestos-containing (ultramafic or serpentine-bearing) rock formations within the CPNM. Currently, road maintenance activities are performed during moderately wet periods during the fall and spring to ensure adequate soil moisture content. This seasonal operation reduces dust generation during grading and enhances road surface compaction, which results in road surfaces that are less prone to dust generation from routine traffic and less likely to erode under precipitation. CPNM operations are either not subject to or are currently fully compliant with all air pollution control requirements. The soil-dwelling fungus that causes valley fever is likely present in soils in the CPNM; this hazard is discussed in Section 3.16, Public Safety and Emergency Services, of this chapter.

Occasionally, easterly winds transport pollutants into the CPNM from the San Joaquin Valley. The southern and eastern portions of the CPNM most frequently receive the heaviest accumulations.

3.5 Soils

The soils of the CPNM vary widely. The presence of the San Andreas Fault and contact between the Pacific and North American plates brings together two very different source rock materials for soil formation. This geologic phenomenon provides for very complex soil types. Approximately 72 percent of the Monument soils are designated as sandy or loamy soils (coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam, loam, silt loam, clay loam, sandy clay loam, and silty clay loam) with the remaining 28 percent being clay soils located on the valley floor, Elkhorn Plain, and in isolated clay belts along the Caliente Mountains to the west.

3.5.1 Soil Types

A soil survey by the Natural Resources Conservation Service (2003) identified 10 general soil map units within the CPNM (see Map 3-8, General Soil Map Units). These units are grouped into three landscape sections as described in the following subsections.

3.5.1.1 Bolson (Valley) Floor Section or Playa Bottom

Chicote-Playas Unit: These are very deep, nearly level to moderately sloping, somewhat to poorly drained soils that formed in fine textured lacustrine sediments and alluvium on the valley floor. They are silty clay loams and silt loam soils. These soils are found in the Soda Lake Sink subregion (see Map 3-1, Carrizo Plain Subregions) and mainly support the sink/scrub vegetation.

Yeguas-Pinspring Unit: These are deep, nearly level and gently sloping, well-drained soils that formed in alluvium from mixed rock types on alluvial fans and alluvial flats on the valley floor. They are loam soils. These soils are found in the Panorama Hills and Carrizo Plain North subregions (see Map 3-1, Carrizo Plain Subregions) and mainly support the nonnative grassland vegetation.

3.5.1.2 Alluvial Flats and Fans, Flood Plains, and Terraces Section

Polonio-Padres-Wasioja Unit: These are very deep, nearly level to moderately sloping, well-drained soils that formed in alluvium from sedimentary rocks on alluvial flats and alluvial fans in the Carrizo and Elkhorn Plains. They are loam, clay loam, gravelly loam, and sandy loam soils. These soils are found in the Carrizo Plain Central, Carrizo Plain North, Caliente Foothills North, Caliente Foothills South, and Panorama Hills-Elkhorn Plain subregions (see Map 3-1, Carrizo Plain Subregions, and Section 3.2.1 Ecological Subregion Descriptions) and mainly support the nonnative grassland vegetation.

3.5.1.3 Hills and Mountains Section

Balcom-Nacimiento Unit: These are moderately deep to deep, strongly sloping to very steep, well-drained soils that formed in material weathered from sandstone and shale on hills and mountain slopes predominantly in the northwestern part of the Temblor Range. They are loam and clay loam soils. These soils are found in the Caliente Mountains North subregion (see Map 3-1, Carrizo Plain Subregions) and mainly support the scrub, shrub, and woodland vegetation.

Bellyspring-San Timoteo-San Andreas Unit: These are moderately deep, strongly sloping to very steep, well-drained soils that formed in residuum weathered from sedimentary rocks on hills and mountains in the Temblor Range. They are sandy loam soils. These soils are found in the Caliente Foothills South subregion (see Map 3-1, Carrizo Plain Subregions) and mainly support the scrub, shrub, and woodland vegetation.

Panoza-Beam-Hillbrick Unit: These are shallow to moderately deep, strongly sloping to very steep, well-drained soils that formed in residuum weathered from sedimentary rocks on hills and mountains in the Temblor Range, Caliente Range, Panorama Hills, and Elkhorn Hills. They are loam, stoney loam, sandy loam, and fine sandy loam soils. These soils are found in the Temblor Range, Caliente Mountains North, and Caliente Mountains South subregions (see Map 3-1, Carrizo Plain Subregions) and mainly support the scrub, shrub, and woodland vegetation.

Aramburu-Temblor-Reward Unit: These are shallow to deep, moderately steep to very steep, well-drained soils that formed in residuum weathered from sedimentary rocks on hills and mountains at the higher elevations in the Temblor Range. These soils are channery loam, very channery loam, and very channery clay loams. These soils are found in the Temblor Range subregion (see Map 3-1, Carrizo Plain Subregions) and mainly support the woodland vegetation.

Aido-Ayar-Hillbrick Unit: These are shallow to deep, moderately steep to very steep, well-drained soils that formed in residuum weathered from sedimentary rocks on hills and mountains mainly in the Temblor Range. These soils are clay and loams. These soils are found in the Caliente Mountain North subregion (see Map 3-1, Carrizo Plain Subregions) and mainly support the scrub, shrub, and woodland vegetation.

Godde-Xerorthents-Rock Outcrop Unit: These are rock outcrops and shallow, steep and very steep, well-drained and somewhat excessively drained soils that formed in material derived from sandstone at higher elevations on mountains in the Caliente Range. They are sandy loams and exposures of hard sandstone and shale. These soils are found in the Caliente Mountains North subregion (see Map 3-1, Carrizo Plain Subregions) and mainly support the scrub and woodland vegetation.

Semper-Rock Outcrop-Muranch Unit: These include rock outcrops and shallow to moderately deep, steep and very steep, well-drained soils that formed in residuum weathered from basalt and sandstone on hills and mountains in the Caliente Range. These soils are very fine sandy loam and loams. These soils are found in the Caliente Mountains North and Caliente Mountains South subregions (see Map 3-1, Carrizo Plain Subregions) and mainly support the scrub, shrub, and woodland vegetation.

3.5.2 Current Management

Current management practices have reduced or tried to reduce unnatural erosion. These practices include proper stocking rates for livestock, rotation of grazing (where applicable), rehabilitation of severely disturbed areas (prescribed burning and drill seeding for native species reintroduction), restriction of vehicles to roads and trails, and control of concentrated recreational activities. However, considering the natural mosaic of habitats among soil, landform, precipitation, temperature patterns, and vegetation

distributions, natural levels of soil erosion would be considered typical in most vegetative communities and soil types. Areas are currently managed to protect the characteristic soil types and plant communities.

3.6 Water Resources

The CPNM Proclamation includes an explicit reference to water rights:

There is hereby reserved, as of the date of this proclamation and subject to valid existing rights, a quantity of water sufficient to fulfill the purposes for which this monument is established. Nothing in this reservation shall be construed as a relinquishment or reduction of any water use or rights reserved or appropriated by the United States on or before the date of this proclamation.

There are no known existing water right issues within the CPNM. Should any water right be requested for access/removal of existing water, BLM would coordinate with the State of California to ensure that the intent of the Monument Proclamation is met.

The majority of the CPNM watershed is an internal drainage basin that lies between the Caliente Ranges on the west and the Temblor Range to the east. These mountains join together to close the basin at the southeastern tip of the CPNM. Runoff on the southern and western portions of the Caliente Mountain Range drains into the Cuyama Valley. The far southwest corner of the Monument incorporates approximately 200 meters of the Cuyama River at its confluence with Cottonwood Canyon. Here, water primarily flows below surface level, unless there has been recent rainfall.

No perennial streams or creeks are present within the Monument. Intermittent and ephemeral streams transport winter and spring runoff to Soda Lake. Covering about 3,000 acres in the center of the valley floor, this lake and the associated San Andreas Fault are the most distinctive geographic features of the Carrizo Plain. Although there are a number of dry lake/playa systems in the Mojave Desert, the Carrizo Plain's Soda Lake is the only feature of its kind in this region of California. Other ancient lakes formed along the San Andreas Fault in the south Coast Range (Jenkins 1973), but Soda Lake is the only extant closed-basin playa system. Core samples indicate that the lake has been present for at least 16,000 years (Rhodes et al. 2005). Like the Pleistocene lakes in the Great Basin region, Soda Lake dried up about 9,000 years ago (USGS 2004). As with other dry lake systems, the Carrizo watershed has no outlet. Winter rains falling on the surrounding plains and mountains drain into the depression in the valley center and then evaporate with the onset of summer heat. Occasionally, in years of above-average precipitation, water persists until the following rainy season. Normally, however, the dissolved salts carried from the surrounding landscape crystallize as the waters evaporate, leaving the lake bed covered with a bright white crust of mostly sulfate and carbonate salts, with less than 10 percent sodium chloride (USGS 2004). Soda Lake is downstream from the community of California Valley. The lake's water quality may be affected as development of that area continues. BLM currently has no program in place to monitor the water quality in Soda Lake or its tributaries. Map 3-9, Hydrographic Features, shows subbasins and springs within the National Monument.

Water also collects in numerous vernal pools, primarily on the north end of the CPNM. Water may be present for only a few days some years or, in wet years, from October into June. Species inhabiting the vernal pools and other ephemeral aquatic habitats are discussed in Section 3.2.2.2.

The majority of the Carrizo Plain is not in a floodplain and is considered to be in Federal Emergency Management Agency Flood Zone C, an area of minimal flooding. The CPNM contains a number of intermittent and ephemeral drainages that flow during heavy rains and are classified in Flood Zone A, areas that are within the 100-year floodplain. These areas have been designated as no-development zones.

Natural springs are common on the Caliente Mountains, but few springs are present on the Temblor Range. Inventory records show approximately 40 springs within the CPNM, with the majority located in the Caliente Mountains. Of these, 11 are recorded as public water reserves and are on file at the Bakersfield Field Office. Fifteen springs have been developed for livestock use (stockponds are associated with some), and they are also available for wildlife. Analysis of springs in the Wells Ranch area and the Caliente Mountains indicated most had very hard alkaline water. Levels of nitrates, sulfates, iron, fluoride, sodium, and total dissolved solids were above recommended levels in one or more springs (BLM 1982). The number of seeps is uncertain, many of which appear to form in response to the year's precipitation.

3.7 Wild and Scenic Rivers

There are no existing wild and scenic river designations within the Monument.

The *Wild and Scenic Rivers Act* of 1968 (Public Law 90-542) was passed by Congress to preserve riverine systems that contain outstanding features. The law was enacted during an era when many rivers were being dammed or diverted and is intended to balance this development by ensuring that certain rivers and streams remain in their free-flowing condition. BLM is required to evaluate stream segments on public lands as potential additions to the National Wild and Scenic Rivers System (NWSRS) during the RMP process under Section 5(d) of the Act. Formal designation as a wild and scenic river requires Congressional legislation, or designation can be approved by the Secretary of the Interior if nominated by the governor of the state containing the river segment. Although there are no perennial rivers within the Monument, the Act and the NWSRS has been applied to a broad range of waterways including some intermittent streams that are significant within the context of surrounding arid environments. The NWSRS study process has three distinct steps:

- Determine what rivers or river segments are eligible for NWSRS designation. The eligibility determination is limited to an assessment of whether or not a stream segment is free flowing and has one or more outstandingly remarkable values (such as geologic, recreational, fishery, or others).
- Determine the potential classification of eligible river segments as wild, scenic, recreational, or any combination thereof. Each of these classifications is based on the level of development within the corridor (for example, a wild segment is essentially roadless and undeveloped, while a recreational segment can have a relatively high level of development).
- Conduct a suitability study to determine if the river segments are suitable for designation as components of the NWSRS. The suitability analysis answers specific questions such as whether or not the segment is a worthy addition to the system, if alternate forms of protection available, if other land uses would be curtailed, or if there is local support.

The Soda Lake watershed was analyzed for eligibility and suitability in the 1997 Caliente RMP and found not to be eligible for wild and scenic river designation. This decision is being carried forward in the CPNM RMP. The following geologic features/watersheds within the CPNM were assessed in this RMP to determine their eligibility and suitability for consideration under the *Wild and Scenic Rivers Act*: Wallace Creek, Cuyama River, and Abbott Canyon. The eligibility findings for these features are found in Appendix F, Wild and Scenic River Eligibility Analysis.

3.8 Climate

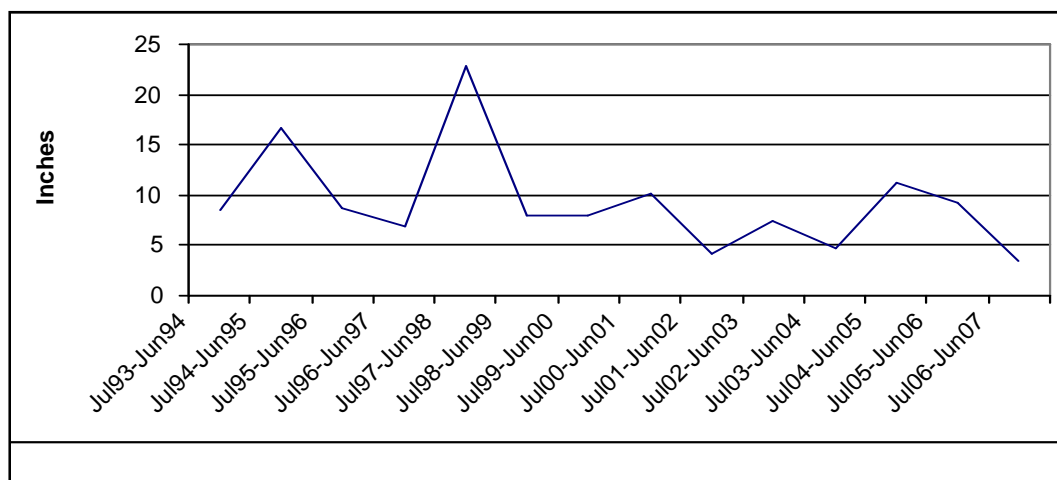
The CPNM has a Mediterranean climate, with warm, dry summers and cool, wet winters. Most precipitation occurs between November and April, primarily as rain. However, occasionally snow falls, usually in the mountains, but occasionally on the valley floor. Within an individual year, temperature and

the amount of precipitation vary from north to south and by elevation. Precipitation patterns are dependent on storm direction and the interception of clouds by local topography. Overall, the Temblor Range is drier than the Caliente Mountains since storms usually intercept the Caliente Mountains first. Judging from vegetation response, precipitation on the Carrizo Plain appears to be very patchy. Although the north is generally wetter, in the drought year 2007, the southern end of the CPNM received more precipitation than the northern parts. Temperature patterns follow a typical elevation gradient and the valley floor tends to be warmer than the surrounding mountains.

Water temperature in the Pacific Ocean has a major influence on the Monument’s climate and is a good predictor of yearly precipitation. Two major temperature and associated atmospheric patterns have been identified: El Niño/Southern Oscillation (ENSO) in the southern Pacific, and the Pacific Decadal Oscillation (PDO) in the northern Pacific. Generally, warmer ocean temperatures in the Pacific are associated with higher than average precipitation in the Southwest. The El Niño pattern has the stronger effect, but the intensity of the response and the resulting precipitation is modified by the long-term patterns of the PDO. The greatest effect is when the two patterns coincide (Gershunov and Barnett 1998; McCabe and Dettinger 1999). Heavy precipitation years, such as 1997–1998, occur when El Niño effects are strengthened by a warm sequence in the PDO cycles. Droughts are more intense when La Niña coincides with colder than average PDO values (Nigam et al. 1999). Based on analyses of currently available climate change models, specific components of the ENSO system are expected to shift, but overall, the major patterns will remain unchanged (Collins et al. 2005; Van Oldenborgh et al. 2005).

Some idea of the climate on the Monument can be derived from the weather station located south of the Washburn Ranch (see Figure 3.8-1 and Table 3.8-1). This station is part of the Western Regional Climate Center’s Remote Automated Weather Station system and has operated for the last 15 years (Western Regional Climate Center 2007). Average temperatures in the summer range in degrees Fahrenheit (°F) from the low 50s at night to the upper 90s during the day. Daytime temperatures often exceed 100 °F, with a record high of 115 °F. Average winter temperatures range from highs in the mid 60s to lows in the mid 30s, with a record low of 0 °F. At the weather station, precipitation averages about 10 inches per year, ranging from a low of 3.5 inches during the 2006-2007 season to 22.9 inches during the El Niño event in 1997-1998. The driest areas on the Monument appear to receive much less rainfall, but this has not been documented with weather station data. Precipitation maps show average rainfall between 8 to 12 inches for the valley floor. Winds are generally from the south or southeast, averaging 5 mph in the morning, increasing to 10 mph by late afternoon, and dropping back down at sunset (see Figure 3.8-2).

Figure 3.8-1. Yearly Precipitation at the Washburn Ranch, CPNM 1993–2007



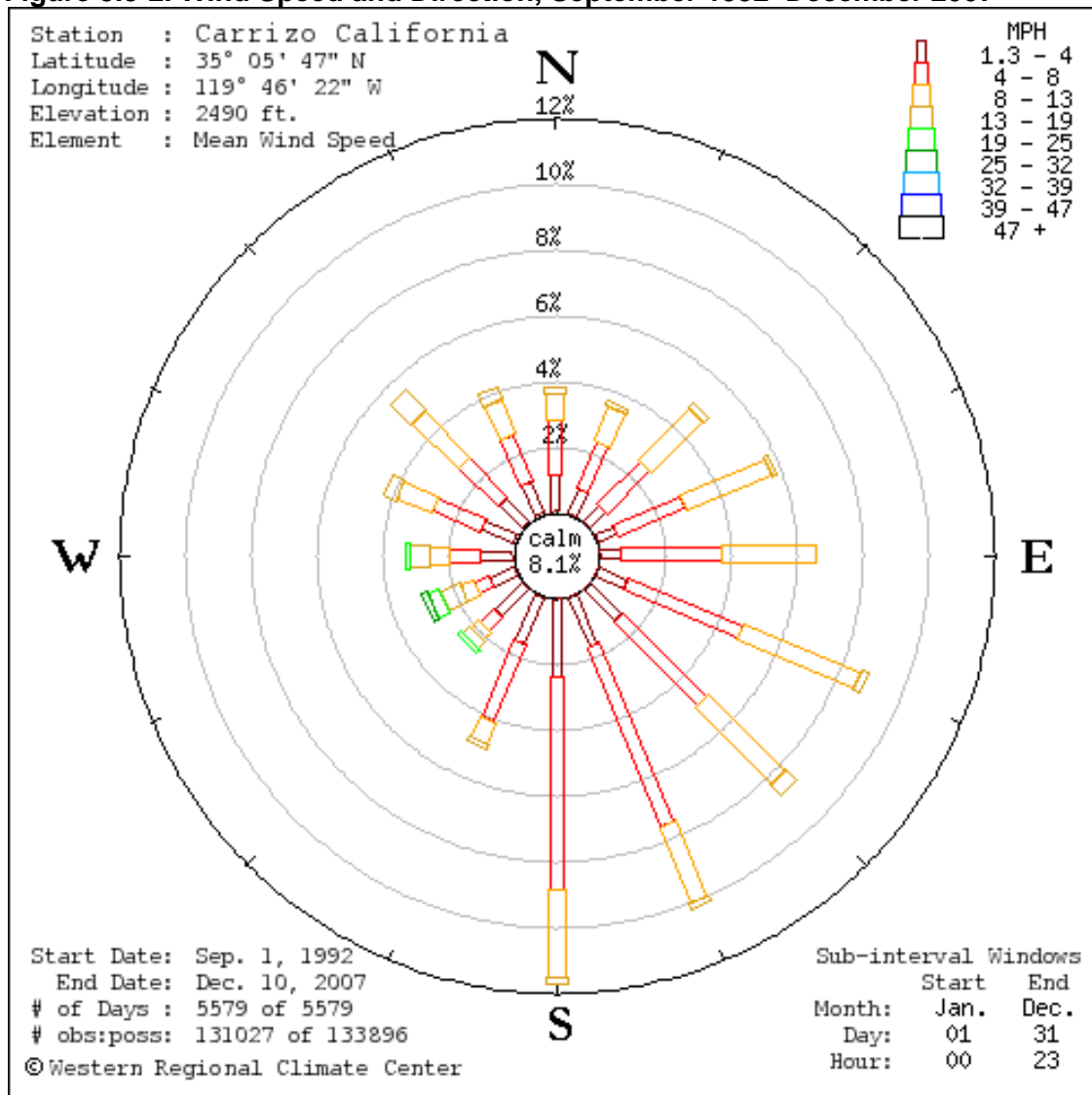
Source: Western Regional Climate Center 2007.

Table 3.8-1. Average Monthly Climate Summary at the Washburn Ranch, CPNM, September 1992 to August 2007

	Rainy Season						Dry Season						Year*
	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	
Total Precipitation (inches)	0.74	1.37	1.72	2.57	1.58	0.66	0.29	0.02	0.05	0.01	0.11	0.45	9.4
Maximum Temperature (°F)	60	53	55	55	60	62	74	77	85	82	78	70	63
Minimum Temperature (°F)	46	45	46	46	45	51	54	66	76	75	68	61	59

Source: Western Regional Climate Center 2007.

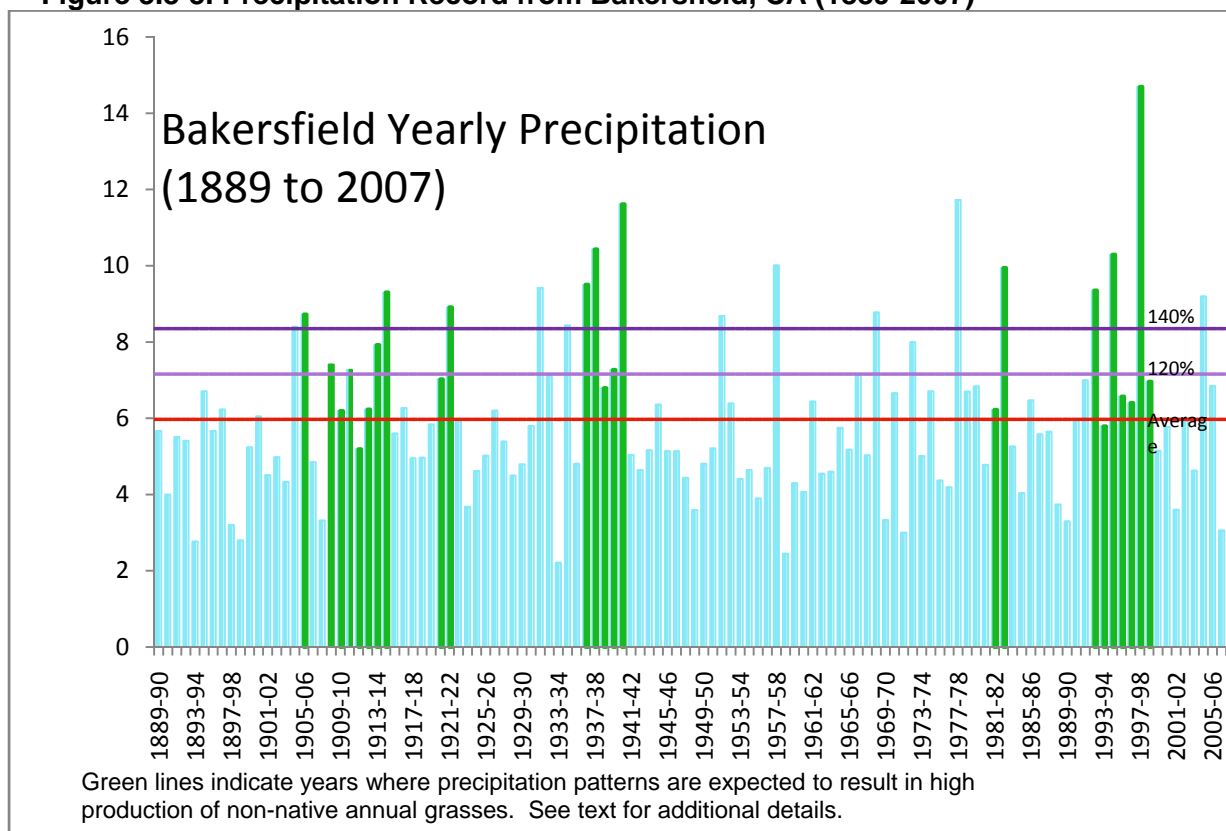
Figure 3.8-2. Wind Speed and Direction, September 1992–December 2007



Source: Western Regional Climate Center 2007.

Some sense of the great variation in yearly precipitation on the Monument can be obtained by looking at the 118-year climate record from Bakersfield (Figure 3.8-3, NOAA 2008). The Carrizo precipitation record of the last 15 years (the available Washburn data) matches the Bakersfield record; however, Bakersfield, on an annual basis, consistently gets less precipitation. The basic shape of the two graphs is the same and the 118 years of Bakersfield data can be used to estimate how often the precipitation pattern would be expected to result in a grassy year, that is, one in which non-native annual grasses dominate the landscape, to the detriment of native species. Grassy years would be expected when precipitation is high and a large seedbank of annual non-native grasses present. These are the types of years where vegetation management actions might be taken to combat the growth of the non-native grasses.

Figure 3.8-3. Precipitation Record from Bakersfield, CA (1889-2007)



Source: NOAA 2008.

Two precipitation patterns are expected to result in grassy years: (a) when precipitation is $\geq 140\%$ of average, unless preceded by 3-4 years of drought (annual non-native grass seeds are short-lived and seed bank populations diminish during drought periods), and (b) when there are a series of 3-4 years when precipitation is above average and at least one of the years is $\geq 120\%$ of average. In both patterns, annual non-native grasses are favored and seed production is expected to be high. These two patterns occur 5-6 times in the 118 years, ranging in duration from 1-7 years each, for a total of 22-23 grassy years (about 20%). Although this is an average of two years out of ten, it should be noted that most of the grassy years came from three groups of 5-7 years, separated by drier, less grassy intervals of 2-40 years.

Precipitation has a major influence on the CPNM's ecology, and management must respond to this variation when addressing important issues such as the quality of endangered species habitat, the success

of restoration activities, the amount of recreational use, and whether sufficient forage is available for livestock. The desired open habitat for the San Joaquin Valley suite of endangered species is realized during average and drier years; however, prolonged droughts and high rainfall years are correlated with population declines. In the latter condition, vegetation management tools may help counteract the accumulation of weedy biomass (almost entirely nonnative annual grasses). The restoration of native vegetation depends on getting sufficient rainfall for seed germination and establishment, but planning restoration projects and gathering seed stock must be done before the current year's rainfall predictions are available. Seed acquired prior to a forecast drought may need to be placed into storage for use during more optimum years. The level of recreational use during the spring is related to the strength of the wildflower bloom, which, in turn, is related to precipitation and temperature patterns. Wet El Niño years tend to generate spectacular wildflower displays and visitor numbers are high. Grazing management is also affected by the climate. Grazing prescriptions such as when to allow livestock on a pasture are based on various factors, including how much biomass is available, with the expectation that additional vegetative growth will occur as the season progresses. If precipitation is inadequate, the grazing season may be shortened or canceled altogether.

3.8.1 Climate Change

The Intergovernmental Panel on Climate Change reports that the southwestern United States is likely to become hotter and drier (Christensen et al. 2007). This prediction is the most current and thorough analysis of expected global climate change and is based on information from four potential sources: Atmosphere-Ocean General Circulation Model (AOGCM) simulations, downscaling of AOGCM-simulated data using techniques to enhance regional detail, physical understanding of the processes governing regional responses, and recent historical climate change. Analysis using a Regional Climate Model (RCM), shown to have good predictive value for California, also indicates that the Monument is likely to be hotter and drier in the future (Kueppers et al. 2005). The RCM scenario was considered better than its AOGCM counterpart because the RCM had a much finer resolution and was based on local topography, distance from the coast, latitude, and other fine-scale attributes not available in an AOGCM. The California Energy Commission (2005), using older analyses, also predicted increased temperatures, but precipitation trends were unclear.

Drier conditions for the CPNM mean that, overall, there would be less vegetative growth. A change in vegetation zones is also expected. Oak and juniper woodlands would tend to shift to scrublands, scrublands to grasslands, and grasslands to desert-like habitat with significant portions of bare soils or, hopefully, biological crusts. Woodlands may be lost altogether from the Monument (Kueppers et al. 2005). With a slight drying, the wild oat grasslands in the northern part of the Monument would be expected to shift to brome-dominated grasslands. The conversion of grasslands to desert may be accelerated if winds erode unprotected soils exposed during droughts. As the general area becomes drier, plant communities and animal guilds are expected to migrate northward or upward in elevation, at least those species that can. Depending on the strength and rapidity of the change, some elements of the flora may disappear. As precipitation levels and recharge decline, some springs would dry up, while others would diminish in flow.

The amount and persistence of vegetation is expected to change. There would be less thatch generated, but, because winter moisture levels would be lower, less thatch would decompose. How this would affect the total amount of persistent biomass is unclear and would depend on the amount and pattern of precipitation as well as on the activities of kangaroo rats and other herbivores. With less precipitation, there would be less annual production and, overall, less food and water resources for animals. Less vegetative growth and a corresponding decrease in seed production are expected to depress population size of herbivorous and granivorous species such as kangaroo rats, rabbits, pronghorn, ants, and grasshoppers. Carnivores that prey on these primary consumers would be similarly affected.

With a drier climate, there should be more drought years, more years where the introduced annual grasses do poorly, and more years where the grassland vegetation is dominated by native drought-adapted species with long-lived seeds. However, there may be an invasion of weedy exotic species now prevalent in southern California deserts such as *Brassica tournefortii* (Saharan mustard) and *Schismus* spp. (Mediterranean grass). With fewer wet years, the grassland vegetation should remain at a lower, more open structure, thought to be optimum for the San Joaquin Valley species (kangaroo rat, antelope ground squirrel, blunt-nosed leopard lizard, and horned lizard) and thus fewer years where vegetation management may need to be applied in the core areas. Overall, population levels of these species are expected to reflect the benefits associated with a more open habitat versus the liabilities of increased droughts and an overall decrease in food and water resources.

3.8.2 Acid Rain

Due to the remote setting of the CPNM, acid rain is not a concern at this time. The main sources for the sulfur and nitrogen compounds involved in the formation of acid rain in central California are vehicle emissions, farm and other off-highway equipment, oil production, and industrial processes (Cal/EPA 2007b; Corfidi 2004). If future development in the area increases local pollution levels, there may be concern, especially during foggy periods. Recent research in southern California indicates that fog readily combines with air pollutants to form acid fog, with higher acidity and potentially more devastating effects than acid rain (Roberts 1982).

3.9 Geology and Paleontology

The Monument Proclamation describes the value of the CPNM's geological resources:

The Carrizo Plain National Monument owes its existence to the geologic processes that occur along the San Andreas Fault, where two of the Earth's five great tectonic plates slide past one another, parallel to the axis of the Plain. Shifting along the fault created the Plain by rumpling the rocks to the northeast into the Temblor Range and isolating the Plain from the rest of the San Joaquin Valley. The area is world famous for its spectacular exposures of fault-generated landforms. Stream valleys emerge from the adjacent mountains, only to take dramatic right-angle turns where they intersect the fault. Ponds and sags form where the ground is extended and subsides between branches of the fault. Benches form where the fault offsets valley walls. Many dramatic landscape features are products of the interplay between very rapid fault movement and slower erosion. The dry climate of the area produces low erosion rates, thereby preserving the spectacular effects of fault slip, folding, and warping. On the Plain, these fault-related events happen intermittently, but with great force. In 1857, the strongest earthquake in California's recorded history ripped through the San Andreas Fault, wrenching the western side of the Carrizo Plain National Monument thirty-one feet northward.

The area is also distinguished for its significant fossil assemblages. The Caliente formation, exposed on the southeast side of the Caliente Range, is host to abundant and diverse terrestrial fossil mammal remains of the Miocene Epoch (from 13 million to 25 million years ago). Fossils of five North American provincial mammalian ages (Arikareean, Hemingfordian, Barstovian, Clarendonian, and Hemphillian) are represented in sedimentary rocks in that formation. These terrestrial fossil remains are interlaced with marine sedimentary rocks bearing fossils of mollusks, pectens, turitellas, and oysters

3.9.1 Regional Topography

The core of the CPNM encompasses two plains: the Elkhorn and the Carrizo. The Elkhorn Plain, nearly 20 miles long and 2 miles wide, lies at the western base of the Temblor Range. Elevation ranges from

2,300 feet at the southern end and gently rises to 2,500 feet toward the north where it gradually terminates with its convergence with the Temblor Range and the San Andreas Fault. Movements of the San Andreas Fault formed the Elkhorn and Panorama Hills that separate the Elkhorn Plain from the Carrizo Plain. The Carrizo Plain, located west of the San Andreas Fault, extends to the eastern base of the Caliente Range. It occupies the central portion of the Monument and is a high-elevation internal drainage basin. The valley floor is roughly 50 miles long and 6 miles wide with an average altitude of 2,000 feet. The Caliente Range, rising to 5,106 feet, is a prominent backdrop to the west while the Temblor Range to the east rises to 4,332 feet. The southern end of the Caliente Range bends east to parallel the Transverse Ranges geomorphic province. Painted Rock, one of the most widely known landmarks within the Monument, is an isolated monolithic outcrop consisting of cemented Miocene marine sandstone of the Painted Rock member of the Vaqueros formation. Southwest of the Caliente Range, the Cuyama Valley is deeply set between the Caliente Mountains and the Sierra Madre Mountains. This valley is approximately 40 miles long and 6 miles wide. The San Emigdio Mountains trend southeastward toward Mount Pinos, part of the Transverse Ranges. East of the Temblor Mountains are a series of more or less distinct foothills leading toward the San Joaquin Valley. The community of California Valley is located immediately north of the Monument and is bordered to the west by Freeborn Mountain and the La Panza Range.

During wetter periods of recent geologic history, runoff from the Carrizo Plain drained north via the ancestral Salinas River. Since then, uplift at the north end of the Carrizo Plain has cut off this drainage, causing all runoff to drain to the lowest part of the plain into Soda Lake. More springs are found in the Caliente Range than in the Temblor Range. This may be attributed to higher precipitation on the Caliente Range, the presence of volcanic rocks or faults that act as groundwater dams forcing water to the surface, and to higher diatomaceous shale content in the Temblor Range that may be more permeable and absorptive (Carter 1985; Dibblee 1962, 1973a, 1973b; Ryder and Thompson 1989; Vedder 1970; Vedder and Repenning 1975).

3.9.2 Geology

The geology of the Monument is the product of millions of years of erosion, sediment deposition, faulting, volcanism, and uplift. From a geological perspective, the mountains and valleys are relatively young. Most of the sediments that consolidated to form the rocks were deposited well after the extinction of the dinosaurs. See Map 3-10, Generalized Geology. The yellow and orange shades on the map represent the younger sediments while the pink represents volcanic rocks. Older sediments are shown in shades of green. Fossils are found in both the older and younger sediments (Carter 1985; Dibblee 1962, 1973a, 1973b; Ryder and Thompson 1989; Vedder 1970; Vedder and Repenning 1975).

Marine sedimentary rock predominates in both the Caliente and Temblor Ranges. This sedimentary rock has both an inorganic and an organic origin. Inorganic sedimentary rock includes sandstone, clay-shale, and conglomerate containing boulders and cobbles. Sedimentary rock of an organic origin includes shale composed of the remains of microscopic plants and animals with a varying component of clay. There are also some organic limestones in the Santa Margarita formation on the west side of the San Andreas Fault. Additionally, sandstones, shales, and conglomerates of marine and non-marine origin are interlayered with volcanic flows in the Caliente Range (Carter 1985; Dibblee 1962, 1973a, 1973b; Dougherty 1940; Ryder and Thompson 1989; Vedder 1970; Vedder and Repenning 1975). The San Emigdio and Sierra Madre Ranges to the south consist of similar rock formations. However, these ranges are oriented east-west compared to the north-south trend of the Temblor and Caliente Ranges (Dibblee 1973a, 1973b; Dougherty 1940; Ryder and Thompson 1989).

About nine million years ago, the granitic northern Gabilan Range lay directly west of the present-day southern Temblor Range. Boulders, cobbles, and coarse sand eroded from this old granite block and were deposited in the area of the Elkhorn Plain. These deposits are important for understanding the history of

the San Andreas Fault. Movement on the San Andreas Fault has since displaced the northern Gabilan Range 120 miles north near Hollister. This sedimentary rock is exposed in the vicinity of Cochora Ranch in the Temblor Range and is known as the Santa Margarita formation. Several endangered and threatened plant species are found on soil derived from this formation (see Section 3.2.3 Vegetation) (Carter 1985; Dibblee 1962, 1973a, 1973b; Ryder and Thompson 1989; Vedder 1970; Vedder and Repenning 1975).

The San Andreas Fault, over 625 miles long, traverses the Monument from north to south near the western base of the Temblor Range. The surface trace of the fault is displayed by creek bed offsets and fault scarps, which are particularly well-preserved in the Carrizo Plain. In part because of the preservation of these physical features, there has been considerable academic research of the fault. The Fort Tejon earthquake of 1857, with a magnitude over 8.0 on the Richter scale, was centered in the Monument and was the strongest earthquake to hit California within historic time. Surface ruptures extended a total of 200 miles and offsets of 30 feet occurred within the Monument. Future seismic activity within the Monument is highly likely (Carter 1985; Dibblee 1962, 1973a, 1973b; Ryder and Thompson 1989; Vedder 1970; Vedder and Repenning 1975).

Research has been conducted on geological and paleontological aspects of the Monument since the 1906 San Francisco earthquake. Recent geophysical investigations measuring natural electrical current present at the earth's surface have been particularly successful due to the Monument's isolation from population centers and lack of electrical interference. These investigations provide geophysicists a passive method to determine rock types several miles below the surface to help study the geology across the San Andreas Fault. Low rainfall and sparse vegetation enhance opportunities to map geologic formations and features. Work within the Monument has enabled reconstruction of earthquake events over the last 2,000 years and has improved understanding of the San Andreas Fault (Carter 1985; Dibblee 1962, 1973a, 1973b; Ryder and Thompson 1989; Vedder 1970; Vedder and Repenning 1975).

3.9.3 Paleontology

The Monument is distinguished for its world-class fossil assemblages (paleontology) and well-exposed rock outcrops (stratigraphy). Several rock formations were first recognized and defined within the Monument. Present within the Monument are the "type locale" (site of the first definitive published description) of the Pattiway and Simmler formations, the Saltos Shale and White Rock Bluff members of the Miocene Monterey formation, the Soda Lake Shale and Painted Rock members of the Vaqueros formation, and the Paso Robles, Caliente, and Morales formations. These locations will be of continuing academic interest (Carter 1985; Dibblee 1962, 1973a, 1973b; Dougherty 1940; Ryder and Thompson 1989; Vedder 1970; Vedder and Repenning 1975).

In the Caliente Range, the Caliente formation contains diverse terrestrial fossil remains interfingering with fossil-bearing marine sedimentary rocks. The formation records continuous deposition during the Miocene Epoch (from 13 million to 25 million years before present) and contains the original type locale for an early horse species. In addition, the Caliente and Painted Rock formations contain significant vertebrate fossil assemblages that include ancient varieties of dog, wolf, cat, mouse, rat, and other rodents (Dibblee 1962).

In the Temblor Range, there are a series of Miocene and Pliocene marine sediments that locally contain both vertebrate and invertebrate fossils (Carter 1985; Dibblee 1962, 1973a, 1973b; Ryder and Thompson 1989; Vedder 1970; Vedder and Repenning 1975).

There have been a series of geological mapping surveys conducted in the Monument that identify the potential for paleontological resources in specific formations within the Caliente and Temblor ranges. Both invertebrate and vertebrate fossils occur in these geologic formations. Soda Lake was once much

larger than it is at present, and the Pleistocene sediments around this Ice Age lake have potential for significant vertebrate and invertebrate paleontological discoveries (Dibblee 1973b).

3.10 Cultural Resources

The Monument Proclamation recognizes:

...the area is rich in human history... Bedrock mortar milling features, village middens, and elaborate pictographs are the primary manifestations of prehistoric occupation. Some of these, such as the Painted Rock and Sulphur Springs rock art sites, are recognized as world class. European expeditions through the area date back to the late 1700s, with settlement beginning in the 1850s. Livestock ranching, farming, and mining activities in the last century and a half are evidenced by numerous artifacts and historic ranch properties within the area.

Cultural resources, including both prehistoric and historic resources, represent a continuum of events from the earliest evidence of humans on the Carrizo Plain through the historic period. Recent archaeological inventory and assessment of cultural resources in the Monument by David Whitley (Whitley et al. 2004) indicates the Native American population was well-established on the Plain from 4,000 to 800 years ago. Whitley's archaeological investigations also suggest the Paleo-Indian may have initially used the Carrizo Plain approximately 9,000 to 10,000 years ago. In the geographic region encompassing the Monument, human presence begins 12,000 to 8,000 years ago with the early cultures in the nearby San Joaquin Valley (Moratto 1984).

Although there are no known documented visits by the Spanish to the Carrizo Plain, their presence is well-established in areas adjacent to the Monument. The first European expedition into the adjacent San Joaquin Valley in 1772 was led by Pedro Fages and his Spanish soldiers as they traveled through the Tejon Pass to the Valley and westward to San Luis Obispo.

Significant cultural resources in the Monument include both prehistoric and historic sites dispersed primarily along the southwestern margin of the Carrizo Plain. The cultural and traditional values associated with these resources are of interest to researchers, public visitors, and Native Americans. Although vandalized in past years, Painted Rock is recognized internationally through conservation groups such as the Getty Conservation Institute, who conducted studies at the site (Thorn 1991). Campbell Grant, a recognized writer on Native American rock art, stated that Painted Rock once exhibited "the finest of known...pictographs" in the United States (Johnson 1985). Grant (1978) further states that Chumash rock art certainly reached its highest development on the Carrizo Plain.

There are two categories of cultural resources defined in BLM Manual 8100, The Foundations for Managing Cultural Resources (BLM 2004): cultural properties and traditional cultural properties. Cultural properties are a definite location of human activity, occupation, or use identifiable through field inventory, historical documents, or oral evidence. The term includes archaeological, historic, or architectural sites, structures, or places with important public or scientific uses, and may include definite locations (sites or places) of traditional cultural or religious importance to specified social and/or cultural groups. Traditional cultural properties derive significance from traditional values associated with it by a social or cultural group such as an Indian tribe or local community. Traditional values are a social or cultural group's traditional systems of religious belief, cultural practice, or social interaction, but not always closely identified with definite locations. Some examples of traditional cultural properties could include a sacred mountain peak, archaeological site, or important plant gathering area or trail used by Native Americans (BLM 2004).

3.10.1 Prehistoric Resources

Of the 181 cultural resource sites recorded in the Monument, 132 of these sites are prehistoric, 41 are historic, and 8 are multi-component sites consisting of historic and prehistoric elements.

Evidence of archaeological resources associated with American Indian settlement, occupation, trade, and special activities in the Monument attest to cultural and traditional values associated with the Carrizo Plain landscape. There were 24 archaeological sites, including Painted Rock, listed in the National Register of Historic Places (NRHP) in 2001, as these cultural properties possess important information about the prehistory and artistic expression of the native peoples that inhabited the Carrizo Plain (Whitley 2001). In 2007, BLM, in collaboration with Whitley and the National Park Service, nominated 90 prehistoric cultural resource sites to the NRHP as eligible cultural properties for inclusion as a National Historic Landmark. Such designation recognizes the exceptional importance of cultural properties in the Monument at a national level, thereby affording greater opportunity for site protection, preservation, and educational and valid research considerations.

Cultural resource inventories completed on public and nonfederal lands in the Monument to date encompass nearly 9.7 percent of the 250,000 acres, or about 24,288 acres. Of the 132 known prehistoric sites in the Monument, common site types include rock art, most frequently in the form of pictographs; special activity areas for community and family events; rock configurations and shelters; stone flake scatters associated with the manufacture of lithic tools; camps for short- and long-term habitation; rock quarries for procurement and use of raw materials; and plant processing areas such as bedrock mortar and milling stations. An additional eight archaeological sites are multi-component, consisting of both prehistoric and historic elements. These resources and their distribution patterns suggest both seasonal and year-long occupation. Of the cultural resources recorded in the Monument, 72.9 percent are prehistoric and 4.4 percent are multi-component.

Archaeological investigations conducted by Whitley in 2001, 2003, and 2004 identified occupation by native peoples on the Carrizo Plain from at least 2000 BC to AD 1800. These studies suggest an increase in populations during times of more favorable climatic conditions on the Carrizo Plain spanning some 4,000 to 800 years ago (the Middle Period). In contrast to the dense populations found on the coast during the Late Prehistoric Horizon (800 to 200 years ago), population in the Monument appears to have decreased during this dry climatic period.

The proximity of the CPNM to the San Joaquin Valley, where early cultures have been documented along the ancient shorelines of Buena Vista and Tulare lakes, and the presence of a significant ancient lake basin (Soda Lake) within the Carrizo Plain, suggest Paleo-Indians may have used the Carrizo Plain as early as 9,000 to 10,000 years ago. This is further supported by the presence of very old, highly oxidized soils (paleosols) at several archaeological sites that are associated with diagnostic artifacts (Whitley et al. 2004).

Painted Rock is the most visited archaeological site in the Monument. Access is restricted to guided tours from March 1 through July 15, with the majority of tours occurring when the Goodwin Education Center is open to the public from March 1 to the end of May. Access restrictions are required to protect sensitive cultural and wildlife resources during the peak period of tourist visitation. The site has self-guided access from July 16 to February 28. Painted Rock is currently managed as a point of public visitation and protection of its traditional Native American values. The Sulphur Spring archaeological site is officially closed to public visitation due to the extremely fragile nature of this rock art site. The site is managed for the purposes of protection and long-term conservation.

3.10.2 Native American and Ethnographic Resources

At the time of Euro-American contact, the Carrizo Plain was situated in the tribal vicinity of three Native American cultural affiliations: the Chumash, the Southern Valley Yokuts, and the Salinan people. Although no ethnographic villages have been confirmed on the Carrizo Plain, archaeological and ethnographic information indicates the Chumash were its primary inhabitants. Johnson (1985) states that Chumash villages are known to the west and south of the Carrizo Plain in the nearby Cuyama Valley and the San Emigdio Mountains. Kroeber (1925) is somewhat vague in his interpretation stating, "The Carrizo plains are doubtful as between Chumash and Salinans, and may not have contained any permanent villages." Other researchers have suggested that the stylistic rock art elements at Painted Rock and other sites on the Carrizo Plain indicate that it was primarily used by the Chumash and, to some degree, by other groups such as the Yokuts (Grant 1978; Lee 1984). Excavations on the Washburn Ranch identified the presence of late prehistoric artifacts characteristic of the Chumash (Finnerty 1963). Latta (1949) stated in a 1920s interview with Indian descendants from Santa Rosa Indian settlement and Tejon Canyon that the Carrizo Plain was occupied by Chumash.

The ethnographic village of K'o'owshup is mentioned in the mission documents pertaining to the Carrizo Plain but the precise location of this habitation site in the CPNM is uncertain. Whitley et al. (2004) reported that 14 individuals had been identified in the mission records as being born at this village.

It is clearly recognized that a number of different Yokuts tribelets occupied the Central Valley of California, extending from the delta south of Sacramento to the Grapevine at the southern terminus of the San Joaquin Valley. Their tribal lands also included the foothills adjacent to the west and east side of the Valley. The southeastern area of the Temblor Range falls within the CPNM and the tribal territory of the Tulamni Yokuts (Kroeber 1925).

There is no known ethnographic or archaeological evidence to support the presence of the Salinan tribal people's use of the Carrizo Plain and the adjacent mountain ranges within the Monument. However, villages attributed to the Migueleño Salinan (southern division of the Salinan, closest to the Monument) are found approximately 40 miles to the northwest of the CPNM in the Cholame Valley (Hester 1978). The stylized rock art elements characteristic of the Salinan may suggest a possible connection to the Carrizo Plain.

Both the Spanish and Mexican periods in California were marked with oppression and death as the indigenous peoples were forced into labor on missions and ranchos while falling to disease by the thousands. However, bands of Native Americans persisted in many isolated regions of California. Native Americans currently do not live on private land within the Monument. However, there are Native Americans living in the adjacent community of California Valley (located north of the Monument) and to the east of the Monument.

The Chumash, Yokuts, and Salinan people use areas in the CPNM today for traditional uses such as plant gathering and conducting ceremonial activities at Painted Rock. Under a charter agreement initiated in 1997 between BLM and representatives of the three aforementioned native peoples, a Native American Advisory Committee was established for the Carrizo Plain. This Advisory Committee actively participates in planning and project activities with the managing partners in the CPNM. The Advisory Committee was formed to encourage participation of both the federal tribes and the non-federally recognized Native Americans having ancestral cultural ties to the lands in the Monument.

BLM's California State Director and the U.S. Department of Agriculture Forest Service Pacific Southwest Region established a new policy in 2006 in coordination with the federal tribes and non-federally recognized Native Americans in California. The new policy ensures traditional native

practitioners will have access to plants and that such plants are managed in a manner that promotes ecosystem health for lands managed by BLM and the Forest Service. The policy places emphasis on local collaboration, implementation of actions, and means to resolve issues. It also encourages planning to address traditional native gathering interests and to support practitioners in gathering culturally utilized plants for personal, community, or other non-commercial traditional use on lands managed by BLM and the Forest Service.

3.10.3 Historic Resources

Although there are no known documented visits by the Spanish to the Carrizo Plain, their presence is well established in areas adjacent to the Monument. The first European expedition into the adjacent San Joaquin Valley in 1772 was led by Pedro Fages and his Spanish soldiers as they traveled through the Tejon Pass to the Valley and westward to San Luis Obispo. In a later expedition in 1776, Francisco Garcés also visited the San Joaquin Valley (Wallace 1978). A closer Spanish presence in the vicinity of the Monument occurred in the expedition of 1806 when Father José de Zalvidea ventured through the Cuyama Valley, traveling from Mission Santa Ynez to Bitterwater Creek and Buena Vista Lake in the San Joaquin Valley. A diary of the expedition mentions a number of Chumash and Yokut villages encountered as they passed through Cuyama Valley on their way to Buena Vista Lake (Grant 1978).

The Carrizo Plain entered the historic period during the mid-nineteenth century when J. Garcia settled there circa 1850. According to Gardner (1967), the Garcia Ranch was named El Saucito after the little willows that grew around the spring located there. He mentions that Indian servants ran the ranch house and that numerous vaqueros attended to the large herds of cattle and sheep (Fisher 1959; Gardner 1967). According to BLM patent files, the Hanline Ranch, on the southern end of the Carrizo Plain, was originally part of a proposed Mexican land grant under the ownership of Don Cesario Lataillade. This land was subsequently transferred to Cesario C. Lataillade in 1879 as heir to the property (Wesson et al. 2005). Although this property was not established as a land grant, lands adjacent to the CPNM in Cuyama Valley were granted to Cesario Lataillade in 1846 and to José María Rojo in 1843 as two separate land grants.

After California's entry into statehood, Euro-American settlers began filtering into the Carrizo Plain to ranch, bringing more cattle and sheep to the region. During the 1860s, the Crocker brothers claimed land on the Carrizo Plain, calling their ranch El Temblor because of the earthquake activity in the area (Morrison 1926). During these early years, James McDonald and his brother John acquired land holdings eventually totaling about 50,000 acres on the Carrizo Plain (Gardner 1967). McDonald was described as a "speculating capitalist" by writer Myron Angel (1883). On a much larger scale, Miller and Lux (circa late 1800s) acquired a great deal of land in the central portion of Carrizo Plain. In 1869 Chester Brumley, an employee of James McDonald, came to the Carrizo Plain to manage grazing leases (Eichel 1972). Brumley eventually took claim to all or part of the land formerly held by J. Garcia (Fisher 1959; Gardner 1967). Chester had his family join him in 1876 at El Saucito Ranch (Christian and McGown 1988; BLM 1991). The family lived in a small adobe house until the two-story redwood home was completed circa 1878. According to accounts about the Brumley Ranch, also known as El Saucito or Saucito Ranch, peaches, cherries, and apples were grown next to the house. An article in the *San Francisco Tribune* in December 1884 states that Brumley annually grew wheat and barley for hay with "good success" (Eichel 1972).

The first post office on the Carrizo Plain was founded in 1882 and was located at the El Saucito Ranch house. The *San Luis Obispo Evening Breeze* reported the closing of the post office in 1895. The post office was initially known as the Carisa Post Office. The Carrizo Plain as it is known today had several different spellings historically. Spellings such as Carisa, Carissa, Carriso, Carrissa, Carrisa, or Carriza are found on legal documents, maps, newspapers, and historical accounts.

By 1886 there were 60 new settlers on the Carrizo Plain (Eichel 1972). Dryland farming was introduced during this period with a primary focus on growing barley and wheat and to a much less degree oats (Christian and McGown 1988). While the soil would grow excellent grains, without good roads for transportation, getting the grain to the market was a problem. The solution came in 1890 when the county put the settlers to work building a road from McKittrick to the Carrizo Plain (Eichel 1972). It was not until 1912, with the advent of mechanized farm machinery, that large-scale farming operations became productive. This large-scale production carried through to World War II (WWII). From 1900, the trend of absentee landlords with large landholdings managed by a third party continued on the Carrizo Plain up until 1987 when the land was transferred to the federal government and the CPNM managing partners.

The El Saucito Ranch house is the only standing house in the Monument representative of the pioneer period. The house remained mostly occupied throughout its history with only brief periods of vacancy. Although the house changed ownership a number of times, the last time the house was owner-occupied was in 1966. In the years that followed, the ranch house was used by property caretakers or intermittently leased to local ranchers until the ranch was vacated in 1984. Over the history of the house, there were a number of modifications including the addition and removal of rooms. Although alterations were made to windows, doors, and the interior of the house over the years, the original two-story redwood house structure remains intact. Ranchers today use the corral at El Saucito to separate cattle and provide necessary doctoring and other needs prior to transporting the cattle to other locations. The ranch house property was transferred from private to federal ownership in 1997.

The Basque and the vaqueros were historically associated with livestock operations as cowboys for both sheep and cattle on lands within the CPNM. Descendants of the Basque families continue livestock grazing on lands in the Monument today, but to a much lesser degree than historically. Some families have federal grazing leases for cattle and others have sheep grazing operations on private lands within the Monument.

The 1853–1854 Pacific Railroad Survey depicts the Carrizo Plain on maps of territory available for potential land grants to be awarded to builders of the 35th parallel transcontinental railroad route. However, the survey did not identify the Carrizo Plain as the potential rail corridor from San Francisco to Los Angeles. The Southern Pacific Railroad and its San Francisco investors preempted the original 35th parallel transcontinental charter between 1872 and 1876, thereby relinquishing the associated land grants. Subsequently, the Southern California railroad line was constructed through the San Joaquin Valley (Wesson et al. 2005). After the railroad withdrew their claims on the Carrizo Plain, the area was open for settlement. Later job opportunities were provided to settlers on the Carrizo Plain during the 1890s with the exploitation of sodium sulfate and phosphate on Soda Lake. This mining activity is evident today by the remaining foundations and earthen berm where the narrow gauge rail system once transported materials from Soda Lake to a connecting point at State Highway 58.

The Caliente Mountain WWII Lookout Tower is located on state school land within the Monument, and is surrounded by the Caliente Mountain WSA. This significant historic cultural property has not been maintained over the years and would need to be stabilized in the near future to prevent the wooden tower from falling to the ground. Considering there are few WWII towers remaining standing in California, this historic site represents an important part of California's heritage and its association in protecting the United States during WWII.

Components of the historic Washburn Ranch and Selby Cow Camp were found eligible for inclusion in the NRHP in 1992. Selby Cow Camp barn was stabilized and partially restored in the latter part of 2007.

The Washburn Ranch continues to serve as an important historic point of interest and administrative center for BLM and the CPNM partners. The Washburn Ranch transferred from private to federal ownership in 1988.

The most common historic resources encountered in the Monument include ranch buildings, structures, or features associated with sheep and cattle livestock operations and dryland farming. To a much lesser degree, features associated with mining of sodium sulfate, phosphate, and gypsum are found in the Monument. The distribution of historic site types in the CPNM demonstrates the dominant role ranching and dryland farming played in the regional history. Of the 181 cultural resource sites recorded in the Monument, 41 of these sites are historic and 8 are multi-component consisting of both historic and prehistoric elements as noted in Section 3.10.1, Prehistoric Resources. The 41 sites, or approximately 22.7 percent of the recorded sites in the Monument, are representative of the historic period. The 8 multi-component sites represent 4.4 percent of the cultural resource baseline.

Four significant historical themes have been identified for the Carrizo Plain: the pioneer phase, the post-1900 expansion and development phase, the Depression era, and the modern phase (BLM 1991), as described below:

- Pioneer phase: The pioneer phase began in the mid 1800s and is characterized by the initial phase of settlement on the plain by pioneers as well as land acquisition by wealthy capitalist. Ranching and limited agriculture were carried out during this period. Initially, sheep were grazed primarily on the Carrizo, but by the end of the nineteenth century, cattle were prevalent.
- Post-1900 expansion and development phase: This period led to the development of a rustic vernacular architecture style. The lack of commercial building materials is evident during this time as reflected in the architecture, although an expression of the pioneer period architecture remained. Farming in part supplanted grazing by the early 1900s. Open range grazing ended with the introduction of fences on the Carrizo Plain during this phase.
- Depression era: This era is characterized by the expansion of dryland farming, the abandonment of the small and unsuccessful farms and ranches, and the consolidation of farms to create large operations such as the Washburn Ranch.
- Modern phase: This phase of development on the Carrizo Plain started in 1940 and continued to recent time. This period is characterized by further expansion of farm production in response to the demand created during WWII. During the modern phase, large corporate holdings and agribusiness were formed on the Carrizo Plain. Additionally, use of mechanized farm equipment was noticeably increased, transportation was improved, and commerce was increased to the San Joaquin Valley and the coastal areas of California (BLM 1991). In recent years, dryland farming has nearly disappeared in the Monument and livestock operations have been reduced considerably. At least one private inholding in the Monument is used today for dryland farming of grains. TNC initiated the acquisition of lands during the 1980s for the purpose of conservation.

3.10.4 Current Management

Cultural resources in the Monument are of interest to researchers, public visitors, Native Americans, conservators, and others with varied interests. Such interest attracts more public visitation and increases demands on resources and the issues associated with managing and protecting heritage resources. To address these public demands, BLM and its CPNM partners are charged with the responsibility to find a balance, allowing the public reasonable access to appreciate these significant yet fragile and non-renewable cultural resources. The Monument Proclamation directs BLM to protect and preserve significant cultural resources in the Monument.

BLM continues coordination with the Native Americans with cultural ties to the land in the Monument and their mutual interest in the recovery of native plants in the CPNM. BLM encourages the traditional use of the native plants that are not protected and supports the annual ceremonial gatherings held at Painted Rock. BLM's efforts to implement the 2006 policy concerning native plants is incorporated in this plan to ensure traditional native practitioners have access to traditional plants of their interest and that these plant areas are managed in a manner that promotes ecosystem health for lands in the CPNM.

3.10.4.1 Carrizo Plain Rock Art Discontiguous District

Protection and preservation measures for archaeological sites in the Carrizo Plain Rock Art Discontiguous District (a three-component historic district listed on the NRHP) were initiated when the Painted Rock complex of sites was transferred to federal ownership in 1989. For an overview of the district's locations, refer to Map 3-11, National Register of Historic Places. The north-south road to Painted Rock was closed, a fence was installed, and grazing was discontinued in the Painted Rock pasture to protect a number of archaeological sites. Shooting was also banned in the same pasture for protection of the public and the rock art paintings. The road on the eastern boundary (Selby-Caliente Road) of the Painted Rock pasture was rerouted to avoid any further impact to cultural resources that were bisected by an existing roadbed prior to federal ownership. The Painted Rock Interpretive Trail and vehicle parking area, located less than 0.75 mile from Painted Rock, were developed to provide site protection by replacing vehicle access with pedestrian access to the site. Painted Rock and other cultural sites in the Rock Art Historic District continue to be monitored regularly to identify and resolve any problems that may threaten them. Painted Rock is closed to public access during the summer solstice ceremony to allow Native American religious rites. Public access is restricted to guided tours from March 1 through July 15 to protect sensitive cultural and wildlife resources during the peak period of tourist visitation. The majority of guided tours during this time are given from March 1 to May 31 when the Goodwin Education Center is open. The site is open for self-guided access from July 16 to February 28. Painted Rock is currently managed as a point of public visitation and protection for its traditional Native American values.

Based on a three-year compilation of data (2001–2003 Recreation Management Information System [RMIS]) from the BLM vehicle meter counter, trail register logs, and records from the Goodwin Education Center, Painted Rock receives an average of 3,667 visitors per year. Of these visitors, 820 individual, or 22.4 percent, are provided public access through escorted tours given by the managing partners or via group supervision. For example, on average, over this three-year period, 420 visitors were given tours by the managing partners through staff at the Goodwin Education Center, and the remaining 400 visitors were on group tours supervised by interested educational groups such as museums, schools, universities, or environmental organizations. Of the 3,667 visitors, 2,847 individuals, or 77.6 percent of the visitors per year, gain self-guided access to Painted Rock. Trail brochures, signage, and kiosk information are provided to the public to enhance site protection, preservation, and educational awareness. Cultural information, sensitivity awareness, and ethics to preserve heritage resources during site visitation are also provided at the Goodwin Education Center and site kiosk.

Natural forces such as wind and water erosion, bird excretions, rock exfoliation, dust particulates, and bee hive construction are a significant threat to rock art preservation in the Monument. It should be noted that greater than 99 percent of the human impacts to Painted Rock occurred when the site was in private ownership. An initial effort for rock art conservation at Painted Rock was implemented by the Getty Conservation Institute in 1991 in concert with BLM.

One of the most effective protective measures for cultural resources implemented in 1987 was the closure of the Painted Rock pasture to livestock use. This action alone excluded cattle from grazing on 15 cultural properties in the Rock Art Historic District. Otherwise, cattle could continue to trample cultural midden constituents and disturb rock art by rubbing against the painted surfaces. This action has not totally

excluded cattle from getting into the pasture. Although infrequent, over the recent years, cattle have been able to get past the fences on occasion.

For years the Saucito Rocks archaeological site, while in private ownership, was open for ranching, agricultural use, and for oil well drilling atop the prehistoric site. After this site transferred from private to federal ownership in 1990, BLM closed vehicle administrative access to components of the site.

The Sulphur Spring archaeological site was previously closed to vehicle and pedestrian visitation as an emergency action shortly after the property was transferred from private to federal ownership in 1988. The site was subsequently identified as closed in the Carrizo Plain Natural Area (CPNA) Management Plan (BLM 1996). The site was threatened by potential impacts caused by visitors coming into physical contact with the friable rock surface at this extremely fragile rock art site. The site is managed for purposes of protection and long-term conservation. This component of the Rock Art Historic District extends further north than the site area previously closed to public access.

3.10.4.2 Additional Sites with National Register Eligibility

BLM is nominating 90 prehistoric cultural resource sites to the NRHP as cultural properties eligible for inclusion as a National Historic Landmark in 2007 (Whitley and Loubser 2003; Whitley et al. 2004). Such designation recognizes the exceptional importance of cultural properties in the Monument at a national level, thereby affording greater opportunity for site protection, preservation, education, and research. Currently, review of the nomination has been completed by the State Historic Preservation Officer, the National Park Service, BLM's Deputy Historic Preservation Officer, and peer reviewers at the University California-Los Angeles and the Santa Barbara Museum of Natural History. The nomination package has been forwarded to the National Park Service and BLM's national office in Washington, DC for final review and approval.

BLM previously assigned "use categories" to several individual cultural properties in the Monument as listed below. It should be noted that the California State Historic Preservation Officer and BLM have agreed to not assign use categories to cultural sites until an assessment of site eligibility and the potential effects the specific use category might have on the property has been determined. As cultural properties are evaluated for their appropriate use subsequent to this plan (for example, scientific, conservation for future use, traditional, public, experimental, or discharged from management), specific sites or classes of similar sites will be assigned appropriate use categories. For details, refer to Appendix G, Cultural Resources Use Allocations. The following cultural resources, with varying NRHP eligibility, were previously assigned management use categories:

- Painted Rock site (eligible, listed): traditional use and public use.
- Sulphur Spring site (eligible, listed): conservation for future use.
- Saucito Rock Art Site (eligible, listed): conservation for future use.
- Traver Historic Ranch (not eligible, not listed): public use.
- El Saucito Historic Ranch (eligible, not listed): public use and scientific use.
- Washburn Historic Ranch (eligible, not listed): public use and scientific use.
- KCL Historic Ranch (not eligible, not listed): public use.
- Historic Selby Cow Camp (eligible, not listed): public use and scientific use.

3.10.5 Preservation Issues and Threats to Cultural Resources

Some of the greatest human threats to cultural resources in the Monument, especially prehistoric sites, are illegal activities such as artifact collecting, digging, defacement of rock art, and physical human contact with painted surfaces which accelerates surface deterioration. Physical contact with the rock art in many cases is intentional, although inadvertent contact also occurs. The Monument Proclamation prohibits all motorized and mechanized vehicle use off road, except for emergency or authorized administrative purposes; however, in the recent past, OHV trespass became a problem for several cultural resources in the Monument. OHV disturbances were documented within the Carrizo Plain Rock Art Historic District in 2002 and 2003. Specifically, four-wheel drive trucks and all-terrain vehicles (ATVs) had encroached on sites within the district near Selby Cow Camp and the Painted Rock pasture. Although no significant disturbance occurred to these cultural resources, such trespass poses a serious threat to these fragile resources. Vehicle use occurring when the soils are wet, or increased use during the dry season, could adversely affect cultural sites by mixing the archaeological constituents in the midden or subsurface soils. Mixing of the soil stratigraphy could result in the loss or reduction of reliable scientific and archaeological data contained in cultural deposits, cause potential breakage of diagnostic artifacts, visually impact the cultural landscape, and displace surface cultural features. Additionally, during the dry season, dust generated from unauthorized OHV use, as well as public access on open dirt roads, could impact rock art panels and individual motifs.

The greatest human threats to historic resources such as buildings and structures are vandalism caused by gunshots and breakage of windows and doors. Other threats include the theft of historic wooden boards, artifacts, and farm equipment associated with ranching and agriculture.

Some protective efforts implemented include site patrol and monitoring by law enforcement, BLM staff, and volunteer site stewards. Additional protection for cultural resources is provided through educational and awareness efforts such trail signage, kiosks, brochures, and visitor registers; fences and cattle guards; road, shooting, and grazing closures; web pages, public presentations, and information provided at the Goodwin Education Center.

Acid rain is known to deteriorate rock art elements, especially pictographs, found at prehistoric sites. BLM recognizes acid rainfall as a potential cause of discoloration, corrosion, or other visual damage to the multiple-colored painted surfaces at archaeological sites. In general, the CPNM has fewer issues associated with acid rain than more populated areas of Southern California (see Section 3.8.2, Acid Rain), but it could still be a factor in rock art deterioration. However, no management conservation effort is known to combat this threat. Global warming could result in less vegetation cover on sites, thereby increasing the potential for wind erosion, blowouts of loose midden soils, and abrasion of rock art motifs caused by blowing sand. Additionally, less vegetative cover on cultural sites increases the potential for illegal collection of artifacts. Such impacts would result in the loss of scientific and archaeological information pertinent to the prehistoric lifeways in the Monument.

Wildfire suppression tactics have the potential to impact cultural resources. The BLM Bakersfield Field Office completed an FMP in September 2004. Measures are identified in the plan to minimize or eliminate potential impacts to cultural resources from fire suppression activities. Any updates to the existing FMP or development of a new FMP for the Monument would address newly discovered cultural resources and additional protection measures as necessary. In regard to prescribed burns, measures are identified in project-specific *National Environmental Policy Act* (NEPA) documentation for the avoidance and protection of cultural resources as proposals are identified.

The Caliente Mountain WWII Lookout Tower has not been maintained and is in disrepair as described above in Section 3.10.3. The peak of Caliente Mountain, where the lookout is located on state property, is the final destination of many hikers that use the Caliente Mountain Trail.

3.10.6 Research and Education

Valid scientific research is encouraged to document and assess cultural resources that may be lost by either natural or human causes. Cultural studies identify and address appropriate conservation measures, identify and record sites to be added to the cultural baseline, identify site problems (human or natural impacts) and corrective actions necessary for long-term preservation, and illuminate an endless number of valid research questions pertinent to past and present human use of the lands in the Monument.

The Monument Proclamation emphasizes the important historic resources in the Monument, as well as the public and scientific interest in these resources. The managing partners continue to pursue research and educational opportunities in the CPNM in a number of ways. The Goodwin Education Center serves as the focal point for providing public educational and interpretive information about the cultural resources and natural history in the Monument. Cultural interpretive trails and information kiosks are provided at several key locations on the CPNM such as Painted Rock, Traver Ranch, and El Saucito Ranch.

3.11 Visual Resources

The CPNM encompasses a dramatic expansive landscape that is in a relatively undeveloped state. Conservation of the area's scenic attributes was an important factor in its designation as a National Monument, and was a major issue in public scoping comments for the RMP. The scenic qualities of most landscape settings in the Monument are defined by striking natural features – the vast open vistas across the plain, backed by stark mountain ridges. Structures from historic and present-day ranching operations are integral parts of a pastoral landscape on the valley floor. Seasonal landscape elements include one of California's most dramatic spring wildflower blooms. Another important component of the visual integrity of the Monument is its dark night skies. As the population of California increases, light pollution has impacted night sky viewing opportunities in many areas. There are outstanding opportunities for viewing the night sky at easily accessible locations within the Monument, such as Caliente Ridge and the Soda Lake Overlook. Astronomy classes and amateur astronomers are drawn to the Plain from as far away as Los Angeles and the San Francisco Bay area.

On-going activities to improve the scenic quality of the Monument have included efforts to eliminate unneeded facilities. These efforts have included removal of derelict equipment and debris (when not historically significant), taking out old fencing, hauling away trash, and eliminating unusable structures. Facilities required for management purposes are designed or modified where possible to mimic historic structures, are placed in areas with natural screening, or are finished to borrow from natural landscape colors. An example is the painting of storage tanks to appear less intrusive and to better harmonize with their surroundings.

When developments complement and borrow form, line, color, and texture from existing characteristic landscape features, they minimize impacts to the landscape and retain the visual integrity of the area. BLM uses the Visual Resource Management (VRM) system as a framework to assess scenic values on public lands and to protect visual integrity and manage visual impacts from activities and projects. Using the Carrizo Plain subregions as a basis (Map 3-1), public lands within the CPNM were inventoried based on three factors:

- Relative levels of scenic quality: Each subregion was evaluated based on seven factors (landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications) and then ranked as

either Scenery A (most scenic), Scenery B (somewhat scenic), and Scenery C (common or not attractive). In the CPNM, the plain and the surrounding mountains represent a vast dramatic landscape of very high scenic integrity and quality (Scenery A). The south side of the Caliente Range (Caliente Mountain South subregion), although scenic, is more typical of landscapes in the inner coast range (Scenery B).

- Level of viewer sensitivity to landscape changes: The highest viewer sensitivity occurs at popular public use areas such as scenic overlooks, recreation sites, and trail and road corridors. Areas visible from private residences also receive high sensitivity ratings. The Soda Lake Sink, Carrizo Plain North, and Caliente Foothills North subregions were rated as high sensitivity levels, while the Caliente Mountain South subregion was rated as low. The remaining subregions were rated moderate.
- Distance of an area from points or corridors of high viewer sensitivity: Even minor landscape changes are very evident when viewed in the foreground zone, but these changes become less evident with distance. The lack of natural topographic and vegetative screening makes the valley floor of the CPNM especially sensitive to any developments (Soda Lake Sink, Carrizo Plain North, and Carrizo Plain Central), with the remainder of the area moderately sensitive because of additional screening and/or further distances from popular use areas.

Based on these factors, VRM inventory classes were assigned to different parts of the planning area and used as a basis to consider visual values in the RMP land use allocations. For the CPNM, the inventory classes were assigned to each of the subregions shown on Map 3-1. All of the subregions were assigned a VRM Inventory Class II, except the Temblor Range Subregion, which was assigned as Class III. Areas bordering the Carrizo were considered to be VRM Class IV.

As stated above, the inventory classes provide a basis and are only one factor used in determining VRM management classes in the RMP alternatives. For example, a VRM Inventory Class II area may be designated as a VRM Management Class III under the plan to allow for additional recreation facility developments. In contrast, the plan could establish a long-term goal to restore some VRM Inventory Class II lands to Class I standards (where the class was based on past landscape modifications) through restoration efforts. Finally, some land use allocations, such as areas managed to protect wilderness character, are automatically identified as VRM Management Class 1 areas.

The objectives of the VRM Management Classes are as follows:

- Class I: The objective of this class is to preserve the existing character of the landscape. This class allows for natural ecological changes and only very limited types of management activities and uses. Any contrasts with the natural landscape must be minimal and not attract attention. This class is typically limited to designated wilderness, wilderness study areas, or wild and scenic river segments with a “Wild” classification.
- Class II: The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities and uses can be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture in the predominant natural features of the characteristic landscape.
- Class III: The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape can be moderate. Management activities and uses may attract attention, but should not dominate the view of the casual observer. Changes should repeat the basic elements of the predominant natural features of the landscape.
- Class IV: The objective of this class is to allow for management activities and uses requiring major modifications to the natural landscape. The level of change to the characteristic landscape can be high. Management activities and uses may dominate the view and be a major focus of viewer

attention. However, every attempt should be made to mitigate the impacts of activities through careful location and repeating the visual elements of the landscape.

Each VRM class allows for projects with differing degrees of contrast with the characteristic natural landscape elements of form, line, color, and texture. As described above, the higher numbered classes allow for projects with greater contrast to the landscape. However, in all cases, projects include mitigation measures to minimize impacts on scenic quality.

When projects or actions are proposed in the planning area, a visual contrast rating is conducted to ensure that they are designed and located to meet the VRM management class objectives. For example, a project to complete a prescribed burn/seeding should follow edges of natural landforms and mimic sizes and shapes found in the landscape.

3.12 Wilderness Study Area and Other Lands with Wilderness Characteristics

3.12.1 Applicable Regulatory Framework and Original Wilderness Inventory

Section 603 of the *Federal Land Policy and Management Act (FLPMA)* directed BLM to review roadless areas under its jurisdiction of 5,000 acres or more having wilderness qualities and to recommend to the President the suitability of such areas for preservation as wilderness. In determining these characteristics, the law directs BLM to use the criteria given by Congress in the *Wilderness Act* of 1964. In Section 2(c) of the Act, Congress states that wilderness is

an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this chapter an area of undeveloped federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.

The original inventory process, initiated in 1978, examined the public lands in the planning area to determine and locate the existence of areas that met these wilderness criteria. Lands in the Caliente Mountain area met the inventory criteria and were established as the Caliente Mountain WSA (#CA-010-042). The result of the inventory process was published in *Final Intensive Inventory, Public Lands Administered by BLM California Outside the California Desert Conservation Area Wilderness* (BLM 1979). Subsequently, in 1988, BLM issued the *Final Environmental Impact Statement for the Central California Study Areas* that analyzed the impact of adding the WSA to the National Wilderness Preservation System and, in June 1991, the Secretary of the Interior sent a recommendation to the President that the area should not be designated wilderness through the *California Statewide Wilderness Study Report*.

Congress has the sole authority to designate an area as wilderness. Until Congress decides whether to designate the area as wilderness or release the area from further consideration for wilderness, BLM is required to manage the Caliente Mountain WSA so as to not impair its suitability for this designation. Commonly called the nonimpairment standard, the management framework for BLM to manage the WSA to meet this mandate is found in the *Interim Management Policy for Lands under Wilderness Review* (BLM 1995). The nonimpairment standard applies to all uses and activities except those specifically exempted from this standard by FLPMA, such as grandfathered uses and valid existing rights.

The Caliente Mountain WSA contains 17,984 acres and is located in the extreme southeastern portion of San Luis Obispo County, approximately 45 miles southwest of Bakersfield. It has a high degree of natural character and rugged topography, with steep canyons and high, sharp mountains and ridges (see Map 2-5, Lands Having Wilderness Characteristics). Elevation varies from 5,104 feet at Caliente Mountain to 2,100 feet at the mouth of Post Canyon. Vegetation varies from dense chaparral and juniper along ridgelines to scattered shrubs and annual grasses in canyon floors. The varied topography and dense pockets of vegetation in the area combine to produce outstanding opportunities for solitude and primitive unconfined recreation experiences.

3.12.2 Wilderness Characteristic Assessment in Resource Management Plans

Since the original BLM wilderness inventory was conducted in 1978-1979, there have been extensive land acquisitions within the planning area. Many of these lands have been impacted by past farming and other land uses. However, over time, some intrusions on these acquired lands, as well as on previously inventoried public lands (found not to have wilderness qualities at the time of inventory), have reverted to a more natural condition. In other areas, fences, structures, two-track roads and other imprints have been physically closed and/or removed and lands have been restored to a more natural condition.

In 1996, the State of Utah, Utah School Institutional Trust Land Administration, and the Utah Association of Counties filed suit challenging BLM's authority to re-inventory lands for possible wilderness study area designation in Utah. A settlement to this suit, as amended, was reached in April 2003 between the Department of the Interior and the plaintiffs. Consistent with BLM policies for the identification, management, and protection of multiple uses, terms of the settlement have been applied throughout BLM. Although the settlement affects formal identification of additional WSAs, BLM may continue to inventory public lands for resources or other values, including wilderness characteristics, as a part of managing the public lands and land use planning. Through the planning process, BLM may manage these lands by identifying objectives, actions, and land use allocations to protect wilderness characteristics.

As part of the development of this RMP, lands within or adjacent to the Caliente Mountain WSA, and other lands within the Monument, have been examined to determine if they have wilderness characteristics. This acreage has been included in the plan alternatives for analysis to determine if they should be managed to protect wilderness character (see Map 2-5, Lands Having Wilderness Characteristics, in which lands identified under Alternative 1 represent the full acreage inventoried for wilderness characteristics). Also, one small acquired inholding (approximately 40 acres) within the Caliente WSA was inventoried and found to possess wilderness characteristics.

3.13 Areas of Critical Environmental Concern

Areas of critical environmental concern (ACECs) are areas of public land where special management attention is required to protect important natural and/or cultural resource values. The ACEC designation indicates to the public that BLM recognizes these significant values and has established special management measures to protect them. BLM is required to consider designation of ACECs under Section 202(c)3 of FLPMA. Areas may be nominated for consideration as ACECs by BLM, other agencies, or members of the public.

For an area to be designated as an ACEC, both of the following criteria must be met:

- **Relevance:** The area must have a significant cultural, historic, scenic, wildlife, fish, or other natural system or process.

- Importance: The relevant value, resource, process, or system must be distinctive and be of greater than local significance.

Areas with significant natural hazards may also be designated as ACECs, although no areas meeting this criterion are known to exist within the Monument.

The CPNA was designated as an ACEC in the Caliente RMP (BLM 1997). The boundary of the former CPNA and ACEC approximates the CPNM boundary. However, some ACEC acreage extends outside the CPNM. The ACEC was designated to protect relevant and important values including sensitive plant, animal, cultural, Native American traditional lifeway, and geologic resource values. At the time of designation (1996), the ACEC included 143,300 acres of BLM surface ownership, 10,880 acres of subsurface only, and 55,730 acres of surface only. The Monument Proclamation protects all of the relevant and important values covered under the ACEC designation. However, the ACEC designation is still in effect and those portions within the CPNM boundary are analyzed in this RMP. Those portions outside the CPNM will be analyzed in the Caliente RMP revision, scheduled for initiation in 2008.

3.14 Livestock Grazing

3.14.1 Introduction and Applicable Regulatory Framework

The Proclamation establishing the CPNM states that

Laws, regulations, and policies followed by the Bureau of Land Management in issuing and administering grazing permits or leases on all lands under its jurisdiction shall continue to apply with regard to the lands in the Monument.

The unique and complex livestock grazing management systems used within the CPNM have evolved through time, following changes in land ownership, federal grazing regulations, and the available information on livestock management effects in the area. The designation of the Monument has also refocused the managing partners on determining the appropriate use of grazing as a vegetation management tool to meet Monument goals.

As part of all RMPs, BLM must designate which lands under their jurisdiction will be available for livestock grazing and which land will be unavailable. There are currently 170,100 acres designated as available for livestock grazing within the Monument and 36,400 acres are unavailable (see Map 2-8, No Action Alternative: Livestock Grazing). Livestock grazing on the lands designated as available is currently administered under two separate types of authorizations utilizing different subparts of the federal grazing regulations. Approximately 55,900 acres are authorized under Section 15 (of the *Taylor Grazing Act*) livestock grazing leases, and these are located principally in the Temblor and Caliente Mountain Ranges. Livestock grazing occurring primarily on the valley floor of the Monument (approximately 114,200 acres) is currently authorized under free use grazing permits, in accordance with 43 CFR 4130.5(b)(1). Grazing permits or leases authorize grazing use on a specific management unit called grazing allotments. All grazing allotments within the Monument are depicted on Map 3-12, Grazing Allotments.

3.14.2 Historic and Current Grazing Authorizations

A brief history of grazing use authorizations in the Monument is helpful to understanding why there are currently two types of authorizations for its administration.

Prior to TNC, BLM, and CDFG land acquisitions starting in 1987, nearly all of the private lands were grazed by cattle and sheep, including the cultivated farm fields. BLM's ownership in what is now

designated the CPNM was limited to original public domain lands in the Temblor and Caliente Mountain Ranges and the Soda Lake lake bed. Much of this area (excluding the area around Soda Lake) was determined to be suitable for livestock grazing under BLM planning guidance. Several grazing leases were authorized under Section 15 of the *Taylor Grazing Act*. Many of these grazing leases have been in place since the early 1930s. Six such grazing leases are currently authorized entirely or partially within the CPNM. In order to hold a Section 15 grazing lease in these areas, grazing lessees must own or control private property that acts as the base to their livestock operation, and this base property gives the lessee a priority over other applicants, especially if it is adjacent to the BLM grazing allotment or management unit.

Grazing use levels are measured in units of animal unit months (AUMs), the amount of forage needed to sustain one cow, five sheep, or five goats for one month. There are 7 grazing allotments totaling approximately 60,000 acres within the Temblor and Caliente Mountain Ranges of the Monument. Currently, one allotment is vacant, and there are five Section 15 grazing leases on the remaining six allotments. These seven allotments are the North Temblor #15, McKittrick Summit #22, Sulphur Canyon #31, Chimineas Ranch South #39 (vacant), Selby Ranch #44, Maricopa #96, and Wood Canyon #3655 (see Table 3.14-1 and Map 3.12, Grazing Allotments, for details). These Section 15 grazing authorizations are issued by BLM under the regulations at 43 CFR 4100 and are managed under the guidelines for grazing management of the Caliente RMP of 1997 and the record of decision documenting the *Central California Standards for Rangeland Health and Guidelines for Livestock Grazing Management* (BLM 1999), which was approved by the Secretary of the Interior in July 2001 (see Appendix E, Central California Standards for Rangeland Health and Guidelines for Grazing Management).

Table 3.14-1. Grazing Lease Allotment Acres and AUMs within the Monument

Allotment Number and Name	Authorization Number	Season of Use	Total BLM Acres in Allotment	Total BLM Allotment Acres in CPNM	Total BLM AUMs	Total BLM AUMs in CPNM
15, North Temblor	0401014	Dec–May and Mar–Feb	35,921	8,506	7,936	1,840
22, McKittrick Summit	0401021	Dec–May	160	160	40	40
31, Sulphur Canyon ¹	0401030	Dec–May	16,970	16,970	2,295	2,295
39, Chimineas Ranch South	Vacant	Dec–May	4,982	2,391	730	168
44, Selby Ranch ¹	0401030	Dec–May and Dec–Mar	26,560	26,560	3,182	3,182
96, Maricopa ²	0401080	Dec–May and Mar–Feb	5,978	1,180	939	188
3655, Wood Canyon ³	0401020	Dec–May	204	95	5	2
7 Allotments	6 leases		90,775	55,862	15,127	7,715

¹ EA.CA169.07.009

² EA.CA160.00.043

³ EA.CA160.07.061

Rangeland health assessments on all grazing allotments are completed with an interdisciplinary team that evaluates the health standards for soils, species, riparian, and water quality in the field, based on several qualitative indicators. The rangeland health assessment and determination form used by the Bakersfield Field Office is included in Appendix L, Rangeland Health Assessment and Determination Form of Bakersfield Field Office. Rangeland health assessments have been completed on all the allotments authorized by Section 15 leases, except the Chimineas Ranch South allotment (since it is currently vacant).

In 1987, TNC and BLM started acquiring significant acres of new land within the valley floor area of the CPNM. TNC purchased 82,000 acres in 1987 and BLM acquired 23,000 acres in 1988 and another 28,500 acres in 1989. With these purchases, TNC owned base property adjacent to this newly acquired BLM land and therefore also had priority for new federal grazing privileges. BLM issued TNC Section 15 grazing leases for the acquired lands, where TNC then pastured the livestock of local livestock owners.

A rest-rotation livestock grazing management program was designed and initiated on the new land acquisitions in these valley floor and foothill allotments in December 1989 to provide conditions for native perennial plant establishment while helping to reduce the competition from nonnative annual plants. In 1995, the Secretary of the Interior issued new federal regulations for grazing management that, among other things, allowed free use grazing permits to be issued by BLM for the management of vegetation to meet resource objectives other than the production of livestock forage or for conducting scientific research or administrative studies. Base property (required for a Section 15 grazing lease) is not required to hold a free use grazing permit. TNC relinquished its Section 15 grazing lease on the valley floor and foothill allotments in 1995 and BLM then issued free use grazing permits to local ranchers who, for the most part, had been using the lands prior to acquisition. The allotments that are authorized by these free use grazing permits support the grazing study and monitoring program described in the following section.

3.14.3 Grazing Studies and Vegetation Management

A grazing study and monitoring program began on the valley floor and foothill allotments in 1996 to help determine whether grazing is an appropriate tool for providing habitat suitable for long-term sustainable populations of listed species and the restoration of native communities. The study was designed to provide information about the effectiveness of livestock grazing as a tool to remove standing biomass, reduce the dominance (as defined by density, cover, and frequency) of nonnative annual species, and enhance the re-establishment of native species. The results from the Carrizo grazing study do not support the general hypothesis that livestock grazing applied in this manner is beneficial for native plant communities; specifically, it does not enhance native annual plant species, nor decrease exotic ones (Christian et. al., in prep.) See Section 3.2.3.3 for a comprehensive summary of the Carrizo grazing study. Throughout the valley floor and foothill allotments in the Monument, there are areas that are not grazed to provide controls for research and to protect sensitive areas such as Painted Rock and alkali wetlands. These 36,400 acres of non-grazed lands are designated as unavailable for livestock grazing in the Caliente RMP of 1997; see Map 2.8.

The existing grazing study and monitoring program occurs on public lands within eight grazing allotments or management units within the valley floor and foothill area, totaling approximately 114,200 acres. These allotments are the Washburn Ranch #18, Painted Rock Ranch #26, KCL Ranch #29, Goodwin Ranch #43, Saucito Ranch #46, Temblor-Caliente #53, Carrizo Ranch #70, and Phelan #92; see Table 3.14-2 and Map 3-12, Grazing Allotments. Grazing authorizations are currently issued annually on these allotments by BLM, specifically under 43 CFR 4130.5(b), the regulations on free use grazing permits, for the management of vegetation to meet resource objectives other than the production of livestock forage and/or to conduct scientific research or administrative studies. Rangeland health assessments have been completed on the Washburn Ranch and KCL Ranch allotments, and both allotments were determined to be meeting all standards of rangeland health. The remaining allotments authorized by free use grazing permits have not yet been assessed.

Table 3.14-2. Free Use Grazing Permit Allotment Acres and AUMs within the Monument

Allotment Number, Name	Authorization Number	Season of Use	Total BLM Acres in Allotment	Total BLM Allotment Acres in CPNM	Total BLM AUMs	Total BLM AUMs in CPNM
18, Washburn Ranch	vacant	See pasture matrix	6,804	6,804	3,350	3,350
26, Painted Rock	0401043	See pasture matrix	7,570	7,570	3,660	3,660
29, KCL Ranch	0401029	See pasture matrix	25,783	25,783	13,070	13,070
43, Goodwin Ranch	0401043	See pasture matrix	5,800	5,800	2,470	2,470
46, Saucito Ranch	0401025	See pasture matrix	3,757	3,757	1,950	1,950
53, Temblor-Caliente	0401051	See pasture matrix	54,244	54,244	28,375	28,375
70, Carrizo Ranch	0401078	See pasture matrix	5,477	5,477	2,750	2,750
92, Phelan	vacant	See pasture matrix	4,755	4,755	4,200	4,200
8 Allotments	8 permits		114,190	114,190	59,825	59,825

Livestock grazing has been applied to the pastures within the allotments under free use grazing permits (see Map 3-13, Range Features for pasture locations) based on the needs of the key resource values identified in a Pasture Matrix (see Appendix M, Pasture Matrix, No Action). This Pasture Matrix identified key resource values for each pasture and prescribed differing grazing management in support of those resources, based on our current knowledge. The managing partners have been developing a more comprehensive approach to applying livestock grazing treatments since 2005. The new approach focuses on the objectives and needs of each resource value or conservation target and correlates those to the various management actions or treatments geared to meet those objectives. This new document is called the Conservation Target Table (see Appendix C, Conservation Target Table). A separate guideline/pasture matrix (see Appendix V, Pasture Management Table) identifies the resource values or targets within each pasture and list the compiled management prescription for that pasture based on the direction from the Conservation Target Table. The locations of the key resource values and grazing management prescriptions in this matrix were developed and applied over time with input from all the managing partners and species experts and are adjusted as new information becomes available. Generally, application of livestock grazing within the pastures largely depends on yearly precipitation rates as reflected by green-up or vegetation response, the existing annual residual dry matter present, and the resultant species composition. In dry years, or in years with favorable annual species composition, little or no livestock grazing may be necessary to meet resource objectives. Each year, pastures within the free use grazing allotments are evaluated based on the criteria in the current pasture matrix and grazing is applied as necessary to meet the objectives for that pasture's resources. Actual applied livestock grazing use by season and pasture since 1989 is tabulated in Appendix N, Actual Grazing Use for Vegetation Management Since 1989.

Although no authorized grazing has occurred on CDFG lands to date, livestock grazing could occur on these lands under 14 CaCR 630(b)(29)(C), entitled the Carrizo Plains Ecological Reserve, but only under permit from the CDFG. If authorized, livestock grazing would be managed consistent with the Monument grazing study and monitoring program and any other grazing prescriptions deemed necessary by the CDFG.

Unfenced private lands within the Monument may also be grazed by other private landholders, and the use of these areas may not conform to the grazing prescription placed on public lands.

3.14.4 Livestock Management Facilities

Current grazing allotments and pastures utilize many existing acquired ranch boundaries, fence lines, and water systems. Fences or other livestock management facilities have been removed to enhance wildlife movement. Over 150 miles of fence have been modified or removed by the managing partners and volunteers since 1998.

The use and development of livestock management facilities on public lands is authorized through cooperative agreements. Maintenance of these facilities is generally the responsibility of the grazing permittee or lessee. However, BLM has assumed a portion of this maintenance, including maintenance of some water systems, fence removal and modification, road and trail maintenance, and others. BLM maintains title to such range improvements (livestock management facilities) on public lands. Administrative access to these livestock management facilities is usually necessary to ensure maintenance capabilities. Existing livestock management facilities, including access roads, corrals, barns, water pumps, water tanks, water troughs, pipelines, spring collection boxes, fences, and cattle guards are used, as appropriate. When consistent with the Monument mission, and needed to achieve management objectives, facilities may be constructed or modified to prevent or reduce livestock distribution problems or to help facilitate the grazing system.

Existing facility maintenance occurs periodically throughout the year, and may include grading, mowing, or repairing roads; repairing drainage crossings; cleaning or replacing culverts; scraping out or modifying corrals; hauling materials from existing roads to repair fences; mowing vegetation along fences; cleaning out, replacing, or moving cattle guards; repairing, removing, or replacing water tanks, their bases, and troughs; locating and repairing, replacing, or bypassing sections of buried pipeline; and locating, cleaning out, repairing, or replacing spring collection boxes.

3.15 Recreation and Interpretation

Recreational use in the CPNM is oriented toward enjoyment of the area's natural and historic resources. People visit the Monument to view wildlife and birds, to see the spectacular wildflower displays in the spring, to walk along the San Andreas Fault, to visit the pictographs at Painted Rock, and to just enjoy the solitude. Other visitors enjoy hunting opportunities in the mountains surrounding the plain, camping in the foothills, horseback riding, hiking, and various other outdoor activities.

A majority of the recreational use of the National Monument is concentrated around the Goodwin Education Center, Soda Lake, Painted Rock, Selby and KCL campgrounds, the Caliente Mountains, and along the Elkhorn Plain (see Map 3-14, Visitor Services and Recreation). Seasonal use varies based on the wildflower bloom in a given year, weather, and the availability of upland and big game. The highest visitation occurs from December through May. The lowest visitation occurs during August, when the summer temperatures peak.

3.15.1 Current Recreation Use and Trends

The CPNM is located within a day's drive of more than 30 million California residents. However, the area receives a relatively low level of visitation. Most "destination" visitors bypass the area and head to more popular locations on the coast or in the Sierra Nevada Mountains. The area's isolation from primary travel corridors, harsh climate, and lack of facilities contribute to this low use. However, these same features also give the area its unique qualities as a scenic recreational setting, and use levels by

destination visitors are expected to increase at modest rates as the area is discovered. The CPNM is also a local recreation destination for residents of Kern and San Luis Obispo counties. Approximately one million residents live within a 1-hour drive of the area. These residents make up a larger percentage of area visitors, both for touring natural and cultural attractions and for hunting.

CPNM is located within a 1- to 3-hour drive of the 1.75-million acre Los Padres National Forest, the 1.2-million acre Sequoia National Forest, and the 650,000-acre Angeles National Forest. There are an additional 300,000 acres of BLM-managed lands within the Bakersfield Field Office, excluding the Monument. These surrounding public lands offer numerous opportunities for camping, hiking, OHV riding, bicycling, climbing, hunting, shooting, viewing scenery and wildlife, and countless other recreational activities. Adjacent National Forest System lands within Kern and San Luis Obispo counties offer recreation opportunities not provided within the Monument, such as operating OHVs off-road. BLM does not allow any off-road use on public lands, but does allow target shooting.

Visitor use for CPNM has been collected and reported annually through the BLM RMIS since the 2001 Monument Proclamation. Overall use increased from approximately 24,620 visitors in fiscal year 2001 to 87,040 in fiscal year 2007. The increase has been fairly steady over the past 7 years as more and more people learn about the features of the Monument. According to RMIS data, the most popular activities at the Monument are currently driving, picnicking, viewing scenery, wildlife, wildflowers, cultural sites, interpretive exhibits, environmental education, nature study, photography, hiking, equestrian use, bicycling, use of OHVs on roads, and hunting. Most use is self-directed as there are few developed facilities or programmed activities located on the Monument.

Anecdotal observations by on-site personnel indicate that there is a trend toward more individual, family, and small group use on the Monument. A large portion of the use in the past was by large groups such as university classes or club activities.

There is also a noticeable increase in the number of OHVs visiting the area looking for riding opportunities. This estimated increase in use and interest is based on the following observations: the large number of inquiries from the public concerning if and where they can operate OHVs on the Monument; newly created (illegal) tracks from 4x4 vehicles, motorcycles, and ATVs; and the recent increase in legal operation of vehicles on roads within the Monument. BLM is addressing this increased demand within both the CPNM and Caliente RMPs so that appropriate opportunities can be provided within and outside the monument while meeting the requirements of the Monument Proclamation to limit travel to open roads.

Recreational use on the Monument is expected to continue to increase at moderate rates similar to the increase in use experienced over the past 7 years.

3.15.2 Overview of Recreation Activities

BLM policy requires that commercial and organized non-commercial group activities obtain special recreation permits prior to utilizing the CPNM for their activities. Commercial permits are required for activities that charge a fee to participants or spectators. Non-commercial group-use permits are required for non-commercial or educational groups containing 20 or more people or 5 or more vehicles, unless BLM is a co-sponsor to the event or activity. All permittees must meet associated fee and insurance requirements. Groups under 20 people and under 5 cars are documented through a special use permit filled out by a BLM employee (for visitor use tracking purposes only; no fees are assessed).

The following restrictions on recreation apply:

- All public lands within 1/4 mile of Sulphur Spring on the north side of the Caliente Mountain range are closed to public access, except under permit from BLM, to protect sensitive resources.
- OHV use is limited to designated routes, which are defined as existing well-traveled roads that have been identified and mapped. The operation of any motorized vehicle off of designated routes of travel is prohibited. Open routes are available for use by all vehicle, bicycle, foot, and equestrian travel. All vehicle use on routes posted or designated as closed is prohibited. Except on county roads, or unless otherwise posted, the speed limit on such open roads is 25 miles per hour. Roads designated as being for administrative use only are open to bicycles and other non-motorized vehicles, pedestrians, and casual horse use unless otherwise posted.
- Operation of motor vehicles, aircraft, and boats and flotation devices of any kind are prohibited on or within Soda Lake and any adjacent stream, channel, dry lake, and body of water.

See Appendix I, Supplemental Rules for Public Use, for a full list of existing Carrizo rules.

3.15.2.1 Auto Touring

The majority of Monument visitors tour the area in cars, stopping at scenic viewpoints, interpretive overlooks, hiking trails, and other points of interest along the way. The majority of these visitors stay on Soda Lake Road. Specific attractions viewed by touring visitors are described in Section 3.15.3 below.

3.15.2.2 Hiking

Hiking in Carrizo is generally self-guided and takes place on roads, trails, and cross-country. There are only a few developed trails within the Monument. These include the Caliente Ridge Trail and various interpretive trails:

- Caliente Ridge Trailhead: This 7-mile long trail is accessed from a small trailhead located at the top of Caliente Ridge. The trailhead provides parking for five vehicles. There are no restrooms or interpretive facilities at the trailhead. The Caliente Ridge Trail provides panoramic views of the Carrizo Plain as well as the Temblor Range and parts of Cuyama Valley. This trail also provides excellent opportunities for wildlife viewing and bird watching.
- Caliente Mountain Trailhead: This trailhead is located 13 miles west of Cuyama on Highway 166. Wide open spaces and spring wildflowers set the stage for hiking on this 2.0-mile trail. This trail is not well defined due to recent fires. Hunters favor the trail for access to deer and quail on adjacent public lands.
- Interpretive trails: see Section 3.15.3.2 below.

3.15.2.3 Camping

In general, the CPNM is not a destination point for camping in itself. However, a significant amount of camping does occur in support of other recreational pursuits such as hunting, hiking, and group activities. There are two developed campgrounds in the CPNM with a total of 17 single-unit sites, 4 walk-in sites, and 3 group sites. All camping is currently free on the Monument.

KCL campground is a semi-primitive campground located at what was the headquarters of Kern County Land Company. It has some of the few shade trees found on the CPNM. KCL campground still has a few historic buildings used by the ranch when it was in operation. There are four developed single-unit campsites, four walk-in sites, and two group campsites. Each campsite includes one *Americans with*

Disabilities Act-compliant picnic table, fire ring/grill, and lantern holder. There is one permanent double-toilet building. The group campsites are designed to accommodate equestrian user groups and include individual corrals.

Selby campground is also a semi-primitive campground equipped with 13 shade structures, picnic tables, and fire pits. There is one permanent double-vault toilet. The campground is located at the base of the Caliente Mountains. There are no shade trees; however, the campground is more secluded than KCL.

Dispersed camping is also allowed within certain areas of the CPNM. The designated dispersed camping areas encompass approximately 100,000 acres where car, tent, backpack, or horse camping is allowed. Generally, dispersed camping is permitted in the foothills and mountainous areas. Dispersed camping is not permitted on the valley floor area to protect sensitive biological resources and to prevent obstruction of scenic vistas, nor is it permitted at Soda Lake and adjacent areas.

Overnight camping is allowed within designated campgrounds and designated camping areas. All other public lands are closed to overnight parking or camping. Camping or overnight parking is prohibited within 200 yards of any natural or artificial water source.

Overnight camping is limited to 14 days within any 30-day period, for a total of no more than 28 days within any 1-year period, except as specified in writing by the authorized officer.

Campfire permits are required for anyone who builds or maintains a campfire as well as for the operation of all charcoal grills, cooking stoves, or other open flame. There is no wood gathering on the Monument and wood is not sold anywhere on the Monument. All firewood needs to be hauled in by the user.

3.15.2.4 Hunting and Shooting

The CPNM offers a wide variety of hunting opportunities. The CPNM has populations of California quail, chukar, cottontail rabbit, deer, tule elk, and wild pigs for the hunter. Varmint hunting is legal for coyote, California ground squirrel, and black-tailed jackrabbit. Nearly all of the CPNM is open to hunting. Areas not open to hunting include a large safety zone surrounding the Guy L. Goodwin Education Center and Painted Rock; all designated campgrounds; administrative and recreational facilities including Painted Rock Ranch, Washburn Ranch, and MU Ranch; all pullouts and informational kiosks; Soda Lake; Traver Ranch; and Wallace Creek.

Tule elk and pronghorn antelope have been reintroduced into historic habitat within the CPNM. Limited hunts, previously held for both species, are now only available through the lottery process for tule elk. The pronghorn hunt has been cancelled due to a dramatic decrease in numbers within the Monument.

Hunting in the Monument is managed and regulated by the CDFG. Nothing in the Monument Proclamation affects the jurisdiction of the State of California with respect to fish and wildlife management. All sections of the CDFG Code and 14 CaCR are in effect.

The CDFG has installed many underground water devices known as gallinaceous guzzlers for supplying water to wildlife. Many of these guzzlers are maintained by various volunteers and sportsmen's groups.

There is no target shooting allowed in the Monument (see Appendix I, Supplemental Rules for Public Use).

3.15.2.5 Equestrian Use

Equestrian use is permitted on the CPNM. Trailer parking is available, but limited to already impacted areas such as campgrounds and parking areas. Equestrians are prohibited on most walking trails, including but not limited to Painted Rock, Wallace Creek, Soda Lake Boardwalk, and Overlook Hill. Portions of some walking trails are used to for equestrians to get past enclosures and exclosures as allowed and signed, such as the Caliente Ridge trail head and the Caliente Mountain Trail.

3.15.2.6 Mountain Biking

Mountain bike use is permitted on the 460 miles of existing public roads on the CPNM. On the Monument, bikes are treated like vehicles and must stay on designated roads. Mountain bikes are prohibited on most walking trails, including but not limited to Painted Rock, Wallace Creek, Soda Lake Boardwalk, and Overlook Hill.

3.15.3 Interpretation and Education

3.15.3.1 Goodwin Education Center

The Guy L. Goodwin Education Center is located 7.4 miles from the north entrance or 30 miles from the south entrance on Soda Lake Road. The center offers the visitor interpretive displays and exhibits explaining the uniqueness of the Carrizo Plain and the adjoining Elkhorn Plain. Here visitors learn about the endangered plants and animals that inhabit the CPNM, the geology of the San Andreas Fault, the human history of Painted Rock and its significance to Native Americans, and the farming and ranching history of the area. A diorama and interactive, interpretive displays are available for visitor education. A breathtaking mural of the Carrizo Plain and its animal and plant life, painted by Santa Barbara artist John Iwerks, focuses attention on the diversity and complexity of life on the Carrizo Plain.

The Guy L. Goodwin Education Center is open seasonally from the beginning of December to the end of May. Normal days and hours of operation are Thursday through Sunday, 9:00 a.m. to 4:00 p.m.

Accessible restrooms at the Goodwin Education Center are open 24 hours a day, 7 days a week, throughout the year. Informational maps and brochures are available at the front door when the center is closed. The Goodwin Education Center driveway may be closed if road conditions are too muddy for vehicles. Visitors are welcome to hike in during these times.

A wide array of merchandise is available for purchase, ranging from stickers and magnets to posters, books, and tee shirts. Also available are checklists of the flora and fauna found within the CPNM. These lists include plants, birds, mammals, as well as amphibians and reptiles. A minimal fee is charged to cover printing costs.

Seasonal tours are offered on the Monument and are coordinated through the Goodwin Education Center.

3.15.3.2 Interpretive Trails

Painted Rock Trail

The Painted Rock Trail is located 2 miles south of the Goodwin Education Center. This trail gives visitors access to the level 1.4-mile round trip trail to the Painted Rock cultural site. Painted Rock, a horseshoe-shaped monolith rock formation, stands about 55 feet tall above the high plain adjacent to the Caliente Mountain Range. The Chumash, Yokuts, and other native peoples lived, hunted, and traded in this central

region of California. Painted Rock, a special place to the native peoples, is recognized as one of the most important rock painting (pictograph) sites in the United States.

The trail is open to pedestrians only (no mountain bikes, dogs, or horses). Painted Rock is closed from March 1st to July 15th to protect the wildlife and resources. During this closure, tours are available through the Goodwin Education Center.

Traver Ranch Trail

The Traver Ranch homestead has a self-guided tour of old farming equipment and discusses the history of farming on the Carrizo Plain.

Wallace Creek Trail

A self-guided 1/5 mile interpretive trail has been constructed at Wallace Creek and along a portion of the San Andreas Fault. The trail walks visitors through the geological impact of the San Andreas Fault on the CPNM over time. There are brochures available at the Education Center or at the trailhead. These brochures provide interesting information on the geology of the CPNM and the San Andreas Fault.

Soda Lake Boardwalk Trail

The boardwalk that goes along the edge of Soda Lake is located on Soda Lake Road across from Overlook Hill. This short, moderately level trail begins at Soda Lake Road, and takes visitors 0.25 miles to the edge of Soda Lake. The elevated, 800-foot-long boardwalk begins at the edge of Soda Lake and allows visitors to walk above the dry lake bed while protecting sensitive habitat. Benches are available for resting and viewing plants and wildlife. Restroom facilities are available at the Overlook Hill parking area.

Overlook Hill Trail

The Overlook Hill Trail is located off Soda Lake Road 2.1 miles inside the north entrance and provides a great view of Soda Lake and the Carrizo Plain. The trail is short but steep. At the top, visitors are greeted by wonderful views and interpretive signs informing them about the native wildlife and the surrounding mountains.

3.15.3.3 Guided Tours

All docent-guided tours are scheduled through the Goodwin Education Center or the Outdoor Recreation Planner for the CPNM.

Wildflowers and Painted Rock Tour

During the spring there are opportunities for a docent-guided tour of the wildflowers and Painted Rock. The tour begins at the Soda Lake Overlook. After an introduction and brief overview of the Carrizo Plain, the group explores Soda Lake and the Carrizo Plain's plant communities. The group then caravans to the Painted Rock parking lot and hikes approximately 0.75 miles to Painted Rock. Although the path does not have a significant change in elevation, it does not currently meet accessibility standards. Time spent within the Painted Rock alcove may be limited to protect prairie falcons or other nesting birds. The tour ends at the Goodwin Education Center.

El Saucito Ranch House Tour

The El Saucito Ranch House is the oldest standing ranch property in the Carrizo Plain, dating back to the late 1870s. The house and the surrounding buildings are currently under renovation and are open to special tours during certain times of the year. There is an informational kiosk and a 0.25-mile interpretive trail on the property.

Driving Tours

A booklet containing two self-guided auto tours is also available for purchase at the Goodwin Education Center or through the BLM Bakersfield Field Office.

3.15.4 Recreation Opportunity Spectrum

The recreation opportunity spectrum (ROS) is BLM's framework to inventory existing recreational settings and opportunities for recreation experiences within a given landscape or management area. The primary factor in determining ROS classes is the setting. This describes the overall outdoor environment in which activities occur, influences the types of activities, and determines the type of recreation that can be achieved. Activities are not completely dependent on opportunity class and most can take place in some form throughout the spectrum. However, in general, activities can be characterized for each ROS class.

The ROS continuum consists of six land classifications ranging from a primitive wilderness setting to an urban park setting, with each defined by physical, social, and managerial characteristics. In the planning process for the CPNM, three of the six land classifications were utilized: semi-primitive non-motorized (approximately 19,000 acres); semi-primitive motorized (approximately 164,000 acres); and roaded natural (approximately 65,000 acres). These classifications are further described below and illustrated in Map 3-15, Recreation Opportunity Spectrum.

- **Semi-primitive non-motorized:** This setting consists of lands at least ½ mile from the nearest point of motor vehicle access. The area is predominantly a natural landscape. Where there is evidence of others, interaction is low, and few management controls exist. Activities include backpack camping, nature viewing, back-country hunting (big game, small game, and upland birds), climbing, and hiking. The experience provides for minimal contact with others, a high degree of interaction with nature, and a great deal of personal risk and challenge.
- **Semi-primitive motorized:** This setting consists of lands within ½ mile of primitive roads and two-track vehicle trails. The area has a mostly natural landscape with some evidence of others (but numbers and frequency of contact seem to remain low) and few management controls. Activities include hunting, climbing, vehicle trail riding, back-country driving, mountain biking, and hiking. The experience provides for isolation from human civilization, a high degree of interaction with the natural environment, and a moderate degree of personal risk and challenge.
- **Roaded natural:** This setting consists of areas near improved and maintained roads. While these areas are mostly natural in appearance, some human modifications are evident, with moderate numbers of people, visible management controls, and developments. Activities include OHV driving, interpretive uses, picnicking, and vehicle camping. The experience provides for a sense of security through the moderate number of visitors and developments, but with some personal risk-taking and challenges.

These settings/ROS classes provide a basis for the development of Recreation Management Zones described in Chapter 2, Alternatives.

3.16 Public Safety and Emergency Services

The isolation of the CPNM complicates emergency medical response and emergency preparedness. Emergency medical transportation may take up to two hours depending on the availability of resources. The California Highway Patrol staffs a helicopter that responds to medical emergencies in the area. However, depending on the availability of the helicopter, it may be delayed. Ground ambulances are dispatched from San Luis Obispo or Kern counties depending on the location of the incident. There are no public phones located within the Monument. Cell phones are able to receive services in some locations; however, it is patchy.

Public safety and law enforcement activities are handled by specialists within BLM, the CDFG, and other law enforcement agencies. Search-and-rescue operations are handled by the San Luis Obispo and Kern County sheriffs' offices.

The CDFG has wildlife protection personnel assigned to southeastern San Luis Obispo County to provide wildlife law enforcement. Additionally, the California Highway Patrol conducts aerial patrols, and the San Luis Obispo County sheriff's office provides general law enforcement capabilities.

The CPNM is covered under mutual aid agreements with surrounding agencies for medical and fire protection.

3.16.1 Earthquakes Response

In the event of a major earthquake, damage to structures, facilities, and utilities would likely be extensive. Emergency response is coordinated by the Federal Emergency Management Agency and the San Luis Obispo and Kern county's respective Office of Emergency Services. There would be extremely high interest by the geophysical community as well as the media and general public to an earthquake on the San Andreas Fault in the area. The USGS, in conjunction with other partners, have continuous monitoring devices located in the Carrizo Plain as an early warning system and to collect data on any movement along the fault.

3.16.2 Valley Fever

Coccidioides immitis, the fungus that causes valley fever, thrives in the alkaline desert soils of southern Arizona, northern Mexico, and California's San Joaquin Valley. This includes parts of the CPNM. This fungus has a complex life cycle. It grows in soils as mold with long filaments that break off into airborne spores when soils are disturbed. These spores are very small and can be carried hundreds of miles.

For more than half the people infected, this poses no problem. Their immune system effectively fights off the fungus and they never develop symptoms. Others have varying degrees of symptoms such as chest pain, weakness, fever, chills, night sweats, and joint aches. In some cases, the illness progresses to severe pneumonia or spreads beyond the lungs and may ultimately prove fatal.

In desert regions, changing rainfall patterns and extended periods of drought seem to closely correlate with an increase in valley fever cases. *Coccidioides* lies dormant during long dry spells and then blooms when it rains. It is then swept into the air by anything that disturbs the surface. This includes earthquakes, storms, farming, and construction. In California, the risk is highest during summer months, usually June through August.

The Carrizo Plain has the potential to harbor this fungus. BLM uses best management practices to minimize the chances of the release of this fungus on all projects that occur within the Monument. Both

the San Luis Obispo and San Joaquin Valley air pollution control districts have regulations that govern earth-disturbing work, such as excavation and new construction. These regulations have varying requirements for dust control according to the size and scope of the work being performed.

3.17 Administrative Facilities

The CPNM has a primary administrative site known as the Washburn Ranch. This facility includes a maintenance shop, housing, office space, and meeting space. There are also historic buildings at this site that are part of a historical district. This site consists of a metal butler building (maintenance shop), a large stick-framed residence, a modular house, and a small stick-framed building to house the solar components. In the historical district, there are three barns, a washhouse, corrals, a bunkhouse, an outhouse, and a cook house. These buildings are in different states of disrepair.

Generally, the working facilities are in good condition. The ranch house was built in the 1950s and has some maintenance needs such as upgrading the wiring. The metal butler building and solar building were built in the mid 1990s. The modular house was manufactured in the late 1980s. These buildings periodically need minor maintenance.

This facility is operated by solar power, which was installed during 2000 to 2001. Generally this has proved to be reliable all year round. Due to the lack of potable water sources located near this facility, potable water is delivered to this facility.

Another administrative site known as the MU Ranch serves as housing for Monument staff, seasonal employees, and researchers. At this location, there is a modular home, built in the late 1980s, a smaller stick-framed residence, a barn, corrals, and a small garage. The wiring and plumbing for the smaller residence is currently being upgraded. This house was built in the 1960s and has a new roof and is structurally sound. After completing the upgrades, the facility will continue to be used for housing needs related to the Monument. The modular home is in good condition and houses Monument staff. The barn and corrals are used when cattle are grazing. The barn needs some repair. The garage is in good condition and has recently had the electrical wiring upgraded. Due to the lack of potable water in the vicinity of this facility, potable water is hauled in and delivered.

The Education Center is also a facility that is a focal point for the Monument and its visitors. This facility was built in the 1990s by TNC and now is managed by BLM. The wiring has been upgraded and the toilets replaced to make them conform to *Americans with Disabilities Act* requirements. Planning and analysis continue regarding installing a photovoltaic system for the Education Center and thus eliminating the need for electrical power and, potentially, a transmission line.

BLM continues to do routine maintenance and conduct condition assessments to ensure proper maintenance continues on all CPNM facilities.

3.18 Travel Management

The Monument Proclamation calls for the following travel limitations within the Monument:

For the purpose of protecting the objects identified above, the Secretary shall prohibit all motorized and mechanized vehicle use off road, except for emergency or authorized administrative purposes. . . . The Secretary of the Interior shall prepare a management plan that addresses the actions, including road closures or travel restrictions, necessary to protect the objects identified in this proclamation.

This section discusses conditions and management of travel and access routes to and within the CPNM. Some of these routes are not under BLM's jurisdiction (county roads, state highways). Any formal planning guidance and associated decisions apply only to the routes on BLM lands within the CPNM.

3.18.1 Applicable Regulatory Framework

Comprehensive public land travel management is the proactive management of public access, natural resources, and regulatory needs to ensure that all aspects of road and trail system planning and management are considered. This includes resource management, road and trail design, maintenance, and recreation and non-recreation uses of the roads and trails. Travel activities in this context incorporate access needs and the effects of all forms of travel, both motorized and non-motorized.

BLM defines appropriate access to public lands through the RMP process. At a minimum, each RMP divides planning areas into OHV area designations that are open, limited, or closed, and includes a map of area designations. Specific criteria for open, limited, and closed designations are provided in 43 CFR 8340.0-5. Additional criteria are provided by existing law, proclamation, executive order, regulation, or policy (including the Monument Proclamation). This BLM policy clarification requires that all area designations for open, limited, and closed continue to be completed at the RMP level, and recommends that route-specific road and trail selections in limited areas be completed in the RMP whenever possible. However, where route designations cannot be completed in the RMP, this BLM policy clarification allows route designations to be completed during the implementation period following plan completion. This RMP includes proposed route designations (see Chapter 2, Alternatives).

As stated above, the Monument Proclamation prohibits all motorized and mechanized vehicle use off road, except for emergency or authorized administrative purposes.

3.18.2 Overview of Travel System

3.18.2.1 Area Highway Access

The CPNM has two major sources of access: one from the north and one from the south. From the north, the access is via Soda Lake Road off of Highway 58. Highway 58 is a two-lane paved highway connecting to Highway 101 in the west at Santa Margarita (50 miles away) and east to Interstate 5 (43 miles to the east). The other major access is from the south via Soda Lake Road or Elkhorn Road off of Highway 33/166. Highway 33/166 is a two-lane highway connecting to Highway 101 near Santa Maria (60 miles west) and Interstate 5 (45 miles east). Although traffic volumes are higher on the Highway 33/166 corridor, the majority of visitors enter the CPNM from the north off of Highway 58 and Soda Lake Road. Most of the Monument facilities and popular attractions are more easily accessed via this route.

3.18.2.2 Road Conditions and Management within the CPNM

Many roads within the Monument have an unimproved dirt surface. During periods of rain, a number of roads become impassable. The main road, Soda Lake Road, is open year round. However, rains may make parts of Soda Lake Road slippery, muddy, and impassable at times. The Caliente Ridge Road can be especially dangerous when wet and may be closed periodically during periods of heavy rain or snowfall. In the rainy season, visitors are advised to contact BLM to find out which roads are safe to travel. All roads in the Monument may be closed periodically for safety conditions such as fire hazard, weather, or unsafe conditions.

Travel routes within the Monument and their current allowable uses are described in the following categories:

- **County:** Roads administered by San Luis Obispo or Kern County, open to street-legal vehicles, bicycles, pedestrians, and equestrians. County roads traverse BLM lands on rights-of-way and are under county government jurisdiction.
- **State of California:** Roads crossing state lands (administered by CDFG and State Lands Commission).
- **BLM open:** BLM-administered roads open to street-legal vehicles (vehicles licensed for highway travel), “green sticker” vehicles (ATVs, dirt bikes and other vehicle registered by the state for off-highway use), bicycles, pedestrians, and equestrians.
- **BLM administrative:** BLM-administered road open for vehicle use for administrative purposes only. Most administrative roads are also open to non-motorized public use by bicycles, pedestrians, and equestrians
- **Closed:** closed to all motorized and mechanized vehicles. Pedestrian and equestrian use is permitted, unless otherwise closed (for example, seasonal wildlife closures).
- **Trail:** BLM-administered travel route open to foot travel only.
- **Private:** Roads that cross privately owned property.

Based on the latest inventory, there are 587 miles of travel routes on the Monument. A summary of routes, mileages, and designations is provided in Table 3.18-1.

Table 3.18-1. Travel Routes in the CPNM

Designation	Miles
BLM Administrative	114
State of California	21
Closed	10
County	88
Foot	7
BLM Open	243
Private	104
Total	587

Note: road mileage in this table does not match mileage in the “No Action” alternative as the roads are categorized differently. This table includes road segments that are not part of the BLM-administered travel network.

3.18.2.3 Road Maintenance

BLM and the County of San Luis Obispo maintain most of the roads within and immediately adjacent to the Monument. Most of the roads within the Monument are unimproved dirt with some portions of Soda Lake Road paved.

County roads within the Monument are managed to complement the direction of the 1996 CPNA RMP and the 1997 Caliente RMP. There are approximately 71 miles of unpaved road and 17 miles of paved road that are maintained by the county. To facilitate necessary maintenance on these roads, and to ensure that this maintenance does not adversely affect sensitive resources, BLM has entered into a memorandum of understanding with San Luis Obispo County.

The 357 miles of BLM administered roads are maintained on an as-needed basis by the BLM Bakersfield Office. Roads that give access to major recreation sites are given priority, so many lesser-used roads may go several seasons without being maintained. Maintenance activities are coordinated among CPNM staff, the BLM Bakersfield Office, and third parties lessees as appropriate.

BLM does not maintain roads on privately owned lands.

3.19 Minerals

The Monument Proclamation states that:

All Federal lands and interests in lands within the boundaries of this Monument are hereby appropriated and withdrawn from all forms of entry, location, selection, sale, or leasing or other disposition under the public land laws, including but not limited to withdrawal from location, entry, and patent under the mining laws, and from disposition under all laws relating to mineral and geothermal leasing, other than by exchange that furthers the protective purposes of the Monument . . . The establishment of this Monument is subject to valid existing rights.

Based on the Monument Proclamation and associated withdrawals, only those valid leases, claims, and other rights that existed as of the date of the Proclamation, January 17, 2001, may see mineral development on federal lands within the Monument. Other laws and policies guiding the minerals management within the Monument vary by the type of mineral resource and are described in more detail below.

3.19.1 Private Mineral Estate within the Monument

Approximately 53 percent of the mineral estate within the Monument is privately owned (see Map 3-16, Oil and Gas Wells within the Carrizo Plain National Monument). If agency approval is required for mineral development on privately owned minerals, the proposal would be subject to environmental review under the *California Environmental Quality Act* (CEQA) and/or NEPA.

When federal approval is required, the proposal would be subject to review under NEPA, and compliance with other applicable laws, such as the federal *Endangered Species Act* and cultural resource protection laws. The applicant would be subject to appropriate stipulations, conditions of approval, and mitigation/compensation requirements. BLM would work with the state, county, and local agencies to ensure that the mission and purpose of the Monument is not impaired and only reasonable uses of public lands may be made to access and develop private mineral estate. In particular, compliance with the *Endangered Species Act* and laws protecting archaeological sites would be critical in a National Monument established to preserve these resources.

Private lands are not directly affected by this plan or the Monument Proclamation. However, access to non-federal minerals across federal surface may require a federal right-of-way or other federal permit, likely resulting in longer timeframes for approval and increased project costs. If consultation with USFWS is required under the *Endangered Species Act*, the delay could be as much as two years, or even longer. Holders of outstanding third-party rights where privately held mineral rights underlie surface managed by TNC, CDFG, and private parties will also be required to adhere to county regulations and CEQA requirements for surface-disturbing activities. This compliance may significantly increase the processing time and costs associated with the proposed action.

3.19.2 Mineral Resources within the Monument

The Monument contains a number of extractable minerals, that is, minerals that are removed from the land by mining, producing through a well bore, or other means. These minerals include oil and gas, sand and gravel, gypsum, phosphate, sodium sulfate, and others. These minerals are managed in accordance with the *Mineral Leasing Act* of 1920, as amended; the *Mining and Minerals Policy Act* of 1980; the *Mining Law* of 1872, as amended; the *Federal Onshore Oil and Gas Leasing Reform Act* of 1987; FLPMA; 43 CFR; Onshore Orders 1-8; notices to lessees; other laws, regulations, and orders; and in accordance with all applicable state, county, and local laws and ordinances.

As of January 17, 2001, there were 19 federal oil and gas leases within the Monument. Nine of these were in producing status, either based on actual production or else due to allocated production if they were in a producing unit. Since that time, all of the leases that were not in producing status have expired or terminated because their primary term expired without production being established, or else production ceased. Of the nine leases that are still in producing status, seven are currently held by production within the CPNM; two are held by production that is in other portions of the leases that are outside the CPNM. The only production in the Monument, including both private and federal, is near the southwest boundary, mostly within the boundaries of the Russell Ranch unit (see Map 3-17, Producing Oil Fields in the Carrizo Plain National Monument). Private leases are not recorded with BLM, so it is unknown whether there are private leases within BLM (other than within the Russell Ranch Unit, a federal unit that contains both private and federal leases.)

All of the leases, both producing and non-producing, were issued with standard lease terms and conditions. Activities that are performed on these leases are subject to standard lease terms, standard engineering practices, and additional restrictions necessary to comply with specific, non-discretionary statutes (such as the *Endangered Species Act*). They are also subject to other reasonable restrictions required by the authorized officer to protect other resource values, land uses, and users.

Even though all nine federal oil and gas leases are classified as “held by production,” two of the leases (the two leases that are held by production from outside the unit) have not actually produced for several years. The term of all leases will continue so long as there is production in paying quantities or actions to restore production are undertaken within 60 days of being notified to do so by BLM. No new leasing of federal minerals will be allowed because of the Monument Proclamation and associated withdrawal.

There were no valid claims, leases, or other valid existing rights pertaining to solid minerals as of the date of the Monument Proclamation, so there will be no development of these minerals on federal mineral estate except for emergencies and administrative purposes, as described elsewhere in this document.

A description of the various mineral resources within the Monument is contained in the following sections. This is intended to provide an understanding of the potential for development on the private mineral estate (and existing valid leases) within the Monument. It is also intended to provide a more complete description of valid existing rights for each of the various classifications of extractable minerals.

3.19.2.1 Oil and Gas Resources

Minor commercial quantities of oil and gas have been located in two areas of the Monument: in the northeast part of the Temblor Range and the south side of the Caliente Range. On the south side of the Caliente Range are two minor fields and a portion of a major oil field, the Russell Ranch field. There are approximately 45 wells within the Monument boundary: 15 producing and 30 shut-in wells. Approximately half of the producing wells are federal. Current federal production within the Monument is approximately 1,200 to 1,500 barrels of oil per month (BOPM), with a current value of \$110,000 per

month and \$15,000 per month royalty to the government. The non-federal production is approximately 1,000 to 2,000 BOPM. There are few active wells outside the Russell Ranch field (see Map 3-16, Oil and Gas Wells within the Carrizo Plain National Monument, and Map 3-17, Producing Oil Fields in the Carrizo Plain National Monument). Many of the shut-in wells will be required to be plugged and abandoned or else returned to production within the next 10 to 15 years.

Of the five oil fields that are partially or totally within the boundary, three of the fields, Temblor Hills, Gonyer Anticline, and Taylor Canyon, do not contain any active wells. The remaining two fields, Morales Canyon and Russell Ranch, contain a total of seven active federal leases. No commercially successful wells have been developed outside of these areas in the Monument, although indications of oil and gas are common in the 267 wells drilled elsewhere in the Monument. Wells up to 18,000 feet deep have been drilled in the Monument without finding commercial quantities.

By contrast, the Monument is surrounded by six giant and super-giant oil fields (fields with over 100 million and 1 billion barrels of reserves, respectively) and numerous smaller productive fields. The Midway-Sunset field, the largest oil field in California and the lower 48 states, lies a few miles to the east of the Monument near Taft. With several billion barrels of oil having been produced in the general area since the late 1800s, this is one of the largest oil-producing regions in the country.

The generally unsuccessful exploration of the Monument can be attributed to the lack of a mature organic source for hydrocarbons and/or lack of a timely trapping structure (USGS 1995). Under the Monument, most of the organic-rich Monterey Formation may not have been buried deeply enough to reach threshold oil-generation temperatures and pressures. Where hydrocarbons may have existed, as in the older Soda Lake member of the Monterey Formation, trapping structures were apparently not present at the time hydrocarbons began to be expelled. Any hydrocarbons that may have existed were apparently released before the faulted structures below the Monument were in place. Older structures existed on the south side of the Caliente Range during the older phase of oil migration, as evidenced by proven hydrocarbon reservoirs. Due to the lack of recent success, exploration activities have been virtually nonexistent for decades. However, recent advances in technologies (including seismic exploration, drilling, and production technologies), along with significant increases in oil and gas prices, may result in more activity in the future.

Although the CPNM is closed to new federal leases, a full range of exploration and development activities may still occur both on existing federal leases and on private leases. This includes seismic exploration, road building, drilling new wells and re-working old wells, laying pipelines, and other activities. Although there has been no new development for the last 10 to 20 years, BLM received a request from a private mineral owner in early March 2008 to conduct seismic operations on the CPNM valley floor.

3.19.2.2 Solid Minerals

Solid minerals are divided into three categories: locatable, solid leasable, and saleable mineral materials. Laws governing the extraction of solid minerals from public land include the *General Mining Law* of 1872, the *Mineral Leasing Act* of 1920, and the *Materials Act* of 1947. Discretionary permitting and leasing of phosphate and saline minerals, which both occur within the Monument, are governed by the *Mineral Leasing Act* of 1920. Sand and gravel sales are covered under the authority of the *Materials Act* of 1947.

There were no valid claims, leases, or other valid existing rights pertaining to solid minerals as of the date of the Monument Proclamation, so there will be no private development of these minerals on federal mineral estate.

Locatable Minerals

Under the Monument Proclamation, no new mining claims are allowed. The federal lands within the Monument are withdrawn from mineral entry for the purpose of locatable mining claims. As mentioned previously, there were also no existing locatable mineral claims on the date of the Proclamation.

Gypsum in the form of gypsite has been prospected for and mined within the Monument and areas immediately adjacent from the early 1900s to the present. It is used as an agricultural soil amendment that displaces salt in alkaline soils. Known deposits are low grade and spread over large acres. The potential for gypsite mining on non-federal lands throughout the Monument is low (Ver Planck 1962; Withington 1966).

Solid Leasable Minerals

Under the Monument Proclamation, no new solid mineral leases are allowed. The federal lands within the Monument are withdrawn from mineral entry for the purpose of solid mineral leases. As mentioned previously, there were no existing solid mineral leases on the date of the Proclamation.

Low-grade phosphate from marine shales is common within the coast ranges of California. Two areas within the Monument have been classified as prospectively valuable for phosphate, based on the existence of phosphate occurrences and similar geology. The Morales Canyon area of the Caliente Range encompasses 11 sections, or about 7,000 acres. The second area, almost 6,000 acres within 9 sections, is on the northernmost part of the Temblor Range. This area is part of a larger area that extends north to State Route 46, 30 miles to the north. Phosphate pellets also occur immediately southwest of the intersection of Soda Lake Road and Seven Mile Road. Phosphate is an essential agricultural fertilizer, but due to the low grade of California deposits, none is produced from California (Gower 1966; Roberts 1981).

In 1912, a geologist from the USGS estimated that Soda Lake contained reserves of over a million tons of sodium sulfate (Gale 1912, as cited in BLM 1996). BLM has classified Soda Lake as prospectively valuable for sodium. Commercial extraction of sodium sulfate from Soda Lake occurred intermittently from around 1900 to 1940. Sodium sulfate minerals identified in the surface crust of Soda Lake are bloedite, thenardite, and mirabilite. Bloedite is a relatively rare evaporite mineral. At the time of its identification here in 1913, it was only known in one other location in the United States. A large specimen from Soda Lake is displayed in the Los Angeles Museum of Natural History. Hobby collection of evaporite minerals at Soda Lake occurs occasionally by individuals who use hand tools to dig through the saline crust into the underlying black mud that contains crystals (Tyler 1935; Ver Planck 1957; Majmundar 1985). These crystals are renewable precipitates that form and reform during subsequent wet and dry seasons.

It is unlikely that either phosphate or sodium sulfate will be developed on non-federal mineral estate within the Monument. If development is proposed, it will be subject to appropriate environmental constraints through the CEQA and NEPA processes.

Saleable Minerals

Under the Monument Proclamation, no new mineral material sales are allowed. The federal lands within the Monument are withdrawn from mineral entry for the purpose of mineral material sales. As there were no existing contracts at the time of the Proclamation, there will be no mineral material sales from federal mineral estate.

Sand and gravel have been intermittently mined for local road repair from private and CDFG lands within and adjacent to the boundaries of the Monument. However, all such sites within the Monument are now closed and there will be no private development of these minerals on federal mineral estate.

3.19.2.3 Other Leasable Minerals

Geothermal resources are considered a type of leasable mineral. According to the California Division of Mines and Geology, the Monument is favorable for discovery of thermal water at shallow depth. However, there are no known geothermal resource area designations, identified hydrothermal convection systems, or any warm springs within the boundary of the Monument (Muffler et al. 1979; Higgins 1980).

There were no geothermal leases at the time of the Monument Proclamation. Under the Proclamation, federal lands within the Monument are withdrawn from mineral entry and no new geothermal leases are allowed. It is unlikely that there will be development of geothermal resources on non-federal land, so geothermal exploitation is not expected to be an issue in the Monument.

3.20 Lands and Realty

3.20.1 Acquisition History and Current Land Status

In 1984, TNC and BLM agreed to explore the possibility of acquiring extensive lands in the Carrizo Plain region. This land, to be set aside for conservation and restoration, would function as a single, large macropreserve for rare and endangered San Joaquin Valley species, as well as other components of San Joaquin Valley vegetation and wildlife. Several workshops were held between TNC, BLM, the CDFG, and the USFWS to determine strategies and priorities for acquisition of these lands.

In January 1988, TNC purchased 82,000 acres on the Carrizo Plain from Oppenheimer Industries. BLM received funding from Congress to acquire 23,000 acres in 1988 and another 28,500 acres in 1989. The California Wildlife Conservation Board purchased 3,000 acres from TNC in December 1988 and 2,500 acres in 1989 to be managed by the CDFG.

As of 2003, surface and mineral ownership within the Monument is a mixture of BLM, state, TNC, and other private owners (see Table 3.20-1 and Map 3-18, Land Ownership Status).

Table 3.20-1. Surface Land and Mineral Ownership in the Monument

Land Owner	Surface Estate (Acres)	% of Total Monument Area	Mineral Estate (Acres)
BLM	206,000	83%	108,000
CDFG	9,300	4%	9,300
TNC	75	<1%	75
Other private owners	32,000	13%	130,000
Total	247,375	100%	247,375

Some of the mineral rights on the acquired lands are privately owned (split estate), allowing for the possibility of mineral exploration and production in the future. Commercial mineral development potential (particularly oil and gas) is relatively low for the foreseeable future due to a lack of proven reserves. However, the exercise of these private rights for exploration and/or production could not be abridged by BLM. Also, the increased price of oil is leading to interest in exploration of areas previously seen as uneconomical for development (see Section 3.19 Minerals for additional information).

Applications and requests for facilities and access are analyzed and authorized either under the right-of-way regulations or the minerals regulations depending on the type of use. Terms and conditions that may apply to right-of-way corridors or development areas include best management practices to minimize environmental impacts and limitations on other uses necessary to maintain the corridor and right-of-way values.

BLM continues to actively pursue acquisitions within the Monument boundary. Some of the potential sellers are expected to retain at least the oil and gas rights. In total, approximately 53 percent of the mineral estate within the Monument is privately owned (see Map 3-19, Land Status and Withdrawals). Additional information on the mineral, oil, and gas program can be found in Section 3.19 Minerals.

Of the approximately 32,000 acres of private land remaining, the largest inholding (approximately 11,000 acres) is part of a privately owned ranch. The other 22,000 acres include many individual parcels ranging in size from approximately 0.1 acre to 2,100 acres. There are four small subdivisions covering approximately 1,700 acres. These subdivisions have parcels of 20 acres or smaller, but the majority of them are undeveloped. There are approximately 500 private land parcels remaining in the Monument.

Many of the remaining small private parcels within the Monument have title defects that would prohibit the acquisition of the parcel by BLM, such as an unprobated estate, an unlocatable partial owner, a community property question, or others. The cost for the landowner to cure such title defects through court action is usually greater than the value of the property. Thus, the landowner has little incentive to cure such defects to sell the property. Title problems compound as owners pass away, the overall ownership becomes more fractionated, and the heirs have even less incentive to correct any title problems. One solution to this issue is the use of a process called friendly condemnation. Such authority could be used to acquire parcels within the Monument where the landowners are willing sellers, but are unable to complete a sale due to title problems. BLM cannot acquire property with title problems such as unprobated estates, unlocatable partial owners, or community property questions. The use of friendly condemnation on parcels with willing sellers but with title problems would eliminate such title problems while still providing the known landowners with a market value payment for their land. Alternate methods of land acquisition, such as donations or exchanges, do not eliminate such title problems. Friendly condemnation is the only feasible method for acquiring the private inholdings in the CPNM that have title problems. Such actions would benefit the long-term manageability of the Monument, as well as provide an opportunity for willing landowners to sell their properties in an economically beneficial manner. Use of friendly condemnation would require Congressional authorization. While the option has been explored for the CPNM, no effort has been made to date to secure local and Congressional support to move forward with the authorization process.

3.20.2 Managing Partner Coordination on Realty Issues

The managing partners recognize that management activities on their respective lands are subject to different authorities and policies, so they coordinate regularly to ensure seamless management of the Monument, including realty-based issues. The partners have shared a long-term commitment to acquiring private inholdings within the Monument, both surface lands and interests in lands, where the landowners are willing sellers. 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,
- unique natural and geologic features, and

- WSA inholdings.

3.20.3 Existing Federal Withdrawals

Under the Proclamation establishing the Monument, all federal lands and interests in lands within the boundaries of the Monument were withdrawn

from all forms of entry, location, selection, sale, or leasing or other disposition under the public land laws, including but not limited to withdrawal from location, entry, and patent under the mining laws, and from disposition under all laws relating to mineral and geothermal leasing, other than by exchange that furthers the protective purposes of the Monument.

Two national cooperative land and wildlife management areas are present within the Monument: the Caliente and the Temblor National Cooperative Land and Wildlife Management Areas. These areas were withdrawn in 1961, and encompass 59,000 and 58,000 acres respectively (see Map 3-19, Land Status and Withdrawals). The withdrawal orders (Public Land Orders 2326 and 2460) segregated the BLM lands from application under the non-mineral public land laws and from disposition under the homestead, desert land, and scrip selection laws. With the issuance of the Monument Proclamation, these national cooperative land and wildlife management area withdrawals are now duplicative.

One existing BLM multiple-use classification still exists within the Monument (S 2576). This classification was established in 1970 and segregates portions of the existing BLM lands from appropriation under the agricultural land laws. With the issuance of the Monument Proclamation, this classification is now duplicative.

3.20.4 Road and Utility Easements

Two BLM-designated utility corridors currently exist in the Monument. These were adopted in the 1997 BLM Caliente RMP and are an adoption of the 1986 Western Regional Corridor Study. They are located at the northern end of Soda Lake and just south of Soda Lake (see Map 3-20, Infrastructure). They run generally east-west and are occupied only by electric power lines at present, with the northern corridor containing twin 500 kilovolt (kV) lines originating from the Diablo Canyon Power Plant on the Pacific coast. The southern corridor contains a single 70 kV line.

3.20.5 Other Rights-Of-Way and Permits

Currently, there are no realty leases or land use permits that are authorized by BLM within the Monument. There are several rights-of-way that were authorized by BLM on original public domain lands prior to the establishment of the former CPNA. These are mostly for electric power lines that have been in place for several decades. One underground communication cable runs the length of the Monument generally paralleling Soda Lake Road. Use of this cable was discontinued in 2001.

Various third-party rights exist on the acquired lands, such as road and utility easements and mineral rights. These rights are infrequently exercised, but are allowed since BLM acquired the lands subject to these rights. BLM maintains records of third-party rights. The other managing partners maintain separate records of third-party rights that affect their respective properties.

Almost all of the mineral rights on the acquired lands are privately owned (split estate), allowing for the possibility of mineral exploration and production in the future. Commercial mineral development potential (particularly oil and gas) is relatively low for the foreseeable future due to a lack of proven

reserves. However, as stated above, the exercise of these private rights for exploration and/or production could not be abridged by BLM.

A permit is required for all commercial filming activities on public lands. Commercial filming is defined as the use of motion picture, videotaping, sound recording, or other moving image or audio recording equipment on public lands that involves the advertisement of a product or service, the creation of a product for sale, or the use of actors, models, sets, or props. Commercial filming does not include activities associated with the broadcast of journalistic news programming. For purposes of this definition, “creation of a product for sale” includes a film, videotape, television broadcast, or documentary of participants in commercial sporting or recreation events created for the purpose of generating income.

A permit is not be required, nor is a fee assessed, for still photography on public lands if such photography takes place where members of the public are generally allowed, except when one or both of the following situations apply:

- photography that includes the use of models or props that are not a part of a site’s natural or cultural resources or administrative facilities, or
- photography that takes place at locations where members of the public are generally not allowed, or occurs where additional administrative costs are likely.

BLM field offices generally no longer require permits for still photography unless one or more of the above conditions exist. However, additional permit requirements may be applied to meet specific objectives of an RMP.

3.21 Social and Economic Conditions

This section discusses the current social and economic context of the CPNM. It describes the communities of place (those in proximity to the CPNM and surrounding region) that form the geographical and social framework within which the Monument is set. It identifies communities of interest (those who live and work in the CPNM area and those who access or use CPNM resources in the course of their work or avocations) whose social or economic interests are tied to the Monument. Native American groups are highlighted in light of the cultural and historical significance of Monument lands in their history and traditional practices. The region’s minority and low-income populations are also considered within the context of Monument management.

Significant non-market values characterize and define the value of the CPNM for management as a National Monument. These values are discussed in this section as they have served as touchstones in the development of the alternatives. It further identifies existing and potential economic activities within the CPNM and the surrounding area that may be affected by management of the Monument.

The information presented herein has been researched and validated through a variety of sources, including literature review of published and unpublished historical, economic, and social system documents that discuss the planning area; review of data from BLM, partners, and other state and federal agencies; statistical data sources; and responses received through the public scoping process.

3.21.1 Current Social and Economic Context

The existing social and economic context of the CPNM consists of and is influenced by the communities of place and communities of interest in the CPNM and vicinity. The attitudes and beliefs of those responding to public scoping are also a part of this context. Commentors during scoping meetings included a broad array of local or regional community members or members of local agencies and

organizations. The issues and planning themes the public identified are summarized in Chapter 1, while the scoping and outreach process itself is described in Chapter 5.

3.21.1.1 Communities of Place

Geographically, the Monument is situated in a remote and sparsely populated area in the eastern Coast Range Mountains and west of the San Joaquin Valley, which crosses Kern County. Most of the CPNM is located within southeastern San Luis Obispo County, with portions in western Kern County. The Monument borders Santa Barbara and Ventura Counties to the south and southeast, respectively. The closest major cities are San Luis Obispo, population 44,326 (in 2006), approximately 54 miles to the west, and Bakersfield, population 306,137 (in 2006), approximately 63 miles to the east.

The region, although not on any major travelways, is easily reached via U.S. Highway 101 to the west, and from U.S. Interstate 5 to the east. The CPNM is accessible to travelers to and from major metropolitan areas, including several international and regional airports. It is within easy driving distance of the Los Angeles metropolitan area, approximately 150 miles to the southwest, and within about a half-day's drive, or approximately 300 miles, from the San Francisco area to the northwest. It is centrally located to residents from central coast communities to the west, and those along the Interstate 5 corridor to the east.

Within an approximately 10-mile radius of the Monument there are several small towns and cities, which are referred to herein as the "Carrizo Trade Area." The communities of California Valley and McKittrick are located to the northwest and north, respectively, along Highway 58. The communities of Derby Acres and Fellows are located to the northeast, along Highway 33 and north of the City of Taft. Maricopa is located to the east/southeast near the junction of Highways 33 and 166, with Cuyama and New Cuyama to the south along Highway 166. The largest of these is Taft, which in 2006 had a population of approximately 9,152 and Ford City, population 3,512 (2000, most recent available data). Maricopa's population was approximately 1,137 in 2006, while all of the other communities listed above had populations of 500 or fewer persons (U.S. Census Bureau 2000, 2006).

Given the remote and undeveloped character of the Monument itself, visitors to the Monument who need lodging, food, and other goods and services must obtain them outside the CPNM. This provides an economic and tourism opportunity for communities near the Monument, while other communities located along access points to the region may also serve visitors traveling to and from the CPNM. For travelers coming from the northwest or southwest, these communities include Santa Margarita, located near the junction of Highway 101 and State Route 58, northwest of the Monument. The City of Atascadero is located further north on Highway 101. San Luis Obispo, as noted above, is further south along Highway 101, with a number of smaller towns along Highway 101 south to State Highway 166. Santa Maria is located near the junction of Highway 101 and State Highway 166. Visitors approaching from the east may pass through Lost Hills along Interstate 5 to the northeast and the community of Buttonwillow, at Interstate 5 and State Highway 58, and Tupman, further to the south.

3.21.1.2 Communities of Interest

In addition to those living near the Monument, there are a number of other groups and individuals who would be considered to have an interest in its management. These include Native American peoples, private landowners or owners of mineral estates within the CPNM, ranchers, non-owner residents of the Monument, and holders of grazing, oil and gas, or mineral leases in the CPNM. People with occupations or avocations that bring them to study and/or utilize the Monument's resources are a diverse and important group. This group includes researchers as well as active and passive recreational visitors and is further discussed below.

Native Americans

There are two Native American groups who have historically inhabited the area (Chumash, Southern Valley Yokuts,. Also, the Salinan tribe occupied the area immediately north of the Carrizo. The cultural significance of the CPNM and its context as an undeveloped remnant of Native American ancestral territory cannot be overstated. The CPNM harbors some of the most significant examples of Native American rock art still extant, as well as numerous other sites of considerable cultural significance. These native groups consider the lands within the Monument to be sacred and use areas within the CPNM for plant gathering and ceremonial activities.

The Native American Advisory Committee, chartered by BLM and representatives of these three native peoples in 1997, participates in planning and project activities with the managing partners in the CPNM. Members of federally recognized and non-federally recognized Native American groups are invited to be part of the Advisory Committee and are actively involved in conferring with BLM regarding resource management on Monument lands.

Monument Visitors

Based on BLM estimates, approximately 38,700 persons visited the CPNM in year 2002 and 87,040 in 2007, reflecting a substantial increase. Data regarding these visitors' place of residence are limited to those who visited the Goodwin Educational Center and signed the visitor's register. However, based on available information, the largest percentage was from the Central Coast region of California. Use patterns and visitor data are further discussed in Section 3.21.3.3 below.

Visitors come to the Monument for a variety of reasons. Researchers and students come to study the unique biological and paleontological resources or to investigate geological conditions. These resources make the CPNM a valuable educational laboratory to those outside the scientific and academic community as well. The relatively wild and pristine nature of the Monument provides a window into conditions that would have existed in the San Joaquin Valley before the encroachment of extensive human activity. The Monument also attracts active and passive recreational visitors who hunt game or simply observe or photograph the many species of birds that inhabit or use the Monument. Following winter rains, wildflowers abound for the enjoyment of visitors, and the Monument affords an abundance of wildlife viewing opportunities. Hiking, horseback riding, and camping facilities are also provided and enjoyed by Monument visitors.

Private Land and Mineral Estates Owners

Approximately 32,000 acres, or 13 percent, of surface lands within the CPNM are privately owned. Of these privately owned surface lands, approximately 11,000 acres are held by one ranch. The balance is held in parcels ranging from 0.1 to 2,100 acres, including 4 small subdivisions totaling approximately 1,700 acres. The majority of parcels in these subdivisions are undeveloped. There are approximately 130,000 acres of subsurface, or mineral, estates held by private owners. Of these, many underlie surface holdings of BLM or another of the managing partners. Land ownership history and current use are further discussed in Section 3.20, Lands and Realty.

Ranchers and Farmers

The Carrizo Plain region and lands within the present-day Monument area have been used for cattle and sheep ranching since about the 1850s, with the establishment of the Garcia Ranch (El Saucito). Other ranches in the region included the Hanline Ranch, El Temblor Ranch, and the Washburn Ranch, the site

of the current day BLM CPNM administrative center. Among those associated with the sheep and cattle operations on the Plain were Basque and Spanish-speaking vaqueros who worked as cowboys. As noted above, the largest private holding within the CPNM is an 11,000±-acre ranch. USDA National Agricultural Statistics Service data for livestock inventories show that cattle inventories have decreased by 36 percent in San Luis Obispo County over the past two decades, from 121,000 head in 1988 to 77,000 head in 2007. The same indicator in Kern County shows inventories fluctuating over that period, with an average increase of only 4.40 percent. Data for sheep inventories were available only through 1992; however, the trend for both counties during the four-year data period (1988 to 1992) was downward, with a 27 percent decrease in San Luis Obispo County and an 18 percent decrease in Kern County (USDA 2007). Based on these data, ranching and grazing operations in the region appear to have diminished overall in the two-decade period. Nonetheless, these operations continue to be an important local economic activity in the region and in the CPNM area. This is further discussed in Section 3.21.4.3 below.

Dryland farming was introduced during the 1880s, primarily for grain crops such as barley, wheat, and to a much lesser degree oats. Orchards and vineyards were also established in some areas. Agriculture in the CPNM expanded during the early part of the 20th century and continued to flourish through World War II. Although there is currently very little if any crop cultivation within the CPNM, farming is to some extent still an important part of the regional economy, particularly in Kern County and parts of San Luis Obispo, Santa Barbara, and Ventura counties.

Leaseholders

There are two major types of resource leases held by private individuals or organizations: grazing leases and mineral leases.

Grazing permits and leases are authorized within specified areas of the Monument and levels of use are variable based on the purpose of the authorization and the current resource conditions. Grazing use levels are measured in AUMs. In the CPNM, grazing is authorized under two programs: traditional grazing leases under Section 15 of the *Taylor Grazing Act*, primarily located on the mountains surrounding the plain; and grazing that is authorized under free use grazing permits for vegetation management, primarily on the valley floor/foothill region of the plain. See Section 3.14, Livestock Grazing, for a more complete description of the types of authorizations and also Section 3.21.4.3 below. Within the Section 15 leases, approximately 8,634 AUMs are available, with 8,466 AUMs currently authorized under 5 leases (see Tables 3.14-1 and 3.14-2 in Section 3.14, Livestock Grazing). There are currently five ranchers with free use grazing permits and cooperative grazing agreements in the valley floor/foothill region of the Monument. AUMs used in these permits have varied from no use in some years, to a high use of 40,705 AUMs the 1999–2000 grazing season. See Appendix N, Actual Grazing Use for Vegetation Management Since 1989.

Mineral estate leases cover the various extractable minerals found within the Monument, including oil and gas. There are nine currently active oil and gas leases on the Monument, of which only one is in production (see Section 3.19.2).

Monument Residents

A very small number of people actually live and work in the Monument. There are only about 12 structures within the Monument boundaries; some of these are inhabited permanently while others are inhabited for shorter periods of time during the year. The majority of residents are involved with managing the lands or conducting research. Some are associated with ranching operations.

3.21.2 Regional Demographics and Environmental Justice

The following subsections present demographic information from several sources, including economic profiles for the counties of Kern, San Luis Obispo, Santa Barbara, and Ventura, compiled by the Sonoran Institute's Headwaters Economics Economic Profile System, U.S. Census Bureau data and estimates for multiple years, county general plans, county business patterns, Bureau of Labor Statistics data, and the Regional Economic Information System of the Bureau of Economic Analysis of the U.S. Department of Commerce. Specific demographic and economic data have been prepared for the "Carrizo Trade Area" surrounding the Monument. This trade area consists of the area within an approximately 10-mile radius of the Monument. Cities and communities within that radius include California Valley, McKittrick, Valley Acres, Derby Acres, Fellows, Ford City, Taft, Maricopa, New Cuyama, and smaller communities falling within this range but not specifically identified. In the following tables, these data are generally aggregated and, where available, data for individual communities have been cited.

3.21.2.1 Population

Population growth over the past three decades has been consistent and has ranged from somewhat to very rapid for Kern, San Luis Obispo, Santa Barbara, and Ventura counties. Population growth in all of these counties has been faster than the rest of the U.S. and, for all except Santa Barbara, has outpaced growth in the State of California as a whole. Table 3.21-1 shows populations for the counties surrounding and including the CPNM from 2000 to 2006, as well as the communities within the Carrizo Trade Area for which data were available. As of 2006, the population in all four counties totaled 2,237,177. The year 2007 population of the Carrizo Trade Area is estimated at 16,736 (Claritas, Inc. 2007a).

3.21.2.2 Age

The median age of residents in the four counties ranged from 30 years in Kern County to 38.5 years in San Luis Obispo County. Table 3.21-2 shows the age structure for each county.

3.21.2.3 Race/Ethnicity

Table 3.21-3 shows that Kern County has a higher percentage of persons identifying themselves as of Hispanic or Latino origin than the other counties. San Luis Obispo County's population predominantly consists of those identifying themselves as white, whereas in other counties this group comprises approximately half the total population. All counties had relatively low populations of those identifying themselves as Black or African American, and American Indian and Alaska Native.

3.21.2.4 Number of Households, Household Size, and Income

Average household size has decreased slightly in Kern County since 2000, increased in San Luis Obispo and Santa Barbara counties, and remained constant in Ventura County. Median housing values for owner-occupied units have risen dramatically in all counties, with the largest percentage increase in Kern County (63.4 percent). The number of housing units has increased in each of the four counties, again with the largest increase in Kern County, at 31,087, and the smallest in Santa Barbara County, with 7,979.

Median household income ranged from \$35,160 in the Carrizo Trade Area to \$72,107 in Ventura County. Per capita income followed a similar pattern. The Carrizo Trade Area also had the highest percentage of families with income below the poverty level at 18.3 percent, with Kern County at 17.1 percent, Santa Barbara County at 9.5 percent, and San Luis Obispo and Ventura counties at 6.2 and 6.4 percent, respectively. These figures compare with 9.8 percent for the nation as a whole, and 9.7 percent over the entire State of California.

Table 3.21-1. Surrounding Counties and Communities Population, 2000–2006

County	Population Growth							Avg Annual Increase 2000-2006	Avg Annual Percent Increase
	2000	2001	2002	2003	2004	2005	2006		
Kern	661,645	6,466,397	663,106	680,804	702,855	724,206	780,117	19,745	2.82%
San Luis Obispo	246,681	252,149 ^a	237,709	237,757	238,502	239,638	257,005	1,721	0.76%
Santa Barbara	399,347	382,925	386,844	386,308	385,238	383,393	400,335	165	0.07%
Ventura	753,197	765,300	779,400	796,165	796,165	783,000	799,720	7,754	1.01%
Total	2,060,870	2,037,240	2,058,317	2,083,234	2,111,280	2,129,996	2,237,177	29,385	1.169%
Surrounding Cities or Places^b									
California Valley	--	--	--	--	--	--	--	--	--
Cuyama/New Cuyama	--	--	--	--	--	--	--	--	--
McKittrick	160	--	--	--	--	--	--	--	--
Derby Acres	376	--	--	--	--	--	--	--	--
Valley Acres	512	--	--	--	--	--	--	--	--
Fellows	153	--	--	--	--	--	--	--	--
Ford City	3,512	--	--	--	--	--	--	--	--
Taft	8,811	8,900	8,950	9,025	8,950	--	9,152	--	--
Maricopa	1,111	1,120	1,130	1,140	1,140	--	1,137	--	--
Total	14,937	--	--	--	--	--	--	--	--

"—" No data available.

Sources: U.S. Census Bureau 2000, 2001, 2002, 2003, 2004, 2005, 2006; California Department of Finance 2007a.

^a No U.S. Census Bureau data available. Source: San Luis Obispo County Association of Governments, 2007.

^b Cities and census-designated places within 10 miles of the CPNM (Carrizo Trade Area).

Table 3.21-2. Estimated Age of Population

County ^a	Age Range						Median Age
	Under 19	20–34	35–44	45–64	65–84	85+	
Kern	255,841	191,542	108,761	155,811	61,762	6,400	30.0
San Luis Obispo	60,579	58,006	34,793	66,665	30,324	6,638	38.5
Santa Barbara	115,677	90,198	52,169	90,908	43,785	7,598	33.8
Ventura	238,154	158,002	116,707	200,614	76,102	10,141	35.4
Carrizo Trade Area ^b	5,457	3,604	2,195	3,585	1,614	281	32.1

^a County data from U.S. Census Bureau 2006.

^b Carrizo Trade Area from Claritas, Inc. 2007a.

Table 3.21-3. Population by Race/Ethnicity

Total Population ^a	Counties				Carrizo Trade Area
	Kern	San Luis Obispo	Santa Barbara	Ventura	
Hispanic or Latino ^b	352,415	46,924	152,743	292,063	4,266
	45.2%	18.3%	38.2%	36.5%	25.5%
<i>Not Hispanic or Latino, by Race</i>					
White	332,981	189,926	212,742	420,664	12,910
	42.7%	73.9%	53.1%	52.6%	77.1%
Black or African American	41,379	3,864	7,498	14,469	276
	5.3%	1.5%	1.9%	1.8%	1.1%
American Indian and Alaska Native	4,285	1,010	1,222	3,047	220
	0.5%	0.45%	0.3%	0.4%	1.5%
Asian	29,728	7,686	16,982	51,636	212
	3.8%	3.0%	4.2%	6.5%	0.8%
Native Hawaiian and Other Pacific Islander	1,030	96	691	1,631	144
	0.1%	0.04%	0.2%	0.2%	0.3%
Other (including those of two or more races)	18,299	57,499	8,457	14,210	2,974
	2.3%	2.9%	2.1%	1.8%	62.6%

^a Sources: County information—U.S. Census Bureau 2006; Carrizo Trade Area—Claritas Inc. 2007a.

^b Latino and Hispanic are ethnic origins. Therefore, persons identifying themselves as having these origins may also be included in data for any of the other race categories.

Table 3.21-4 summarizes the data on households and income distribution, and provides comparisons with year 2000 figures where available.

Income sources for the four counties are shown in Table 3.21-5. These data are not available for the Carrizo Trade Area. In 2004, 32 percent of all personal income in Kern and San Luis Obispo counties was derived from non-labor sources, as compared with 25 percent in Ventura County and 36 percent in Santa Barbara County. Dividends, interest, and rent accounted for 13 percent of non-labor income in Kern County, and 15 percent in San Luis Obispo County, whereas in Santa Luis Obispo and Santa Barbara counties these categories were 23 percent and 24 percent, respectively.

3.21.2.5 Education

Table 3.21-6 shows the level of educational attainment for the population aged 25 and over. All four counties and the Carrizo Trade Area have high percentages of persons having achieved a high school diploma or equivalent. Kern County and the Carrizo Trade Area are notably lower for persons holding bachelor's degrees or higher.

3.21.2.6 Employment of Residents

Employment patterns are shown for the four counties in Table 3.21-7. Data for the Carrizo Trade Area are based on 2007 estimates and are not available for all categories. Based on available data, however, it is estimated that there are 12,594 persons age 16 and over in the Trade Area. Of these, 6 are in the Armed Forces, 5,824 are in civilian employment, and 807, or 6.4 percent, are unemployed. There are approximately 5,957 persons not in the labor force.

Census data regarding employment by occupation of residents in each of the four counties for 2006 are also shown in Table 3.21-7. Based on these data, the largest sector for employment for residents of all

Table 3.21-4. Households and Income Distribution

		County				
		Kern	San Luis Obispo	Santa Barbara	Ventura	Carrizo Trade Area
Average Household Size (number of people)	2006	3.13	2.35	2.68	3.04	2.78
	2000	3.03	2.49	2.8	3.04	--
Median Value of Owner-Occupied Housing	2006	\$255,100	\$581,000	\$685,700	\$648,000	\$154,755
	2000	\$93,300	\$230,000	\$293,000	\$248,000	--
Total Housing Units	2006	262,651	114,213	150,880	270,664	6,559
	2000	231,564	102,275	142,901	251,712	--
Occupied Housing Units	2006	238,229	102,007	140,752	259,093	5,780
	2000	208,652	92,739	136,622	243,234	--
Vacant Housing	2006	10.3%	12.0%	7.2%	4.5%	11.9%
	2000	9.9%	9.3%	4.4%	3.4%	--
Owner Occupied	2006	61.9%	59.5%	53.3%	68.7%	61.9%
	2000	62.1%	61.5%	56.1%	67.6%	--
Income						
Less than \$10,000		17,236	8,092	7,423	9,314	-- ^a
\$10,000–\$14,999		19,082	6,513	6,850	8,719	1,208
\$15,000–\$24,999		30,096	10,418	15,272	20,983	913
\$25,000–\$34,999		29,154	10,075	15,856	19,562	759
\$35,000–\$49,999		37,736	15,682	19,380	28,553	983
\$50,000–\$74,999		41,904	20,528	27,952	47,231	1,029
\$75,000–\$99,999		27,674	10,802	16,298	38,644	411
\$100,000–\$149,999		22,622	11,808	18,252	48,050	368
\$150,000 +		12,725	8,089	13,469	38,037	110
Total Households		238,229	102,007	140,752	259,093	5,781
Median Household Income	2006	\$43,106	\$50,209	\$53,477	\$72,107	\$35,160
	2000	\$35,446	\$42,428	\$46,677	\$59,666	--
Per Capita Income	2006	\$19,132	\$27,506	\$27,476	\$30,517	\$16,993
	2000	\$15,760	\$21,864	\$23,059	\$24,000	--
Persons Below Poverty Level	2006	20.60%	13.60%	16.30%	8.90%	--
	2000	20.8%	12.8%	14.4%	9.2%	--
Families Below Poverty Level	2006	17.1%	6.2%	9.5%	6.4%	18.30%
	2000	16.8%	6.8%	8.5%	6.4%	--

^a For Carrizo Trade Area, households with income less than \$10,000 are aggregated with those earning less than \$15,000.
Sources: County information—U.S. Census Bureau 2006, Carrizo Trade Area information—Claritas, Inc. 2007a.

Table 3.21-5. Labor vs. Non-Labor Income

	County								
	Year	Kern		San Luis Obispo		Santa Barbara		Ventura	
		Total	% of Total ^a	Total	% of Total ^a	Total	% of Total ^a	Total	% of Total ^a
Total Personal Income (2004 dollars)	2004	17,864	100%	8,188	100%	14,493	100%	30,047	100%
	1994	13,537	100%	5,689	100%	12,093	100%	22,164	100%
	1974	6,329	100%	1,932	100%	6,237	100%	7,799	100%
Labor Sources^b	2004	12,212	68%	5,185	63%	9,288	64%	22,399	75%
	1994	9,088	67%	3,318	58%	7,065	58%	16,308	74%
	1974	4,858	77%	1,279	66%	4,274	69%	6,159	79%
Non-Labor Sources	2004	5,651	32%	3,002	32%	5,205	36%	7,648	25%
	1994	4,449	33%	2,370	42%	5,028	42%	5,856	26%
	1974	171	23%	653	34%	1,964	31%	1,640	21%
Dividends, Interest, and Rent	2004	2,295	13%	1,891	23%	3,511	24%	4,467	15%
	1994	2,010	15%	1,521	27%	3,697	31%	3,609	16%
	1974	741	12%	382	20%	1,441	23%	1,018	13%
Personal Current Transfer Receipts ^c	2004	3,356	19%	1,112	14%	1,694	12%	3,082	10%
	1994	2,438	18%	849	15%	1,332	11%	2,247	10%
	1974	730	12%	271	14%	522	8%	622	8%

Sources: Sonoran Institute, 2007a through d.

^a Percentages do not add to 100 because of adjustments made by Bureau of Economic Analysis, U.S. Department of Commerce.^b Wages, salaries, employee contributions to deferred compensation programs such as 401(k) plans, and other labor income.^c Payments from governments to individuals, such as age-related payments, as well as disability insurance and retirements.

Table 3.21-6. Educational Attainment

Educational Attainment ^a	County				
	Kern	San Luis Obispo	Santa Barbara	Ventura	Carrizo Trade Area
< 9 th Grade	66,549	6,781	30,369	48,815	1,009
Grades 9–12	62,154	14,409	19,200	41,526	--
HS diploma or equivalent	133,431	37,331	48,613	109,901	3,246
Some college, no degree	96,318	41,194	51,445	113,015	2,537
AA or AS	34,012	16,888	21,288	41,857	779
BA or BS	44,617	35,899	47,158	97,934	575
Graduate/professional degree	21,590	16,642	27,458	52,739	256
% HS graduate or higher	71.9%	87.5%	79.8%	82.1%	72.1%
% BA/BS or higher	14.4%	31.1%	30.4%	29.8%	8.1%

^a Population aged 25 years or over.

Sources: County information—U.S. Census Bureau 2006; Carrizo Trade Area information—Claritas, Inc. 2007a.

Table 3.21-7. Employment Characteristics for Counties

	County							
	Kern		San Luis Obispo		Santa Barbara		Ventura	
Civilian Labor Force	338,400		133,900		214,200		425,400	
Civilian Employment	312,800		128,600		205,500		407,100	
Civilian Unemployment Rate	7.6%		3.9%		4.1%		4.3%	
Sector	Employees	%	Employees	%	Employees	%	Employees	%
Total Agricultural	44,600	16.1%	4,300	4.0%	15,500	8.2%	22,800	7.1%
Natural Resources, Mining, and Construction	29,300	10.6%	8,100	7.5%	11,600	6.2%	21,700	6.8%
Manufacturing	12,900	4.7%	6,400	5.9%	13,700	7.3%	38,000	11.8%
Transportation, Warehousing, and Utilities	9,300	3.4%	3,800	3.5%	3,100	1.6%	6,200	1.0%
Wholesale Trade	7,500	2.8%	2,600	2.4%	5,000	2.7%	12,600	3.9%
Retail Trade	29,200	10.5%	14,300	13.3%	20,300	10.8%	37,000	11.5%
Information	2,600	0.9%	1,600	1.5%	4,100	2.2%	6,100	1.9%
Financial Activities	9,000	3.2%	4,900	4.6%	8,800	4.7%	25,000	7.9%
Professional and Business Services	25,000	9.0%	9,500	8.8%	22,100	11.7%	39,600	12.3%
Educational and Health Services	22,900	8.3%	10,700	9.9%	19,400	10.3%	28,900	9.0%
Leisure and Hospitality	20,700	7.5%	14,900	13.8%	23,000	12.2%	30,200	9.4%
Other Services	6,900	2.5%	4,300	4.0%	5,800	3.1%	10,300	3.2%
Government	57,300	20.7%	22,200	20.6%	35,600	19.1%	42,500	13.2%
Total	277,200	100%	107,600	100%	188,400	100%	320,900	100%

Source: California Department of Finance 2007b.

counties was government, followed by retail trade and agriculture in Kern County, leisure and hospitality in San Luis Obispo County, professional and business services in Santa Barbara and Ventura counties, and manufacturing in Ventura County.

3.21.2.7 Environmental Justice

Minorities and Minority Populations

The social and economic context within which the Monument is located is relatively diverse and varies among the four counties and the Carrizo Trade Area. Table 3.21-3 describes the estimated 2006/2007 racial composition of the region. The data indicate that the majority of residents categorize themselves as white, ranging from 42.7 percent in Kern County to 77.1 percent in the Carrizo Trade Area. Other races represent a significantly smaller segment of the population. A substantial portion (45.2 percent) of the population in Kern County identify themselves as Hispanic or Latino origin in combination with other

racess, with 38.2 and 36.5 percent in Santa Barbara and Ventura counties, respectively. In San Luis Obispo County and in the Carrizo Trade Area, only 18.3 and 25.5 percent of the population identify themselves as being of Hispanic or Latino origin.

Approximately 67,486 persons, or about 11.6 percent of the total population, identified themselves as Black and African American. Fewer than 10,000 persons, or approximately 3.1 percent of the total population, identified themselves as American Indian and Alaska Native.

Low Income Populations

A diverse range of incomes also characterizes the regional and local population. As may be seen from Table 3.21-4, median incomes per household range from \$35,160 in the Carrizo Trade Area to \$72,107 in Ventura County. In Kern County, median income is \$43,106 per household, and in San Luis and Santa Barbara counties, it is \$50,209 and \$53,477, respectively. Based on U.S. Census Bureau estimates, approximately 18.3 percent of families in the Carrizo Trade Area have an income that is below poverty level. For Kern County as a whole, this figure is 17.1 percent, while Santa Barbara County more closely matches the national average, at 9.5 percent. San Luis Obispo and Ventura counties are estimated to have 6.2 and 6.4 percent families living below the poverty level, respectively.

Native American Populations

Data in Table 3.21-3 indicate that individual Native Americans (and Alaskan Natives) account for a small percentage of the regional population. Federally recognized groups occupy the Santa Ynez Band of Mission Indians (Chumash) reservation in Santa Barbara County, located many miles southwest of the Monument, near Santa Ynez. Other federally recognized groups include residents of the Tule River Reservation near Porterville, to the northeast, and the Santa Rosa Rancheria near Lemoore, to the north; both are Yokuts reservations. There are also a number of non-federally recognized groups of Chumash, Yokuts, and Salinan. These groups have characteristically expressed an active interest in the management of the Monument and are represented on the Advisory Committee (see Section 3.21.1.2).

People of the Chumash tribe, as well as Yokuts and Salinan, utilize areas within the Monument for traditional uses including plant gathering and ceremonial activities. Policies established by BLM and the Forest Service Pacific Southwest Region in 2006, in coordination with federal tribes and non-federally recognized Native Americans in California, ensure access by traditional native practitioners to plants. The policy also ensures that management of these plants promotes ecosystem health for BLM- and Forest Service-managed lands. BLM management units are encouraged to support and incorporate into their planning traditional native and native practitioner plant-gathering of culturally utilized plants for traditional use.

3.21.3 Local Economic Activity Affected by CPNM Management

This section discusses potential economic activity within the four counties and the trade area surrounding the CPNM that may be affected by CPNM management. It considers non-market economic values, which yield direct and indirect benefits to the local and regional economy. It discusses commodity values wherein land uses have potential to yield direct economic benefits.

3.21.3.1 Non-Market Values

The most important socio-economic factors associated with the CPNM are the non-market values offered by the conservation and management of the Monument's lands as a pristine and remote undeveloped area, with unique and sensitive natural and cultural resources. Non-market values are those that enhance quality

of life and the enjoyment of place, and thereby improve regional and local economic conditions, such as proximity to undeveloped natural lands and the resources they harbor, scenic vistas, recreational and wildlife viewing opportunities, and others. In recognition of the value of the abundant natural resources of the Carrizo Plain, the Monument was established by Presidential Proclamation in 2001. The Monument Proclamation cited the unique and sensitive biological, paleontological, geological, and historical resources encompassed by the Monument. It recognized the critical importance of these lands to the region's biological diversity through the preservation of the largest undeveloped remnant of the grassland ecosystem of the San Joaquin Valley, noting that the Monument provides "critical habitat for the long-term conservation of the many endemic plant and animal species that still inhabit the area." The Monument Proclamation acknowledged the unique landforms and geological features of these lands, including Soda Lake (the largest remaining natural alkali wetland in Southern California), and the well-preserved and visible effects of seismic fault slip, folding, and warping associated with the San Andreas Fault. It cited the noteworthy fossil assemblages associated with the Caliente formation and the significant pre-historic and historical artifacts.

During the public scoping process conducted by BLM in 2007, many of the respondents cited these same values, characterizing the area as "open, expansive, undeveloped, wild, remote, pristine" and expressing their regard for the "sense of freedom" and "a chance for solitude and quiet" that the Monument offers. The CPNM affords visitors with plentiful opportunities to view wildlife, including migratory birds and the often-lavish seasonal wildflower displays that occur after winter rains.

These significant and diverse biological and cultural resources, and well-preserved and observable geological conditions and paleontological resources provide a natural classroom in which researchers and students can better understand the history of the region and the forces that have shaped the present-day landscape. As noted by the public scoping responses, the Monument's wild and remote nature invites its use for various recreational activities. The Monument represents an oasis of expansive and relatively undisturbed open space located at the confluence of the southern California, central coast, and central valley regions, which are typically characterized by intense development, dense population centers, and often-congested roadways. It affords visitors an opportunity to connect with nature, enjoy clean air, solitude, and uninterrupted views of mountains, valleys, and grasslands. In short, it allows for a singular experience of the natural environment that stands in marked contrast to the much of the contemporary urban world.

3.21.3.2 Land Value and Income Enhancement Values

In addition to the quality-of-life values cited by the scoping respondents, these non-market resources enhance the value of other land in the region. Although difficult to quantify, this value-added has been established through various empirical studies. Open space is generally seen as an enhancement value, especially if the open space lands are not intensively developed for recreation purposes (Fausold and Lilieholm 1996). A study conducted in Boulder, Colorado indicated that property values near open space increased property tax revenues to the city approximately \$500,000 annually. In Salem, Oregon, lands adjacent to open space were valued at approximately \$1,200 more per acre than lands more removed from greenbelts. The National Association of Homebuilders (Caputo 1979, as cited in Miller 1997) has estimated that proximity to parks in urban areas accounts for up to 15 to 20 percent of a property's value (Miller 1997). While these studies have focused on more urbanized areas and more localized impacts than those associated with the CPNM, they provide evidence that property owners and local governments can expect to derive economic benefit from the presence of open space lands in a community or region.

Research conducted by the Sonoran Institute shows that individual income growth benefits from the presence of publicly owned lands. In counties with more than 60 percent of lands managed by federal agencies such as the Forest Service, BLM, and National Park Service, personal income has grown at a

faster rate than in counties where less than 10 percent of lands are publicly owned. This trend is even more notable in rural counties where public lands are conserved and protected from development. In counties with more than 60 percent of federal lands designated as wilderness, national parks, wildlife refuges, national monuments, or other protected status, data show there was a 66 percent increase in average annual income growth over the 30-year period from 1970 to 2000 (Sonoran Institute 2006; Rasker et al. 2004).

The Sonoran Institute summarized the factors that were correlated with personal income growth over these 30 years (Rasker et al. 2004):

- How public lands are managed: unprotected lands that are distant from protected areas are more likely to be used for resource extraction and have the least potential to boost economic growth. Protected lands, or lands in proximity to those that are protected, are the most likely to correlate to increase personal income.
- A higher proportion of workers within a county that are employed in the high-wage producer services, such as engineering, architecture, design, management, and finance correlates with faster economic growth.
- Other important factors that showed a positive correlation are education levels, the presence of an airport, a ski area, and the percent of persons employed in the arts, entertainment, recreation, accommodation, and food services.
- The presence of mountains is considered a positive factor for economic growth.
- Factors that generally result in slower or declining growth include distance to larger markets; lack of economic diversity; reliance on resource extractive industries including agriculture, mining, and manufacturing; and counties where a high percentage of residents are native-born and which do not attract newcomers.

3.21.3.3 Monument Visitor Use Patterns

Estimates of visitorship to the Monument are based on records of visitors to the visitor's center, as well as on traffic data collected at the primary entrances to the Monument and extrapolated using an average per vehicle occupancy of 2.5 persons. Based on these data, BLM estimates that an average of 38,700 persons visited the CPNM in 2002 and 2003, of which an average of 3,372 stopped at the visitor's center. Visitorship to the Monument increased to 87,040 in 2007.

For visitors who signed the registry in 2002–2003, about 34.7 percent identified their place of residence as the Central Coast; BLM estimates that about one-half of these were from San Luis Obispo County. Another 20.5 percent came from northern California, while 17.8 percent came from Bakersfield and the Central Valley. Visitors from southern California accounted for another 17.9 percent, and out of state or foreign visitors represented about 9.0 percent. Visitorship is typically highest during March and April, during wildflower season, with about 56 percent of visitors counted at the visitor's center during those months (B. Wick, BLM, personal communication, 2007).

3.21.3.4 Biological, Cultural, and Physical Resources

Biological Resources

As described in detail in the other sections of this chapter, the CPNM abounds with a variety of wildlife, bird, reptile, and insect species, as well as plant communities and habitat. These resources constitute a significant non-market value wherein the CPNM is recognized as a place where recovery of threatened

and endangered species is succeeding. The value of the CPNM as a natural classroom for biologists and students as well as a prime location for wildlife viewing also serves to enhance land values in the region.

Cultural, Paleontological, and Physical Resources

The CPNM contains more than a hundred recorded pre-historic sites, over 40 historic sites, and several multi-component sites (consisting of historic and pre-historic elements), many of which are listed or have been nominated for listing on the NRHP. These valuable cultural and historical resources, as well as the well-preserved paleontological deposits and formations that are present in the CPNM, further define the unique and valuable place that the CPNM holds in the region's social and economic context.

The distinctive and exceptionally well-preserved geological features attract the study of geologists, seismologists, and students. The value of these features to the academic world and body of knowledge lend a sense of place and uniqueness and add to the distinctive character of the CPNM. Over the last century the Carrizo Plain has been the subject of numerous geotechnical, soils, paleontological, and paleoclimatic studies. A permanent GPS station is located near the visitor's center to gather data regarding earthquakes as part of a network jointly funded by a scientific consortium that includes the U.S. Geological Survey (USGS) and others (BLM 2007e).

The natural setting of the CPNM lends itself to expansive vistas of dramatic and varied landforms and offers ample opportunities to view wildlife and spring wildflower displays. Comments received during the public scoping noted that the absence of ambient light from urban areas provides for optimum views of night skies. These resources constitute an important and noteworthy non-market value worthy of protection, and which ultimately enrich and inform the present-day culture.

3.21.3.5 Recreational Resources

As discussed in Section 3.15, Recreation and Interpretation, there are many recreational resources and facilities in the Monument. National trends in tourism that indicate a likely increased interest over the planning period in the CPNM's opportunities are described in the following paragraphs.

Recreation and Tourism

Recreation and tourism activities within the Monument include hunting, bird and wildlife viewing, photography, hiking, camping, and horseback riding. The 2000 National Survey on Recreation and the Environment (USDA 2000), primarily sponsored by a consortium of federal agencies, has provided information regarding recreation trends among American adults. The survey shows that approximately 88.6 percent of Americans aged 16 and older participate in trail/street/road activities. Walking outdoors ranks as the most popular such activity in the U.S., and biking, backpacking and camping are also popular activities. Approximately 32.8 percent of those sampled have visited a wilderness or primitive area. Approximately 69.6 percent reported they have engaged in viewing and photographing activities, such as bird watching and viewing other wildlife, wildflowers, and natural vegetation or scenery. The five most popular individual activities among U.S. adults, as indicated by the survey, are walking; family gathering; viewing natural scenery; visiting a nature center, nature trail, or zoo; and picnicking.

In 2006, approximately 13.3 million persons visited parks or other public areas to view wildlife (USFWS 2007c). Expenditures for wildlife-watching activities in California accounted for approximately \$4.6 billion in 2006, of which approximately \$2.1 billion was trip-related (USFWS 2007d).

Cultural tourism aims at experiencing cultural, historic, and natural resources. While many travelers choose to combine cultural tourism with recreation tourism (for entertainment or escapism), approximately 88 percent of U.S. tourists in a 1998 survey indicated that understanding culture was a

primary motivation for travel. Approximately 73 percent chose a location with natural beauty, and 50 percent visited cultural, historical, or archaeological treasures (Lord 1999). Data indicate that cultural tourists have higher incomes and spend more money on vacation, are more likely to stay at hotels or motels, are more likely to shop, and spend more time in an area on vacation. Approximately 46 percent of U.S. travelers indicate they include a cultural activity while on a trip, and a third of that group added extra time to their trip to accommodate more cultural activity.

Eco-tourism, a subset of cultural tourism, is travel to destinations where natural resources and cultural heritage are the primary attractions, and usually involves safe, moderate forms of exercise such as hiking, biking, sailing, and camping. Important elements in responsible eco-tourism include minimizing impacts on the natural environment, enhancing the cultural integrity of local people, providing for positive experiences for visitors and hosts, and providing direct economic benefits for conservation and the local population (International Ecotourism Society 2003). Eco-tourism is considered the fastest growing tourism market. The World Tourism Organization (as cited in Global Development Research Center 2003) estimates this market represents 11.4 percent of all consumer spending, and is growing at an annual rate of 5 percent worldwide. Of those surveyed, top-ranked activities included visiting parks, hiking, exploring a preserved area, wildlife viewing, following nature trails in ecosystems, participating in environmental education, and bird watching (Global Development Resource Center 2003).

3.21.3.6 Hunting

Hunting is permitted within most areas of the Monument, as discussed in more detail in Section 3.15.2.4. Based on a cursory review of available literature, it is unclear whether or to what extent the local hunting population would consider hunting in the Monument a subsistence use. It is generally characterized as recreational, and therefore is considered in that light herein. Recreational hunting generates fees to the state and other revenues to the local and regional economy.

CDFG collects \$37.30 per annual hunting license for state residents over age 16. Non-resident licenses cost \$129.40 per person annually. Lifetime bird hunting privileges and lifetime hunting licenses are available to residents and range from around \$240 for bird hunting to nearly \$700 for a hunting license, depending on the age of the applicant. There are also a variety of entry fees, validation stamps, per-species tag applications, and duck and game bird stamps that may also be required (CDFG 2007b).

In California, hunting expenditures in 2006 totaled \$732,427,000, of which \$216,677,000 was trip-related. Food and lodging expenditures accounted for \$90,193,000, and equipment for about \$192,644. This represents a nearly 50 percent increase in total hunting expenditures since 2001, and an approximately 12 percent increase in trip-related expenditures.

Although local expenditures associated purely with hunting have not been quantified herein, for the Carrizo Trade Area, consumer expenditures in sporting good stores have accounted for \$646,839 for year to date 2007 (Claritas, Inc. 2007b). This represents approximately 0.55 percent of total consumer expenditures in the trade area for this period. It should be noted that these expenditures do not account for sporting goods sold in department or other stores which sell these products, nor does it quantify how much of these goods sold are specifically hunting equipment or supplies. It also does not account for other expenditures that may be associated with hunting or hunting trips, such as food, lodging, transportation, or other trip expenditures.

3.21.4 Market and Commodity Values

3.21.4.1 Land Use and Development

Land uses within the four-county area that define the social and economic context of the Monument are varied. Within portions of each of the four counties, there are high-density urban and suburban residential developments, and commercial and industrial centers. The nearest urbanized areas are Bakersfield, approximately 75 miles to the east, and San Luis Obispo, approximately 60 miles to the west.

As shown by the demographic data in Section 3.21.2, within an approximately 10-mile radius of the Monument itself, total population has been estimated at approximately 16,736 persons, with the largest concentrations in Taft, Ford City, and Maricopa (Claritas, Inc. 2007a). Land uses in this area are primarily single-family residential development, agricultural and ranching operations, and energy production, primarily oil and gas fields. Agriculture and oil and gas production are among the primary economic activities of the area, further discussed below. The Kern County General Plan designates a total of 3,568,697 acres, or approximately 67 percent of land designated under the plan, with the “Resource” designation, which includes petroleum and wind (Kern County 2005).

Development constraints in the area surrounding the Monument have historically included remoteness, availability of water, and, to some extent, access (San Luis Obispo County 1980). Emerging issues include potential conflicts related to conversion of agricultural lands to non-agricultural uses and land use compatibility issues associated with these conflicts (Kern County 2005). Topography and risk from seismic activity may also serve as constraints in some areas.

Lands within the Monument are primarily undeveloped and vacant, with limited paved public roads. There are fewer than 15 structures over the total Monument area, including historic ranch buildings and the Goodwin Education Center. These lands are also used for livestock grazing, mineral extraction (to a limited extent), and recreational uses.

As previously discussed, it is well understood that the presence of conserved open space lands, especially those under federal management, enhances the value of nearby lands. The non-market values described above distinguish the CPNM as a vital regional and local natural asset. The success of conservation efforts such as the San Joaquin Valley Recovery Plan depends on the continued protection of the sensitive biological resources found in the Monument. Based on the trends and patterns discussed in Section 3.21.3, the preservation of the CPNM’s remote and pristine nature may well be considered as a potential growth attracter, albeit indirectly, to developable lands in neighboring valleys, and may also provide a context for development planning on those lands. Safeguarding the CPNM’s abundant natural riches is therefore an important component in the future economic well-being of the region. Equally important is the wise and thoughtful management of development of areas surrounding the Monument, in recognition that the health of each of these disparate yet inter-related pieces is dependent on the other.

3.21.4.2 Mineral Estates

As noted above, oil and gas production has historically been one of the primary economic activities in the Monument area. There are six giant (over 100 million barrels of reserves) and supergiant (over one billion barrels of reserves) oil fields on lands near the Monument, including the largest in California and the lower 48 states, the Midway-Sunset Field. There are also a number of smaller oil fields in the vicinity (BLM 1996).

The portions of the Monument and surrounding area that are within Kern County are within the Westside Sub-Area as designated by the Kern County General Plan. The plan characterizes the economy of this sub-area as resource based, with oil exploration and production providing a large segment of the

employment base. Clay mineral extraction also occurs. As of 2004, oil wells in Kern County provided approximately 68 percent of all the crude oil produced in California and accounted for 77 percent of California's onshore production (Sheridan 2006). Through the use of steam cogeneration in the production process, many of these wells also generate electricity that is delivered to other areas within the state, including Los Angeles. More electricity is produced from cogeneration in Kern County than any other county in California (Kern County 2005).

Some oil and gas production occurs within San Luis Obispo County, although to a lesser extent than in Kern County. For year 2003, the California Employment Development Department estimated that 6.7 percent, or 6,800 employees in San Luis Obispo County were employed in natural resources, mining, and construction.

Within the Monument, approximately 56 percent of the mineral estate is privately owned. Valid leases, claims, and other rights that existed as of January 17, 2001, may be developed, and any proposed activities would be subject to applicable CEQA and NEPA environmental processes, as appropriate. There are currently nine active oil and gas leases. Currently there is only one active production area, located near the southwest boundary of the Monument, and test wells have indicated limited potential for commercial quantities of oil elsewhere in the area. However, with the skyrocketing price of oil, reserves that are currently considered uneconomical may become economically viable for future development. (BLM 1996; personal communication, J. Prude, BLM petroleum engineer, 2008).

3.21.4.3 Agriculture

Agriculture has historically been and currently is a primary and vital economic activity in the region (Kern County 2005). In 2006, 44,600 persons, or 16.1 percent of the civilian labor force in Kern County, were employed in agriculture, while in Santa Barbara and Ventura counties there were 15,500 and 22,800 persons employed in agriculture, respectively. In San Luis Obispo County, this industry accounted for only 4,300 people in the civilian workforce, or 3.2 percent (California Department of Finance 2007b).

Livestock grazing and ranching have been of particular importance in the region. Based on U.S. Census Bureau agriculture data for 2002, there were about 2.7 million acres in farms in Kern County, of which 1.6 million acres were in pastureland and rangeland. For San Luis Obispo, there were 1.3 million acres in farms and 1.0 million acres in pastureland and rangeland (USDA 2002). Cattle sales in Kern County in 2002 yielded approximately \$88.3 million in revenues, as compared with approximately \$21.7 million in San Luis Obispo County in the same year (USDA 2002).

Within the CPNM, there are approximately 60,000 acres available for grazing authorizations in the Section 15 grazing lease areas. Current active Section 15 grazing leases occupy about 58,000 acres. In the valley floor/foothill region, there are about 115,000 acres that may be included in free use grazing permits. See Tables 3.14-1 and 3.14-2 in Section 3.14, Livestock Grazing.

As previously discussed, grazing authorizations and livestock uses are measured in AUMs. An AUM is the amount of dry forage required to sustain one "animal unit" for one month; this equates to a forage allowance of 26 pounds per day. For authorization calculation purposes, an animal unit is one cow and her calf, one horse, or five sheep or goats. Depending on the composition and weight of animals in the herd, actual forage use may vary. Currently, 5 ranchers have Section 15 grazing leases with up to 8,466 AUMs available to them annually. Five additional ranchers have free use grazing permits with variable AUMs available for their use, depending on vegetation management needs in the valley floor/foothill regions of the Monument. See Appendix N, Actual Grazing Use for Vegetation Management Since 1989.

Grazing Fees and Contributions

BLM calculates federal grazing fees in March of each year, based on a formula that is calculated using the 1966 base value of \$1.23 per AUM for livestock grazing on public lands in western states. Annual adjustments are based on three factors: current private grazing land lease rates, beef cattle prices, and the cost of livestock production. The grazing fee rate was \$1.79 per AUM in 2005 (BLM 2005), \$1.56 per AUM in 2006 (BLM 2006), and was at its minimum value of \$1.35 per AUM in 2007.

In compliance with the *Taylor Grazing Act* (Section 10), BLM shares grazing receipts from Section 15 grazing leases equally with local governments where they are collected. For the state fiscal year 2003–2004, Kern County received \$7,347 in Section 15 lease fees, and San Luis Obispo County received \$3,208. For fiscal year 2004–2005, Kern County reported \$6,996, and San Luis Obispo County \$5,081. These figures increased in 2005–2006 to \$7,603 for Kern County, and decreased for San Luis Obispo County, to \$4,266. It should be noted that these revenues come from all BLM Section 15 grazing leases in these counties, not only those within the CPNM (K. Doran, BLM, Personal communication, 2008).

There are no direct grazing fees associated with the free use grazing permits on the valley floor/foothill region of the Monument. Permittees under these authorizations have agreed to voluntarily contribute to a BLM fund for the construction and maintenance of range improvements or facilities to support the vegetation management program within the Monument. Contributions to the Carrizo Grazing Facility Fund are determined by actual AUMs of livestock use and AUM rates are based on a modified federal grazing fee structure. These contributions are variable per year based on how much pastureland is available and conditions in the region. Contributions to the fund in fiscal year 2003–2004 were approximately \$2,629.27, in fiscal year 2004–2005 were \$0.00, and in fiscal year 2005–2006 were approximately \$5,585.29.

Grazing Permit and Real Estate Value

Generally, there is a correlation between ranch land values and federal grazing permits, with ranches that hold such permits having a higher value. This value is based on the premise that the permit's value reflects, to some extent at least, the capitalized difference between the grazing fee and the competitive market value of federal forage. It also reflects the requirement for the permittee to hold private base property to which the federal permitted use is attached, giving the base property holder priority for renewal over other potential applicants. This value is recognized by lending institutions during a loan process and by the Internal Revenue Service when a property transfer occurs.

Permit values fluctuate based on market forces but generally depend on the number of AUMs and other terms of the lease or permit. Permit values may vary widely, depending on the location and the estimated average value of replacement forage. The 2006 average fee per AUM on private lands ranged from a low of \$8.00 to \$22.50 over 16 western states, with an average of \$13.34. The rate assessed in California in 2006 was \$15.40 per AUM. This is also the rate assessed by BLM for non-willful unauthorized grazing use in the state (BLM 2006). This figure is used here to estimate a conservative value of all Section 15 leases in the CPNM. Based on 8,634 AUMs, the total annual grazing value of all traditional leases in the CPNM would be \$132,964. It should be noted that the issuance of a grazing permit or grazing lease does not create any right or title to U.S. interests for the permittee or lessee.

Although not attached to private land base properties like Section 15 grazing leases, free use grazing permits, such as those on the valley floor/foothill regions of the Monument, have capital value that allows ranchers to use permits as a form of collateral. Counties also assess the value of these permits for collecting possessory interest tax, discussed further below.

3.21.4.4 Local Government Revenues

Private landowners in the CPNM pay property tax to the county within which their holdings lie, with San Luis Obispo County receiving the most property taxes annually. Revenues from public lands in the Monument are paid to each county through payments in lieu of taxes (PILT) and possessory interest tax.

Payments in Lieu of Taxes

PILT are paid by federal agencies to local governments to compensate for the nontaxable federal lands that occur in their boundaries. These funds are appropriated annually by Congress to BLM, which then allocates payments according to a formula established in the *Payments in Lieu of Taxes Act*. These payments account for population, receipt-sharing payments, and the amount of federal land in a county. PILT payments are transferred to state or local governments, as applicable, and are in addition to other federal revenues, including those from grazing fees. For San Luis Obispo County, PILT receipts for fiscal year 2005–2006 were \$617,106, and for fiscal year 2006–2007 were \$619,602. For Kern County for the same years, PILT receipts were \$1,390,889 and \$1,383,581, respectively (USDI 2008).

Possessory Interest Tax

Federal grazing permits and leases in California are subject to possessory interest tax. State and local jurisdictions do not receive property tax revenues on public lands, as they do on private lands. However, free use grazing permits and Section 15 grazing leases, as well as mining claims and other permits that allow private citizens to use resources on publicly owned lands, are considered as the private right to the possession and use of those lands. These “rights” are taxed by the county in which the lands are located. The base rate is determined by each county’s assessment of the permit value. San Luis Obispo County and Kern County assess this tax at a base rate of approximately 1.1 percent of the assessed value of the permit (C. Dines, County of San Luis Obispo Auditor/Controller’s Office, Personal communication, 2008; D. Stevenson, Kern County Administrative Office, Budget and Finance, Personal communication, 2008).

3.22 Solid and Hazardous Waste

Solid and hazardous waste management practices on BLM lands are regulated under the following U.S. laws, with implementing regulations in the identified sections of the CFR:

- *Clean Air Act*, as amended (40 CFR 50-80, 61)
- *Clean Water Act* (40 CFR 110-140, 400-470)
- *Safe Drinking Water Act* (40 CFR 140-149)
- *Toxic Substances Control Act of 1976* (40 CFR 700-750, 760s, 790-799)
- *Federal Insecticide, Fungicide and Rodenticide Act* (40 CFR 150-186)
- *Resource Conservation and Recovery Act* (40 CFR 260-263, 264-270)
- *Hazardous Materials Transportation Act* (49 CFR 170s)
- *Occupational Safety and Health Act* (29 CFR 1910)
- *Asbestos Hazards Emergency Response Act of 1986* (40 CFR 763)
- *Comprehensive Environmental Response, Compensation, and Liability Act*, as amended (40 CFR 300s)
- *Superfund Amendments and Reauthorization Act of 1986* (SARA)
- *Emergency Planning and Community Right to-Know Act of 1986* (SARA Title III) (40 CFR 350, 355, 370, 372)
- *Federal Food Drug and Cosmetic Act of 1938*
- *Pollution Prevention Act*

- NEPA
- any other relevant federal, state, or local laws or regulations

BLM currently complies with the pertinent laws and regulations regarding solid and hazardous waste disposal within the monument. Non-hazardous solid waste is routinely collected from receptacles and facilities by BLM personnel or contractors and transported to a properly licensed and operated waste transfer station. BLM does not burn waste or dispose of waste on-site. Occasionally, illegal dumping occurs on public land within the monument. This illegal waste is disposed properly by BLM and, when feasible, the responsible party is identified and legal remedies are sought.

The military installation known as the Soda Lake Air to Ground Gunnery Range (AGGR) consists of 15 sections of BLM and private land (approximately 9,600 acres) in the northern part of the CPNM. These lands were withdrawn by the U.S. Department of Defense in 1944 for use as air-to-ground strafing and bombing training targets. Used only for a few years, these 15 sections of land were transferred back to BLM and the private land owners by the Department of Defense in 1947. BLM has since purchased the private lands in the former Soda Lake AGGR, and all 15 sections of the former Soda Lake AGGR are now owned as public land and managed by BLM as part of the CPNM.

The Soda Lake AGGR was composed of one strafing range, one skip bomb range, and one bomb target range. The U.S. Army Corps of Engineers has conducted two on-site reconnaissance surveys of this withdrawn facility. The first was conducted in 1996 to survey the site for unexploded ordnance, and second was in September 2007 to sample the AGGR for chemical contamination. Small arms ordnance and practice bombs have been identified on the ground at all three ranges. As with all former target ranges, there is a potential for the continued presence of unexploded ordnance and chemical contamination.

If and when ordnance or chemical hazards that endanger the public are identified, normal and appropriate emergency response actions would immediately be taken in accordance with the policies of BLM and San Luis Obispo County (such as closure of hazard area, public notification, removal of hazard). Since the need for or specific details of such actions are speculative, they are not discussed further in the RMP; however, an appropriate level of NEPA review would be undertaken if the need for a response action is identified.

No landfills or other hazardous waste sites are known to occur on public lands in the CPNM. Currently, the volume of hazardous waste that is generated in the CPNM does not exceed the threshold allowed for a conditionally exempt small quantity generator. The small volume of hazardous waste that is generated at the CPNM is either recycled or disposed through San Luis Obispo or Kern County's Small Quantity Generator Program. The hazardous waste stream consists of used motor oil and occasional expired or obsolete hazardous materials such as paint, solvents, batteries, and lubricants. These hazardous materials are recycled using best management practices, when possible.

Personnel associated with the CPNM continue to identify less-toxic alternatives to hazardous materials that have been used traditionally. As required by the Occupational Safety and Health Administration's Hazard Communication Standard (29 CFR 1910.1200), material safety data sheets are obtained and made available where potentially hazardous chemicals are used or stored.

Non-hazardous waste streams (such as paper, aluminum, and glass) are recycled when it is economically feasible. However, most CPNM public facilities are not currently equipped with receptacles for recyclable materials. In summary, the hazardous and solid waste management program at the Monument is implemented following standard federal and state policies, and there are no issues that are within the

scope of the RMP. Therefore, hazardous and solid wastes are not be addressed further under the RMP alternatives or impact discussion.