APPENDIX E
REGULATORY FRAMEWORK AND REGIONAL BACKGROUND INFORMATION

Appendix E

Regulatory Framework and Regional Background Information

E.1 Introduction

This appendix summarizes the regulatory framework and regional background information relevant to each resource evaluated in the West Mojave Route Network Project (WMRNP) Supplemental Environmental Impact Statement (SEIS). Resource data that are more location-specific and are used directly in the impact analysis are presented in Chapter 3 of the SEIS.

For the comparison of route network alternatives to resources for the impact analysis in Chapter 4 of the SEIS, primary data were collected and compiled into GIS layers. GIS layers used in the analyses and impact evaluations, along with their sources, are listed below. Most of these data are readily available from the source listed.

- Abandoned Mines (Source: BLM)
- Active Golden Eagle Nest Occurrences (Source: CNDDB) and Modeled Suitable Habitat (Source: 2016 DRECP LUPA)
- Air Quality (MDAQMD)
- Alkali Mariposa Lily Occurrences (Source: CNDDB) and Modeled Suitable Habitat (Source: 2016 DRECP LUPA)
- Areas of Critical Environmental Concern (Source: BLM)
- Bakersfield Cactus Occurrences (Source: CNDDB) and Modeled Suitable Habitat (Source: 2016 DRECP LUPA)
- Barstow Woolly Sunflower Occurrences (Source: CNDDB) and Modeled Suitable Habitat (Source: 2016 DRECP LUPA)
- Bendire's Thrasher Habitat (Source: CNDDB) and Modeled Suitable Habitat (Source: 2016 DRECP LUPA)
- Burrowing Owl Occurrences (Source: CNDDB) and Modeled Suitable Habitat (Source: 2016 DRECP LUPA)
- California Desert National Conservation Lands (Source: BLM)
- Charlottes Phacelia Occurrences (Source: CNDDB) and Modeled Suitable Habitat (Source: 2016 DRECP LUPA)
- Clokeys Cryptantha Occurrences (Source: CNDDB)
- Cultural Resources Information (Source: BLM, generated from County records)
- Cushenbury Buckwheat Critical Habitat (Source: US Fish and Wildlife Service)
- Cushenbury Buckwheat Occurrences (Source: CNDDB) and Modeled Suitable Habitat (Source: 2016 DRECP LUPA)
- Cushenbury Milkvetch Critical Habitat (Source: US Fish and Wildlife Service)

- Cushenbury Milkvetch Occurrences (Source: CNDDB)
- Cushenbury Oxytheca Critical Habitat (Source: US Fish and Wildlife Service)
- Dedeckers Clover Occurrences (Source: CNDDB)
- Desert Bighorn Sheep Occurrences (Source: CNDDB) and Modeled Suitable Habitat (Source: 2016 DRECP LUPA)
- Desert Cymopterus Occurrences (Source: CNDDB) and Modeled Suitable Habitat (Source: 2016 DRECP LUPA)
- Desert Linkages (Source: SC Wildlands)
- Desert Tortoise Critical Habitat (Source: US Fish and Wildlife Service)
- Desert Tortoise ACECs (Source: BLM)
- Fringed Myotis Occurrences (Source: CNDDB)
- Gray Vireo Occurrences (Source: CNDDB) and Modeled Suitable Habitat (Source: 2016 DRECP LUPA)
- Grazing Allotments (Source: BLM)
- Guzzlers (Source: Society for Bighorn Sheep)
- Halls Daisy Occurrences (Source: CNDDB)
- Kelso Creek Monkeyflower Occurrences (Source: CNDDB) and Modeled Suitable Habitat (Source: 2016 DRECP LUPA)
- Kern Buckwheat Occurrences (Source: CNDDB) and Modeled Suitable Habitat (Source: 2016 DRECP LUPA)
- Lane Mountain Milkvetch Occurrences (Source: CNDDB) and Modeled Suitable Habitat (Source: 2016 DRECP LUPA)
- Lands Managed for Wilderness Characteristics (Source: BLM)
- Lakes (Source: BLM)
- Little San Bernardino Mountains Linanthus Occurrences (Source: CNDDB) and Modeled Suitable Habitat (Source: 2016 DRECP LUPA)
- Route Densities (Generated by BLM (Margosian) for this project)
- Special Recreation Management Areas Boundaries (Source: BLM)
- Wilderness Areas (Source: BLM)
- Wilderness Study Areas (Source: BLM)
- Least Bells Vireo Occurrences (Source: CNDDB) and Modeled Suitable Habitat (Source: DRECP)
- LeConte's Thrasher Habitat (Source: CNDDB) and Modeled Suitable Habitat (Source: 2016 DRECP LUPA)

- Mojave Fringe-toed Lizard Occurrences (Source: CNDDB) and Modeled Suitable Habitat (Source: 2016 DRECP LUPA)
- Northern Sagebrush Lizard Occurrences (Source: CNDDB)
- Pallid Bat Occurrences (Source: CNDDB)
- Spotted Bat Occurrences (Source: CNDDB)
- Southwestern Willow Flycatcher Critical Habitat (Source: US Fish and Wildlife Service)
- Southwestern Willow Flycatcher Occurrences (Source: CNDDB) and Modeled Suitable Habitat (Source: 2016 DRECP LUPA)
- Southwestern Pond Turtle (Source: BLM)
- Swainson's Hawk Occurrences (Source: CNDDB) and Modeled Suitable Habitat (Source: 2016 DRECP LUPA)
- Western Smallfooted Myotis Occurrences (Source: CNDDB)
- Western Mastiff Bat Occurrences (Source: CNDDB)
- Yellowbilled Cuckoo Occurrences (Source: CNDDB) and Modeled Suitable Habitat (Source: 2016 DRECP LUPA)
- Mohave Ground Squirrel Population Centers (Source: California Department of Fish and Wildlife)
- Mojave Monkeyflower Occurrences (Source: CNDDB) and Modeled Suitable Habitat (Source: 2016 DRECP LUPA)
- Mojave Tarplant Occurrences (Source: CNDDB) and Modeled Suitable Habitat (Source: 2016 DRECP LUPA)
- Ninemile Canyon Phacelia Occurrences (Source: CNDDB)
- Ninemile Canyon Phacelia Occurrences (Source: BLM)
- Owens Peak Lomatium Occurrences (Source: CNDDB)
- Parish’s Daisy Critical Habitat (Source: US Fish and Wildlife Service)
- Parish’s Daisy Occurrences (Source: CNDDB) and Modeled Suitable Habitat (Source: 2016 DRECP LUPA)
- Parish’s Phacelia Occurrences (Source: CNDDB) and Modeled Suitable Habitat (Source: 2016 DRECP LUPA)
- Red Rock Poppy Occurrences (Source: CNDDB) and Modeled Suitable Habitat (Source :2016 DRECP LUPA)
- Robison Monardella Occurrences (Source: CNDDB) and Modeled Suitable Habitat (Source: 2016 DRECP LUPA)
- Shortjoint Beavertail Cactus Occurrences (Source: CNDDB)

- Spanish Needle Onion Occurrences (Source: CNDDB) and Modeled Suitable Habitat (Source: 2016 DRECP LUPA)
- White Margined Beardtongue Occurrences (Source: CNDDB) and Modeled Suitable Habitat (Source: 2016 DRECP LUPA)
- Unusual Plant Assemblages (Source: BLM)
- Vegetation (Source: California Department of Fish and Wildlife/2006 DRECP LUPA)
- National Trails (Recreational and Historical) (Source: BLM)
- OHV Areas (Source: BLM and DOD)
- Parking Locations (Source: BLM)
- Recreation Destinations/Points of Interest (Source: BLM)
- Rock Collecting Areas (Source: BLM)
- SRP Routes (Source: BLM)
- Visual Resources Inventory (Source: Contract to BLM)
- Range Improvements (Source: BLM)
- Residences (Source: Vegetation Layer)
- Sensitive Receptors/Colleges (Source: ESRI)
- Sensitive Receptors/Health Facilities (Source: ESRI)
- Sensitive Receptors/Public Schools (Source: ESRI)
- Sensitive Receptors/Private Schools (Source: ESRI)
- Slopes (Source: Generated from BLM Contour Lines Data)
- Soil Wind Erodibility Group (Source: USDA SSURGO)
- Soil Hydrologic Group (Source: USDA SSURGO)
- Springs (Source: US Geological Survey)
- Washes (Source: BLM)

In addition to route data, additional field data was collected on the condition of riparian waters and springs, on cultural resources sites, wilderness characteristics, recreational destinations, and MFTL.

E.2 Air Resources

E.2.1 Air Quality

E.2.1.1 Regulatory Framework

The following regulatory framework identifies the federal and state agencies in charge of monitoring and controlling mobile and stationary sources of air pollutants and describes measures

taken to achieve and maintain healthful air quality in the WEMO planning area. This section summarizes the applicable regulations related to the Proposed Project.

Rules and regulations promulgated by the federal, state or local agencies impose limits on emissions from sources of air pollutants. These agencies manage mobile sources of air pollutants and exhaust from off-road vehicles (OHVs) through emission performance standards and fuel formulations requirements.

Federal

The Environmental Protection Agency (EPA) implements and enforces the requirements of most federal environmental laws. EPA Region 9 administers federal air programs in California. The federal Clean Air Act (CAA) provides the EPA with the legal authority to regulate air pollution from stationary and mobile sources. The EPA has authority over conformity issues with the CAA in areas that do not meet national ambient air quality standards (NAAQS). The EPA has delegated the authority to review to the California Air Resources Board (ARB). The ARB has further delegated this authority to Air Quality Management Districts (AQMDs) and Air Pollution Control Districts (APCDs) established throughout the state. Federal land management agencies also are responsible for conformity issues related to federal activities and projects that federal land managers authorize in conjunction with the AQMDs and APCDs.

Federal Clean Air Act (CAA)

The CAA, enacted in 1970 and amended in 1977 and 1990 (42 United States Code [U.S.C.] 7401 et seq.), protects and enhances the quality of the nation's air resources to benefit public health, welfare, and productivity. The CAA regulates certain forms of air pollution under three main categories: criteria pollutants, air toxics, and global warming and ozone-depleting gases. Regulation also covers a more general category of emissions that reduce visibility: regional haze, prevention of significant deterioration (PSD), and visibility reducing particulates (VRP).

In 1971, the EPA developed National Ambient Air Quality Standards (NAAQS) to achieve the mandates of CAA Section 109 (42 U.S.C. 7409). NAAQS cover seven "criteria" pollutants of national concern for public health: ozone, respirable particulate matter (PM_{10}), fine particulate matter ($PM_{2.5}$), carbon monoxide, nitrogen dioxide, lead, and sulfur dioxide.

Each NAAQS has two parts. A primary standard intended to provide an adequate margin of safety required to protect health in consideration of long-term exposure for sensitive groups in the general population. Sensitive groups include children, senior citizens, and people with breathing difficulties. A secondary standard for each criteria pollutant is intended to "protect the public welfare from any known or anticipated adverse effects associated with the presence of such air pollutant in the ambient air" (42 U.S.C. 7409[b] [2]).

State

California Health and Safety Code § 41700

The Health and Safety Code prohibits the discharge of air pollutants that cause injury, detriment, nuisance or annoyance to the public. AQMDs and APCDs implement this requirement through rules.

California Clean Air Act, California Health and Safety Code § 42300 et seq.

The California CAA of 1988 provides for air quality planning and regulation beyond and independent of federal regulations. ARB is the state's lead air quality agency and adopts standards for the California Ambient Air Quality Standards (CAAQS), some of which are more stringent than the NAAQS. ARB is responsible for the attainment and maintenance of both NAAQS and CAAQS, oversees the operation of local AQMDs and APCDs, and is responsible for motor vehicle air pollution control. ARB also assists the individual air districts with air quality monitoring as well as planning activities such as inventorying air pollutant emissions and modeling air quality.

In addition the federal criteria pollutants established under the CAA, the State of California also sets air quality standards and manages for sulfates, hydrogen sulfide, visibility-reducing particles, and vinyl chloride.

ARB Special Programs for Reducing Emissions from Off-Highway Recreational Vehicles

The California Clean Air Act mandates that ARB achieves the maximum feasible emission reductions from all off-road mobile sources as part of attainment of the CAAQS. Off-road mobile sources regulations target construction equipment as a major source targeted for reductions to achieve hydrocarbons, nitrogen oxides (NOx), carbon monoxide (CO), and $PM_{2.5}$ exhaust standards. In addition, ARB implements control measures to reduce diesel particulate matter emissions ($PM_{2.5}$) as well as NO_x from existing off-road diesel vehicles and equipment, fleet emission targets for new vehicles, and specific limits on emissions from classes of vehicles, including red-sticker and green-sticker off-road vehicles.

The California Department of Motor Vehicles has designated off-highway vehicles from 2003 or newer model years that do not meet ARB emissions standards as non-complying "red-sticker" vehicles. ARB permits red-sticker vehicles to operate at certain BLM OHV facilities during specified times of year. Within the WEMO planning area, red-sticker vehicles and engines that do not meet ARB OHV emissions standards may operate only at BLM OHV Open Riding Areas at specified seasons as follows: Olancha Dunes, all-year; Dove Springs, Jawbone Canyon, Johnson Valley, Rasor, Spangler Hills, Stoddard Valley, September 1 to May 31; and El Mirage, October 1 to 30 April. Red-sticker vehicles may not operate on BLM-designated OHV routes.

All other off-highway vehicles that meet ARB standards are allowed on all BLM OHV open riding areas and all BLM-designated routes fall under the category for "green-sticker" vehicles. All pre-2003 model year and all compliant 2003 or newer model-year vehicles qualify as green-sticker vehicles. ARB began rulemaking to control emissions for off-highway recreational vehicles in 1994 with California Regulations for New 1995 or Later Off-Highway Recreational Vehicles and Engines under 25 horsepower. Off-highway recreational vehicles (OHRVs) constitute a single regulatory category in California that includes motorcycles (OMCs), all-terrain vehicles (ATVs), off-road sport vehicles, off-road utility vehicles, sand cars, and golf carts, as defined in Cal. Code

Regs., tit. 13, § 2411(a). ARB has developed a regulation to control evaporative emissions from gasoline-powered OHRVs in order to satisfy the 2007 State Implementation Plan (SIP) commitment to reduce reactive organic gas (ROG, also known as volatile organic compound - VOC) emissions from OHRVs.

ARB Organization for Managing Air Quality

Air Basins Intersecting the WEMO Planning Area

Air basins are the basic geographic management units for which the ARB sets limits on maximum amounts of air pollutants allowed for attainment of NAAQS and CAAQS. Air basins consist principally of adjacent areas with similar geographical and meteorological features, but political boundaries may also shape air basin boundaries in some cases. Usually air pollution can move freely within an air basin, but pollution can also sometimes move from one basin to another. The WEMO Planning area falls within portions of three of California's 15 air basins (see Figure E.2-1). The Great Basin Valleys Air Basin encompasses the Inyo County portion of the WEMO planning area. The Mojave Desert Air Basin includes the Mojave Desert portions of Kern, Los Angeles, east-central Riverside, and San Bernardino Counties in the WEMO planning area. The Salton Sea Air Basin includes the WEMO planning area in a small part of central Riverside County and contains no BLM public lands.

Air Quality Management Districts and Air Pollution Control Districts Intersecting the WEMO Planning Area

The State of California has further subdivided these air basins into administrative planning areas based variously on problems of emissions attainment, watershed boundaries, and county boundaries.

The WEMO planning area falls within five different regional air districts (see Figure E.2-2):

- Antelope Valley Air Quality Management District (AVAQMD) covers the Antelope Valley portion of Los Angeles County that comprises part of the Mojave Desert Air Basin.
- East Kern Air Pollution Control District (EKAPCD) encompasses the Mojave Desert portion of Kern County within the Mojave Desert Air Basin.
- Great Basin Unified Air Pollution Control District (GBUAPCD) partially includes the Inyo County portions of the Great Basin Valleys Air Basin.
- Mojave Desert Air Quality Management District (MDAQMD) consists of the Mojave Desert portions of San Bernardino County.

South Coast Air Quality Management District (SCAQMD) includes the WEMO part of Riverside County

Ambient Air Quality Standards

The CAA and the California Clean Air Act contain the primary provisions relating to air quality. The most important provisions relate to establishment of the NAAQS and CAAQS for criteria air pollutants, nonattainment areas, development of state implementation plans (SIPs), prevention of significant deterioration (PSD), air toxics, and federal general conformity. The EPA and the ARB have issued rules to implement the CAA and California Clean Air Acts respectively.

Under the CAA, ARB and the EPA determine whether they are in attainment or nonattainment or are unclassified for any of the NAAQS.

California has established CAAQS for the same federal criteria pollutants, plus an additional four pollutants (visibility reducing particulates, sulfates, hydrogen sulfide, and vinyl chloride).

Prevention of Significant Deterioration

The CAA Section 162(s) classifies areas where air quality already attains the NAAQS or where air quality for the NAAQS remains unclassified with regard to attainment. The three classes of air quality have specific goals. For example, the EPA has authority to review new projects that may affect Federal Class I areas as defined in 40 CFR 51.166. The management goal for Federal Class I areas is pristine air quality. Requirements for additional limits above NAAQS, specifically for emissions of particulate matter and SO_2, are most stringent in Class I areas.

Mandatory Class I federal lands include those lands that as of the date of enactment of the Clean Air Act Amendments of 1977 were:

- International parks.
- National wilderness areas larger than 5,000 acres.
- National memorial parks larger than 5,000 acres.
- National parks larger than 6,000 acres.

These lands may not be redesignated as Class II or Class III areas. The WEMO planning area includes a portion of Joshua Tree National Park, which is a Class I area.

The BLM wilderness areas and national monuments within the WEMO planning area did not exist in 1977. The CAA provides (Section 163(4)), however, that additional acreages added to Class I wilderness areas after enactment of the CAA Amendments of 1977, also receive Class I designation. A singular exception for Class I air quality status on BLM lands in the WEMO planning area comprises the BLM lands added in 1994 to the San Gorgonio Wilderness, which itself was established as a US Forest Service Wilderness in 1964 and was an original Class I area.

All other air quality jurisdictions not qualifying as Class I areas were originally designated as Class II areas in 1977. Most other areas already in attainment of NAAQS are Class II areas where the air quality goal is no significant deterioration of current air quality. BLM public lands usually fall under Class II status in California. Class II areas are also subject to maximum limits to air quality degradation called air quality increments (often referred to as PSD increments). These air quality increments are more stringent than NAAQS.

If desired by local constituents, a state air quality management agency or a federally recognized Native American tribe may redesignate a Class II area as a Class III area. In Class III attainment areas, air quality may be degraded but only to levels no less than the NAAQS.

For Federal lands with special designations that were established since 1977, CAA Section 164 delegates to the State of California the authority to designate Federal lands in NAAQS attainment or unclassified status as new Class I areas. Requirements for Federal land to be considered for redesignation to Class I areas are:

1. A national monument, a national primitive area, a national preserve, a national recreation area, a national wild and scenic river, a national wildlife refuge, a national lakeshore or seashore which exceeds 10,000 acres; or
2. A national park or national wilderness area which exceeds 10,000 acres.

To date, the State of California has not designated any Federal lands as new Class I areas.

E.2.1.2 Regional and Background Information

Air quality in the WEMO planning area is often good. At times, however, air quality planning areas do not meet ambient air quality standards (i.e., are in nonattainment status). Fugitive dust is the most pervasive air pollutant in the WEMO planning area, portions of which constitute the two criteria pollutants, PM_{10} and$PM_{2.5}$.

Frequent high winds aggravate fugitive dust pollution in the desert. Emissions that affect air quality in the WEMO planning area may also originate from outside the planning area and migrate into the West Mojave Desert by way of the Owens Valley and low-lying passes from the Los Angeles Basin and the Central Valley. Bytnerowicz et al. (2016) describe the source, cause, and impacts to the WEMO planning area from the Owens Valley:

> "Dust storms occurring in the Owens Valley east of the Sierra Nevada as a result of many decades of pumping water from that aquifer to Los Angeles lead to violations of the coarse particulate matter air quality standard. The Owens Valley is one of the most turbulent valleys in the U.S. and one of the largest coarse particulate matter sources in the Western hemisphere (Reid et al. 1994). Coarse particulate matter is generated during wind events by sandblasting of the efflorescent crust with saltation particles created from lakebed sediment and sand from the shoreline (Reid et al. 1994). Atmospheric coarse particulate concentrations in the Owens Valley area during windstorms can exceed 1,000 μg m-3 (compared to the federal health standard of 150 μg m-3), with plumes reaching above 2,000 meters in height (Reid et al. 1994)."

Many times winds blow from the Owens Valley into the immediately adjacent WEMO planning area. Prolonged dry conditions and fires in southern California mountains can also intensify fugitive dust pollution and substantially reduce visibility in the Mojave Desert.

Air quality degradation and ambient air quality standard exceedances in the planning area have been episodic in nature. High PM_{10} concentrations that exceeded the PM_{10} NAAQS peaked in the early 1990s. In recent years, monitoring data has led to reclassification requests to the EPA for most nonattainment areas of the region. Implementation of fugitive dust control rules and controls on a number of critical sources have led to reductions in PM_{10} concentrations.

E.2.2 Climate Change

E.2.2.1 Regulatory Framework

Federal

Presidential Executive Order 13783 on Promoting Energy Independence and Economic Growth, dated March 28, 2017, has revoking the preceding Executive Order 13653 Preparing the United States for the Impacts of Climate Change, dated November 1, 2013. The 2017 Order also rescinded

the President's Climate Action Plan from June 2013 and the Climate Action Plan Strategy to Reduce Methane Emissions from March 2014. Further, the Order directs the Council on Environmental Quality to rescind its final guidance entitled "Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews," which is referred to in "Notice of Availability," 81 Fed. Reg. 51866 (August 5, 2016).

In addition, the Secretary of the Department of Interior and directors of its component agencies shall identify existing agency actions, reports, and guidance related to or arising from the specified rescissions of climate-related Presidential and Regulatory Action enumerated in the Order to be revoked or rescinded. As soon as practicable, each agency is to suspend, revise, or rescind, or publish for notice and comment proposed rules suspending, revising, or rescinding any such actions, consistent with existing law and the policies of Order 13783.

State

The State of California is pursuing wide-ranging policies to reduce greenhouse gas (GHG) pollutant emissions originating with vehicular and industrial sources as a means to cap total emissions and to mitigate adverse impacts to society and ecosystems from atmospheric warming and attendant climate change. GHGs are increasing in the atmosphere and effect a warming trend in the atmosphere because molecules of GHGs are effective at capturing and reradiating energy (heat) reflected from the earth's surface back to earth rather than continuing into outer space.

To that end, the State of California has developed a unique market-based "cap-and-trade" approach to emissions management intended to address current and potential future impacts of climate. Governor's executive orders, legislation incorporated into the California Code of Regulations, and policy documents direct integrated and collective efforts to offset production of GHGs in California. Climate-related documents bearing on this SEIS refer here mainly to efforts on the part of the California Air Resources Board (CARB) to curb vehicle emissions, particularly in exurban settings where motorized access and recreation occur, including on BLM public lands.

Following is a brief summary of State climate change measures in place or soon to be in place.

Governor's Executive Orders on Climate Change and Control of GHGs from Motor Vehicles

Executive Order S-3-05

In 2005, the Governor of California issued Executive Order S-3-05, establishing statewide GHG emission reduction targets scaled back to 2000 levels by 2010, 1990 levels by 2020, and 80 percent below 1990 levels by 2050.

Executive Order B-16-12

The Governor of California ordered CARB and other California state government agencies in 2012 to achieve the following benchmarks by 2025:

- Over 1.5 million zero-emission vehicles will be on California roads and their market share will be expanding; and
- California's clean, efficient vehicles will annually displace at least 1.5 billion gallons of petroleum fuels.

Executive Order B-30-15

In April 2015, the Governor established an accelerated target for reducing GHG emissions to 40 percent below 1990 GHG levels by 2030.

California State Legislation on Climate Change and Control of GHG Emissions from Motor Vehicles

2002: AB 1493, the "Pavley Bill" on Vehicular Emissions: Greenhouse Gases, established the California Climate Action Registry, and require CARB to develop and adopt regulations that achieve the maximum feasible and cost-effective reduction of greenhouse gases from motor vehicles. The Registry applies procedures and protocols for the reporting and certification of reductions in GHG emissions from mobile sources [e.g., motor vehicles] for use by CARB in granting the emission reduction credits. Regulations aim for maximum feasible reduction of GHGs emitted by passenger vehicles and light-duty trucks and any other vehicles determined by CARB to be vehicles whose primary use is noncommercial personal transportation in the state

2006: AB 32, the Global Warming Solutions Act, caps the California GHG emissions at 1990 levels by 2020 starting in 2012. This law enacted the first statewide program in the United States to mandate an economy-wide limit for GHG emissions from motor vehicles accompanied by enforceable penalties. The Act directed CARB to develop and implement regulations to reduce statewide emissions from stationary sources. It also specifies that CARB regulations adopted in response to AB 1493 also address GHG emissions from vehicles. Guidance was put in place to reduce emissions in an economically efficient manner while ensuring that reductions do not unfairly affect businesses and consumers.

2006: AB 1803 requires CARB to assume responsibility for preparing, adopting, and updating the State of California inventory of GHG emissions.

2016: SB 32 requires that CARB ensure that statewide GHG emissions are reduced to 40% below the 1990 level by 2030.

2016: AB 197 requires that CARB inventory all sources of air pollution within California air basins and determine the kinds and quantity of air pollutants, including but not limited to, the contribution of natural sources, mobile sources, and area sources of emissions, including separate identification of those sources. CARB also makes available, and updates at least annually on its Internet website the emissions of GHGs, criteria pollutants, and toxic air contaminants throughout California broken down to a local and sub-county level for stationary sources and to at least the county level for mobile sources. The law further stipulates that CARB consider the social costs of GHG emissions. Social costs are defined as "an estimate of the economic damages, including, but not limited to, changes in net agricultural productivity; impacts to public health; climate adaptation impacts, such as property damages from increased flood risk; and changes in energy system costs, per metric ton of GHG emissions per year."

CARB Policy Documents Guiding Reductions of GHGs

Zero-Emissions Vehicles (ZEVs)

The Governor's Interagency Working Group on Zero-Emission Vehicles (2016) establishes State of California policy to achieve targets set forth in Executive Order B-16-12. The Working Group

has charged CARB with consideration of regulations in 2018 that would create emissions-based credit programs for zero-emission motorcycles, off-highway recreational vehicles, and off-highway utility vehicles.

2017 Climate Change Scoping Plan Update

CARB approved its initial Climate Change Scoping Plan in 2008 to fulfill directives of AB 32. With periodic updates, the Scoping Plan is the State's roadmap to reach GHG reduction goals. The plan outlines a number of key strategies to reduce GHG emissions. The latest update from 2017 continues cap-and-trade regulation of GHG emissions, maintains the low-carbon fuel standard, and advances technology to reduce tailpipe emissions from all motor vehicles. For the first time, the Scoping Plan also addresses reducing GHG emissions from natural lands. By the end of 2018, CARB will develop the Natural and Working Lands Action Plan to reach a goal of making the entire land base of California a net carbon sink, i.e., sequestering more carbon than emitting carbon as GHGs into the atmosphere.

E.2.2.2 Regional and Background Information

Climate Conditions

Temperature

The WEMO planning area is characterized by hot summer temperatures (average daily highs above 37°C (100°F). Temperature extremes are common in the planning area. Seven of thirteen weather stations in the WEMO planning area have average low temperatures below freezing in December and January. El Mirage at the San Bernardino / Los Angeles county line has the lowest average temperatures in the planning area, and Twentynine Palms at the east end of the planning region has the highest average temperatures. Average daily temperature change ranges 16°C (29°F) for all stations. Seasonal variations are high. Ridgecrest, for example, has recorded highs of 48°C (118°F) and lows of -18°C (0°F) since the mid-1980s.

Rainfall

The rain shadow effect of the mountains on the western and southern boundaries of the WEMO planning area produces less precipitation than on the coast-facing sides. Rainfall generally follows seasonal wind patterns. Most winter rainfall arrives from the southwest and spreads eastward in diminishing amounts across the desert. Cool-season precipitation is the most important and extensive source of rain in the region. Areas of rainfall are generally more widespread and of longer duration during the cool season than in the warm season. Snow occurs during the winter over a large portion of the planning area. The total average snowfall ranges from under one inch in Trona to over three inches at Haiwee Reservoir and Lancaster.

A major feature of western Mojave Desert rainfall is its variability. The cyclic weather phenomenon known as El Niño increases annual winter precipitation in the planning area. The difference in rainfall between wetter El Niño years and the drier intervening La Niña years creates high interannual variability in rainfall over the long run. For example, the town of Mojave in Kern County has mean annual precipitation of 6.06 inches but with a standard deviation from the mean of 4.04 inches expected, so that in about two-thirds of all year's annual precipitation ranges from a low of 2.02 inches to 10.10 inches. Weather records indicate that there have been 23 El Nino years since 1931, approximately one-third of all years. El Niño years, however, account for 65 percent of the precipitation since 1931 at the westernmost edge of the planning area. East-to-west variability

is apparent in the difference in the influence of El Niño years. In Twentynine Palms, by contrast, only 44 percent of the precipitation fell in El Niño years since 1931.

During the summer, southwest airflow results in typically very dry weather on the western edge of the Mojave Desert. The influence of summer southwest winds diminishes toward the eastern Mojave Desert, however. This pattern results in a greater continental influence, characterized by a monsoonal weather pattern in the east. The annual precipitation cycle across the entire Mojave Desert shows the two distinctive patterns that approximately divide the region in half. May and June are consistently dry in both patterns, accounting for less than 5% of annual rainfall. From October through April, precipitation is the dominant pattern and accounts for 82% of the annual total in the west part of the West Mojave Desert, whereas in the more easterly bi-seasonal monsoonal weather zone, just 66 percent of the annual precipitation comes in the winter. From July through September, 13 percent and 29 percent of the annual rainfall total falls in the western winter-dominant and the eastern bi-seasonal zones, respectively.

Randsburg, along the western edge of the planning area, and Twentynine Palms, at the eastern edge, illustrate the summer precipitation conditions. In Randsburg, only two percent of the Julys from all years and six percent of Augusts from all years have more than one inch of precipitation. By comparison, Twentynine Palms averages more precipitation in July and August combined than in January and February combined.

Warm-season precipitation results largely from convective precipitation in the form of thunderstorms. Although infrequent, the most dramatic precipitation source is tropical cyclones and hurricanes that drift across the region from offshore Baja California. These typically occur late in the warm season and with widespread and severe flash flooding. Summer thunderstorms can drop more precipitation on a site in one event than the mean annual precipitation for that location. On the other hand, the extent of thunderstorms not associated with tropical storms is often highly localized, and weather stations in areas having a low density of weather stations may miss recording occurrences of local cloudbursts (Redmond 2009).

Wind

Summer storms may bring high winds with peak wind velocities above 50 miles per hour, and even wind speeds of 100 mph occur locally nearly every year. High winds can occur at any season. Winds can increase aerosolization of soil particles and create unhealthy particulate levels in the air.

Climate Change in the Mojave Desert from 1900 to the Present

Climate change has been occurring across the Mojave Desert in the recent past, with a consistent increase in seasonal maximum temperatures regionally (Davey et al. 2007b). Evidence of climate change in the Mojave Desert is based on weather station data (air temperature and precipitation) since 1900 combined with the US Geological Survey's Basin Characterization Model (Flint et al. 2013, Rapacciuolo et al. 2014, Thorne et al. 2015). Because the intervals of time used in retrospective studies of recent climate change differ, model results differ in some aspects. Results appear in Tables E.2-1 and E.2-2. These studies show increases in temperatures recently, but results about precipitation generalized across the Mojave Desert are not easy to pinpoint. Table E.2-1 displays the historic changes.

Table E.2-1. Changes in nine climate variables for the Mojave Desert based on differences between historical (1951-1980) and modern (1981-2010) conditions

	Mean Annual Temp. (°C)	Minimum Annual Temp. (°C)	Maximum Annual Temp. (°C)	Total Annual Precip. (mm)	Potential Evapo-transpiration (mm)	Actual Evapo-transpiration (mm)	Mean Climatic Water Deficit (mm)	Runoff (mm)	Recharge (mm)
Average Change	+0.4	+0.7	+0.30	+13.6	+27	+13	+20.4	+0.5	+0.9

Source: Flint et al. 2013, Thorne et al. 2015

Table E.2-2. Changes in the Means, Minima, and Maxima of Six Climate Variables for Mojave Desert[1]

Description of the Range of Climate Change	Mean Annual Temperature (°C)	Minimum Annual Temperature (°C)	Maximum Annual Temperature (°C)	Total Annual Precipitation (mm)	Mean Actual Evapo-transpiration (mm)	Mean Climatic Water Deficit (mm)
Average Change	+0.67	+0.81	+0.30	-1.04	-1.65	+24.63
Minimum Change	-0.17	-1.02	-0.70	-30.34	-34.25	-39.13
Maximum Change	+1.50	+2.84	+0.94	+46.96	+23.30	+71.53

1 - Based on differences between historical (1900-1939) and modern (1970-2009) conditions

Source: Rapacciuolo et al. 2014, supporting information in Appendix S1 available online at: http://onlinelibrary.wiley.com/doi/10.1111/gcb.12638/full

The term climatic water deficit (CWD) (Stephenson 1998) is the amount of water by which potential evapotranspiration (PET) exceeds actual evapotranspiration (AET) of vegetation, i.e., the amount of additional water that would have evaporated or transpired under non-drought conditions if the water had been present in the soils under ambient conditions. CWD is a useful indicator of net change in climate conditions over time as it combines the concurrent effects on vegetation from solar radiation, evapotranspiration, air temperature, and soil moisture (as a function of water recharge from precipitation). Importantly for the vegetation of the Mojave Desert, each recent study indicates that CWD has been increasing in recent decades, whether or not rainfall is increasing or decreasing. Even under conditions where rainfall increases as climate warms, the CWD may still increase because rates of soil transpiration and vegetation evapotranspiration of water under hotter ambient air temperatures may exceed the rate of water delivery to the soil from increased rainfall. This calculation has ecological significance because it estimates drought stress on soils and plants and can point to physiological stress of plants and growing habitat unsuitability for some plant species.

The distribution of impacts of a changing climate are not uniform across a landscape. Rapacciuolo et al. (2014) demonstrate in their modeling of recent climate conditions that topographic diversity and other environmental factors create a range of different responses at a fine scale. Therefore, maximum and minimum ranges of values for climate change since 1900, inclusive of local variations across the Mojave Desert, appear alongside average regional changes in Table D.2-2. Even though regional trends in the Mojave Desert may overall be toward warming (and perhaps

drying), individual drainages may have diverged from the regional trend and individually undergone cooler and/or wetter conditions during the same period.

Gonzalez (2016) analyzed climate change between 1950 and 2010 in Death Valley National Park, at the northeast boundary of the WEMO planning area. Average annual temperature in the Park increased statistically significantly at a rate of 1.3 ± 0.5°C per century. Terrain has played an important role in how much climate has changed in recent time. The highest historical rates of temperature increase have occurred at higher elevations in the northwest section of the park adjacent to the WEMO area. A trend in rainfall amounts was not statistically apparent.

Scenario Models of Future Climate in the WEMO Planning Area

Models of future climate do not predict the future. Future scenario modeling provides insight to landscape and resource managers about a range of possible futures and an understanding of the risks that might confront managers in the future. Models also aid managers to set in motion a portfolio of robust management actions now so that in coming decades future managers will be better able to avoid, mitigate, adapt to, or offset eventual adverse impacts from climate.

Detailed climate scenario modeling for the Mojave Desert has been undertaken less often, as the complexity needed for depicting climate at a scale meaningful for managers is formidable in the highly varied topography of the Mojave Desert and because data from the Mojave Desert for use in scenario modeling are less extensive in contrast to other parts of California. The BLM did not conduct climate scenario modeling specifically for the WEMO SEIS. Recently, however, the BLM has commissioned two independent projects that modeled scenarios of future climate for the WEMO planning area: the BLM Mojave Basin and Range Rapid Ecoregional Assessment (REA) (2013) and products generated in support of the DRECP (2016). Other pertinent sources of scenario modeling for WEMO climate conditions come from Thorne et al. (2015) and Gonzalez (2012, 2016). These resources provide a starting point for adaptation planning for public lands in the West Mojave Desert.

In 2010, NatureServe produced future climate modeling for the BLM Mojave Basin and Range REA. Subsequently in 2013, the Conservation Biology Institute produced maps for the BLM DRECP (2016) based on the modeling work of Flint and Flint (2012) at the US Geological Survey. Two distinct climate change scenarios using different assumptions about the atmospheric forcing (the process of atmospheric warming) and future GHG emissions showed divergent modeled results for the climate and hydrologic features for the period 2070-2099 in the WEMO planning area. The Parallel Climate Model (PCM), developed by the U.S. Department of Energy showed in general less severe results than the Geophysical Fluid Dynamics Laboratory model, developed by the National Oceanographic and Atmospheric Administration (NOAA).

The increase in annual minimum-temperature projections suggests a reduction in the duration and intensity of freezing conditions. By mid-century, the frost-free growing season in the Mojave Desert is projected to lengthen by about 30 days and begin about 22 days earlier (Bell et al. 2004). The number of days below 0°C (32°F) is projected to decrease, with the Mojave Desert experiencing almost 40 fewer days of temperatures below freezing (Bell et al. 2004). Extremely cold days (days exceeding the long-term 95th percentile) are projected to decrease by 44 days per year in the Mojave Desert (Bell et al. 2004). Change to higher frequency of severe flooding from less frequent but heavier rainfall linked to climate change are forecast under some modeled

projections of climate change in the Southwest. Flood risks are likely to become greater if winter storms and/or monsoons increase in frequency and severity.

Climate Refugia

Climate refugia are parts of landscapes where topographic features and weather patterns combine to sustain current climate conditions or slow the pace (velocity) of changing climate. Such refugia are likeliest where elevation rise is steep, for example. Refugia for the Mojave Basin and Range REA based on conditions modeled through 2060.

According the REA model, climate refugia will be most extensive in three areas: the mountainous northern half of the China Lake Naval Weapons Air Station in southern Inyo County, the eastern Sierra Nevada and its foothills, and the northeast and east edges of the San Bernardino Mountains.

In separate modeling for the DRECP, the Center for Biological Conservation (CBI) (2013) produced additional modeling of climate refugia also using PCM A2 and GFDL A2, for the entire DRECP are, covering the WEMO planning area. The PCM model displays a possible future with greater opportunities for conservation in refugia than the possible future shown resulting from the GFDL model. This range of possible futures gives managers a sense of the uncertainty about future conditions that they can consider in formulating robust decisions now that will impact the future.

E.3 Geology, Soils, and Water

E.3.1 Geology and Soils

E.3.1.1 Regulatory Framework

There are no federal, state, or local regulations associated with geology or soil resources that are applicable to the WMRNP.

Regional and Background Information

Geologic Setting

The WEMO Planning area is mainly in the Mojave Desert geomorphic province (Mojave Block) of California. The geomorphic provinces do not completely match the bioregional provinces that were used to identify the WEMO Planning area and adjacent planning area boundaries. The Planning area also encompasses a substantial portion of the Basin and Range province to the north and small portions of the Sierra Nevada province to the northwest and the Transverse Ranges to the southwest. The geomorphology of the province is dominated by broad basins filled with sediments eroded from adjacent highlands and mountains, burying the ancient topography. The region may once have been entirely within the Basin and Range province until the Garlock Fault became active in the early to mid-Tertiary Period to create a geographic and climatic boundary. Although Paleozoic- and early Mesozoic-age rocks are present, the desert itself is a Cenozoic-age feature, formed as early as the Oligocene, presumably from movements of the San Andreas and the Garlock faults. During the Pleistocene (Ice Ages), this region of California had a cooler average temperature and lower evaporation rate than at present. While never a wet climate, the Mojave Desert nonetheless once contained many small lakes, and the Mojave River had water flow throughout its length. The majority of the surface in the planning area is covered by Quaternary-age (Pleistocene and Holocene) unconsolidated surficial deposits. These deposits consist primarily of alluvial, fluvial, lacustrine and aeolian sediment.

The Mojave Desert province has distinct western and eastern portions. The "western Mojave" lies within the wedge where the San Andreas and Garlock faults meet, and is bounded on the east by the Mojave River and a line running northwest from Barstow, San Bernardino County, to Red Rock Canyon, Kern County. Uplifts along the two major fault systems include the El Paso Mountains along the northwest side of the Garlock fault, and the San Gabriel and San Bernardino Mountains to the southwest along the San Andreas fault. The western Mojave Desert consists of great expanses of gentle surface with isolated knobs, buttes, ridges, and locally hilly areas. The eastern Mojave consists of alluvial filled basins (downthrown blocks) between mountain ranges separated by normal faults, but includes thrust-fault emplacement hills and mountains. In the southern half, the mountain ranges have a general northwest trend, whereas in the northern half these features have no consistent orientation. For more detailed geology, the reader is referred to the Geologic Map of California, San Bernardino Sheet (Bortugno and Spittler 1986).

Basin and Range province is a geologic term referring to the structure of Mojave Desert valleys (basins) and mountains (ranges) that are aligned roughly north to south. The province extends from the Wasatch Mountains of Utah to the east side of the Sierra Nevada in California. In this region the earth's crust has been extended (stretched thinner) from east to west, and faults associated with this thinning and stretching generally border mountain ranges in this province. The planning area north of the El Paso Mountains and east of U.S. Highway 395 is part of the Basin and Range province. Basin and Range includes the Coso, Argus, and Slate mountains and their adjacent valleys. The Coso Mountains consist largely of igneous/volcanic rocks, including pumice, basalts, cinders and obsidian, and are tectonically active with frequent, very small earthquakes. The Argus and Slate Ranges are mostly igneous/granitic rocks, with some volcanic rocks and exposures of limestone formations. Searles Valley is well-known for its deposits of sodium minerals that are the remnant of a Pleistocene lake that once formed the terminus of the Owens River.

Mountain ranges and valleys of the Transverse Range region trend eastward in a pattern essentially transverse to generally northwest-trending features of southern California. The lowlands of the San Bernardino and Los Angeles plains in the southern part of this region rise abruptly northward to the San Bernardino and San Gabriel mountains, respectively, two of the most rugged and highest ranges in southern California. The rock units of the Transverse Range region may be divided into two main groups: (a) crystalline basement complex composed of metamorphic and plutonic rocks; and (b) sedimentary and volcanic rocks. The metamorphic rocks of this complex include, from oldest to youngest: Precambrian gneiss and marble; Precambrian Pelona Schist; Paleozoic meta-sedimentary rocks containing mineralized gold; and marble/limestone; and Pre-Cenozoic rock (Dibblee 1970).

Highly diverse marine and non-marine sedimentary rocks, volcanic and intrusive igneous rocks range from Precambrian to Recent times. Geologic events involve plate collision, metamorphism, and faulting. This diversity of rock types, long history of igneous activity, and the complex structural and geomorphic development of the region have resulted in the formation of a wide variety of mineral assemblages and their concentration to form ore deposits that are present in the planning area.

Available Soil Survey Information for the Planning Area

The USDA Natural Resource Conservation Service (NRCS) soil surveys have identified many kinds of soils across the planning area. The NRCS has created two separate types of soil mapping

data. The Digital General Soil Map of the United States (STATSGO2) is an inventory of soils and non-soil areas at a map scale of 1:250,000 for the continental United States. STATSGO2 is useful for broad planning and management uses covering state, regional, and multi-state areas. For much of the Mojave Desert, STATSGO2 is the only source of soils data. In the absence of ground-based soil survey data, STATSGO2 data relies on geology, topography, vegetation, and climate derived from Land Remote Sensing Satellite (LANDSAT) images for probable classification and extent of the soils. For project-specific planning such as OHV route designation, STATSGO2 is not sufficient.

A second NRCS data source for soils mapping is the SSURGO database. The SSURGO database contains soils information collected by the National Cooperative Soil Survey. The information come from direct on-the-ground observations coupled with interpretation of remotely sensed data, often followed up with laboratory analysis. Soil maps generated in SSURGO outline areas called map units. Map units describe soils and other components that have unique properties, interpretations, and productivity. Each map unit may contain one to three major soil components and some minor components. Map units typically have the name of the major soil components. Information available from the SSURGO database includes physical and chemical properties, frequency of flooding, and limitations affecting recreational uses. Soil scientists collect information at scales ranging from 1:20,000 to 1:63,360. Resulting maps are intended for natural resource planning and management.

The NRCS organizes the SSURGO data into soil survey areas. SSURGO map data can be viewed in the Web Soil Survey (https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm). Table E.3-1 lists the NRCS's Order 3 soil survey areas that encompass BLM public lands in the WEMO planning area. Other soil surveys are available for Department of Defense military installations, adjacent national forests, and Joshua Tree National Park. Although these survey areas do not overlap with BLM lands, they contain information useful for BLM managers about public lands adjacent to these other jurisdictions. Wherever possible, data from the SSURGO are used in description and analyses of soils in this SEIS. Each year the NRCS soil survey staff updates SSURGO databases to reflect new information.

Table E.3-1. NRCS Soil Survey Areas in the WEMO Planning Area

Survey Name	Survey Number	County	Status	Coverage
Benton-Owens Valley Area	CA802	Inyo	complete	Along highway 395 from the WEMO boundary south to the south end of Haiwee Reservoir and then east to the China Lake Naval Air Weapons Station.
Kern County, Southeast Part	CA670	Kern	complete	Tehachapi Range foothills parallel to Rosamond north to Cantil, east to Atolia, and south to Boron across the north side of Edwards Air Force Base.
Mojave Desert Area, Northwest Part	CA682	Kern, San Bernardino	partial	The BLM Ridgecrest Field Office boundary on the west from Cantil north to the Inyo County line and then east to Searles Lake and the boundary of the Fort Irwin National Training Center and south to just below Atolia, west back to Cantil.

Table E.3-1. NRCS Soil Survey Areas in the WEMO Planning Area

Survey Name	Survey Number	County	Status	Coverage
Antelope Valley Area	CA675	Kern, Los Angeles	complete	Mojave Desert portion of Los Angeles County and north into Kern County along the Tehachapi Range foothills outside the Los Padres National Forest north parallel to the town of Boron.
Mojave River Area	CA671	San Bernardino	complete	North from the boundaries of the Angeles and San Bernardino National Forests and east of Edwards Air Force Base to Harper Lake, east past Barstow along the south side of Fort Irwin to Yermo (I-15) and Newberry Springs (I-40), then west again to near Daggett and south to Lucerne and the San Bernardino National Forest
Mojave Desert Area, West Central Part	CA698	San Bernardino	partial	Near I-40 south and west of Newberry Springs and east of Lucerne Valley to the west boundary of the Twenty-nine Palms Marine Corps Ground Combat Center and south to the southeast boundary of the WEMO planning area and the boundary with Joshua Tree National Park.

Desert Soil Properties and Processes

Desert soils differ considerably from soils of mesic (moist climate) ecosystems, which scientists have studied in greater depth. For example, Mojave Desert vegetation often provides scant cover for wildlife from predators and extreme temperatures. Many vertebrate animal species, therefore, use desert soils burrows as their principal source of cover and habitat for reproduction and survival. Lizards, snakes, desert tortoises, burrowing owls, rodents, kit foxes, and badgers are some of the desert animals that dwell in sub-surface burrows during a large portion of their lives.

Size and texture of sediments, mineral composition, amount of pore spaces between sediments and between soil organic complexes, soil fertility, vegetation cover, presence of biological soil crusts, and water content become critical in water-limited or xeric desert ecosystems. Soils in arid and semi-arid region are important because they can promote microbial and invertebrate populations that facilitate plant growth and nutrient cycling despite water scarcity. The ability of soil to hold water for long periods is critical to photosynthesis in plants that converts atmospheric carbon through plant water use to add or maintain sufficient aboveground vegetation and belowground root biomass.

Important processes in the Mojave Desert are the accumulation of organic matter, the formation of and translocation of clay minerals, the accumulation of particulate matter deposited from the atmosphere, weathering of parent material, sequestration of inorganic carbon, and the formation of desert pavement. Degradation of these soil processes occurs when soils lose their capacity to hold moisture and soil nutrients in desert ecosystems.

Fertility also depends on the availability of soil mineral macronutrients and key micronutrients in desert soils. Low amounts of phosphorus in the soil often limit growth of plants in desert soils, for example. Inputs of nutrients to desert soils come from deposition of minerals, sediments, and

organic matter, either from the atmosphere or from water transport. Minerals are important because they bind especially to soil organic compounds for eventual uptake by plants when soil water is sufficient to dissolve the minerals attached to the compounds and transfer dissolved minerals to plant roots.

West Mojave Desert soils locally receive unnaturally high amounts of nutrients, creating environmental problems. One example is the high rate of deposition of nitrogen onto the surfaces of soils. This nitrogen load stems from high amounts of atmospheric nitrogen generated principally by vehicle traffic in the Los Angeles Basin and moving downwind into the West Mojave Desert. Added nitrogen increases the habitat suitability of desert soils for comparatively high-nitrogen consuming plants such as non-native invasive annual grasses. Native plants can't effectively use this excess nitrogen because they didn't evolve in a higher nitrogen environment. These non-native plants now comprise as much as 90 percent of the annual plant biomass in some areas and subsequently lead to the loss of species-diverse native plant communities and to an unprecedented increase of fire-prone fine fuels in the desert.

Scientists have often underestimated the amount of carbon sequestered in the desert because investigations of soil carbon limited their inquiry to the top one meter of soil and considered only organic carbon (Wang et al., 2010). Soil inorganic carbon, especially in the form of calcium carbonate (CaCO3), results from mineral weathering under dry conditions. Mineral weathering is a major process transforming carbon from the atmosphere and from plants into inorganic carbon sequestered in mineral compounds such as carbonates. Desert soils are the third largest global pool of carbon (Emmerich 2003), most of it stored as inorganic carbon. Soil inorganic carbon tends to be more stable than soil organic carbon over time because inorganic carbon compounds are not readily available for microbial respiration.

E.3.2 Water Resources

E.3.2.1 Regulatory Framework

Federal

The Federal Clean Water Act

In 1972, amendments to the Federal Water Pollution Control Act, or "Clean Water Act" (CWA), created a broad national program to protect water quality and regulate waste and pollutant discharges in United States waters (Title 33 United States Code [U.S.C.] Section 1251 et seq.). The CWA authorizes the U.S. Environmental Protection Agency (EPA) to establish water quality standards and to oversee permitting for otherwise prohibited waste and pollutant discharges from "point sources," that is sources from industrial facilities, sewage treatment plants, and stormwater drains. Large amounts of sediment in streams from one or more upslope erosion areas ("non-point sources") may also qualify as pollutants under the CWA.

The CWA also grants to the EPA the authority to delegate to state governments the implementation of CWA provisions. In California, the State Water Resources Control Board (SWRCB) oversees administration of CWA regulations.

Key CWA provisions relevant to the scope of this SEIS include:

- Section 303(d) – Identification of waters where current pollution control technologies alone cannot meet the water quality standards set for that waterbody. Every two years, states are

required to submit for EPA approval a list of impaired waters plus any that may soon become impaired. Each state prioritizes impaired waters based on the severity of the pollution and the designated beneficial use of the waterbody (e.g., fish propagation or human recreation). States must establish the total maximum daily load(s) (TMDLs) of the pollutant(s) in the waterbody for impaired waters on their list or provide an alternate means to reverse the impairment. In some water body located in the Mojave Desert naturally occurring pollutants such as Arsenic may be present with no practical way of reversing the impairment.

- Section 401 – Water Quality Certification requirements for federally permitted activities involving construction that may result in discharges to surface waters and wetlands.
- Section 404 – Permit program for controlling discharges of dredge or fill materials into surface waters and wetlands. The EPA delegates to the US Army Corps of Engineers implementation of Section 404. Activities in waters of the United States regulated under this program include fill for development, water resource projects (e.g., dams) and infrastructure development (e.g., stream crossings, culverts, visitor centers). Section 404 also requires a permit before dredged or fill material may be discharged into waters of the United States unless the activity is exempt (e.g., certain farming and forestry activities). No discharge of dredged or fill material may be permitted if a practical, less damaging alternative exists, or if waters would be significantly degraded. For most discharges with only minimal adverse impacts, a *general permit* may suffice. Specific categories of activities receive general permits on a national, regional, or state basis. General permitting process eliminates individual review and allows some activities such as minor road activities, utility line backfill, and bedding to proceed with little or no delay once general or specific conditions for the general permit are met. Section 404 permits are also subject to CWA Section 401 water quality certification from the regional representative office for the SWRCB or Regional Water Resources Control Boards (RWQCB). There are two RWQCBs in the WEMO Planning Area, the Lahotan and Colorado River RWQCBs.

Executive Order 13778 Review of the 'Waters of the United States' Rule

The EPA and the US Army Corps of Engineers determine whether Sections 404 and 401 of the CWA protect a waterway, water body, or wetland under the definition of "waters of the United States. On February 28, 2017, Executive Order 13778 "Restoring the Rule of Law, Federalism, and Economic Growth by Reviewing the 'Waters of the United States' Rule" directed the EPA and the Army Corps of Engineers to (1) review and rewrite the final rule entitled "Clean Water Rule: Definition of 'Waters of the United States,'" 80 Fed. Reg. 37054 (June 29, 2015), for consistency with the current policy and (2) publish for notice and comment a proposed rule rescinding or revising the rule, as appropriate and consistent with law. In connection with the proposed rule, the EPA and the Army Corps … shall consider interpreting the term "navigable waters," as defined in 33 U.S.C. 1362(7), in a manner consistent with the opinion of Justice Antonin Scalia in Rapanos v. United States, 547 U.S. 715 (2006).

On July 27, 2017, the EPA Administrator and the acting the Assistant Secretary of the Army for Civil Works proposed a rule to rescind the existing definition. Once the final rule is published, the current definition will be rescinded. A second step in rulemaking intends to return the legal definition of "waters of the United States" to the definition used before 2015.

The text of current rule under rulemaking to be rescinded is available at: https://www.federalregister.gov/documents/2015/06/29/2015-13435/clean-water-rule-definition-of-waters-of-the-united-states. The 2015 Rule recognizes three basic categories of jurisdiction for "waters of the United States": waters that are jurisdictional in all instances, waters that are excluded from jurisdiction, and a narrow category of waters subject to case-specific analysis to determine whether they are jurisdictional.

Under the 2015 definition, waters of the United States comprise:

1. All waters that are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters that are subject to the ebb and flow of the tide.
2. All interstate waters including interstate wetlands.
3. All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce including any such waters:
    (i) Which are or could be used by interstate or foreign travelers for recreational or other purposes
    (ii) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
    (iii) Which industries use or could use for interstate commerce.
4. All impoundments of waters otherwise defined as waters of the United States.
5. Tributaries of waters identified in paragraphs (s) (1) through (4) of this section.
6. The territorial sea.

Wetlands that are not waters of the United States include waste treatment systems and treatment ponds and lagoons. Waters of the United States also do not include converted cropland. A project proponent would conduct a Jurisdictional Determination (JD) to determine whether "waters of the United States" are within the project boundaries and whether the proposed action would impact these waters. The US Army Corps makes that final determination whether Section 404 Permits are required and whether Section 401 Certification is issued with additional mitigation required to have the project comply with the CWA. Within the WEMO planning area, the Mojave River is considered a "waters of the United States."

Executive Order 11990 Protection of Wetlands

Executive Order 11990 requires that federal agencies prohibit construction or management practices that would adversely affect wetlands, unless an agency finds either that no practical alternative exists or that a proposed action has considered all practical measures to minimize harm to the wetlands. EO 11990 directs all federal agencies to minimize the destruction, loss, or degradation of wetlands. The order also directs agencies to preserve and enhance the natural beneficial values of wetlands in the conduct of agency responsibilities for: (1) acquiring, managing, and disposing of federal lands and facilities; (2) providing federally undertaken, financed, or assisted construction and improvements; and (3) conducting federal activities and

programs affecting land use, including but not limited to water and related land resource planning, regulating, and licensing.

Executive Order 11988: Floodplain Management

EO 11988 requires federal agencies to avoid, to the extent possible, both long- and short- term adverse impacts from the occupancy and modification of floodplains, and to avoid both direct and indirect support of floodplain development wherever there is a practical alternative. This order states that "each agency shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities" for:

- Acquiring, managing, and disposing of federal lands and facilities.
- Providing federally undertaken, financed, or assisted construction and improvements.
- Conducting federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulation, and licensing activities.

The guidelines follow an eight-step process that agencies are to carry out as part of their decision-making on projects that could potentially impact a floodplain. The eight steps are:

1. Determine whether a proposed action is in the base floodplain (an area that has a 1% or greater chance of flooding in any given year).
2. Conduct early public review, with appropriate advance public notice.
3. Identify and evaluate practicable alternatives to locating in the base floodplain, including alternative sites outside the floodplain.
4. Identify impacts of the proposed action.
5. Develop measures to minimize impacts and to restore and preserve the floodplain, as appropriate, where impacts cannot be avoided.
6. Re-evaluate alternatives.
7. Present the findings and a public explanation.
8. Implement necessary actions.

The Federal Interagency Task Force on Floodplain Management has clarified requirements for development in floodplains and emphasized that agencies should select alternative sites for projects outside floodplains and, where practical, develop measures to mitigate unavoidable impacts.

Department of Interior and BLM Water Resource Management Policies

Federal policy defines wetlands as areas inundated or saturated by surface water or groundwater at a frequency or duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions. BLM Manual 1737, Riparian–Wetland Area Management, includes under this definition marshes, shallow swamps, lakeshores, bogs, muskegs, wet meadows, estuaries, and riparian areas (seeps and springs). The manual defines riparian areas as a form of

wetland transition between permanently saturated areas and upland areas. BLM's Riparian-Wetland Initiative for the 1990s established national goals and objectives for managing riparian and wetland resources on public lands. The overall objective was to restore riparian and wetland areas so that 75 percent or more were determined to be in Proper Functioning Condition (PFC). PFC is a qualitative method for assessing the condition of riparian-wetland areas. A PFC assessment considers in a consistent approach hydrology, vegetation, and processes and attributes of erosion and deposition of soils and sediments. BLM staff evaluate conditions of riparian areas using the Standards for Rangeland Health (see 43 CFR 4180.2) and PFC for riparian management as explained in BLM Technical Reference 1737-15 (Prichard 1998) and BLM Technical Reference 1737-16, revised edition (Prichard 2003).

State

California Constitution, Article X, Section 2

The California State Constitution, Article X, Section 2, states that water resources of the state be put to beneficial use to the fullest extent possible and prohibits water waste, unreasonable use, or unreasonable methods of use.

Porter–Cologne Water Quality Control Act, as Amended

The Porter–Cologne Water Quality Control Act protects the water quality and beneficial uses of "waters of the state" (California Water Code, Division 7, Section 13000 et seq.). Under the Act, waters of the state include "any surface or groundwater, including saline water, within boundaries of the state" (California Water Code, Division 7, Section 13050 [e]). All waters of the United States (federal waters) and all non-federal waters are also waters of the state.

The Porter Cologne Act authorizes the SWRCB and the state's nine RWQCBs to establish water quality standards and discharge prohibitions, issue waste discharge requirements, and implement provisions of the federal CWA.

The SWRCB and RWQCBs are the principal state agencies responsible for water quality. On behalf of the federal CWA, they jointly establish water quality standards, beneficial uses, water quality objectives for beneficial uses, best management practices (BMPs), an anti-degradation policy, and regulations for waste discharges to ensure compliance with water quality standards. Basin Plans prepared by the staffs of each RWQCB provide details of these elements.

Two RWQCBs, the Lahontan and Colorado River, have jurisdiction over parts of the WEMO planning area. The Lahontan RWQCB is further divided into north and south basins, of which the south basin covers the larger part of the planning area. BLM WEMO public lands are extensive in both regions. The Colorado River RWQCB has jurisdiction in the WEMO planning area over the BLM public lands approximately south of Barstow and east of Victorville. In 1985, the BLM California Desert District and the Colorado River RWQCB established a memorandum of understanding (Board Resolution 85-24) for collaborative work.

Water quality standards "consist of a designated use or uses for the Waters of the United States and water quality criteria for such waters based upon such uses. Water quality standards are to protect the public health or welfare, enhance the quality of water and serve the purposes of the CWA" (40 CFR 131.3[i]). Water quality standards developed for particular water segments are therefore location-specific as well. Designated uses in California fall under categories of "beneficial uses."

In 1987, the CWA was amended to include the National Pollutant Discharge Elimination System (NPDES). The RWQCBs have the authority to issue NPDES General Permits for construction project that have been authorized on public and private land within the WEMO planning area, currently and into the future. The NPDES permitting program manages waste discharges into Waters of the US and State.

California Water Code

The California Water Code stipulates that the primary interest of the people of the State of California is the conservation of all available water resources, and requires that the maximum re-use of reclaimed water offset potable resource use (Sections 451 and 13550 et seq.). The code divides California water rights into three categories: surface water, percolating groundwater, and subterranean streams that flow through known and definite channels (Section 1200). The code defines waters of the state (Section 13050) and requires RWQCBs to prepare Basin Plans that define water quality objectives for protecting beneficial uses of surface water and groundwater and provide comprehensive water quality planning (Sections 13240 through 13243). The code further includes many other provisions that (1) define reasonable and beneficial water uses; (2) set standards for well drilling; (3) require that water supplies for large new developments be demonstrated in advance; (4) require Storm Water Pollution Prevention plans; and (5) address other aspects of water resources, water rights, and water management.

Water Quality, Supply and Infrastructure Improvement Act

In 2014 the Water Quality, Supply and Infrastructure Improvement Act was signed into law. The Water Quality, Supply and Infrastructure Improvement Act institutes funding for integrated regional water management, water recycling, groundwater sustainability, and watershed protection and ecosystem restoration.

Groundwater Sustainability Act, CGC 65350.5

In September of 2014, Governor Brown signed three bills that together constitute the Sustainable Groundwater Management Act (SGMA). SGMA has defined sustainable groundwater management as the management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results. SGMA authorizes water management agencies and stakeholders collaborate in the formation of Groundwater Sustainability Agencies to prepare Groundwater Sustainability Plans, with public input, to achieve sustained groundwater yield. The Department of Water Resources publication *California's Groundwater, Bulletin 118, Interim Update 2016* has identified boundaries of groundwater basins, high- and medium-priority groundwater basins, and basins in critical conditions of overdraft. Sustainability Plans for groundwater basins that are both high- or medium-priority *and* in critical conditions of overdraft must be completed January 31, 2020. High- and medium-priority groundwater basins *not* in critical conditions of overdraft must have completed Sustainability Plans by January 31, 2022.

California Fish and Game Code, Sections 1600-1616, as Amended

The California Fish and Game Code states that all streams and lakes are subject to the Code (Section 1600 et seq.). The California Department of Fish and Wildlife (CDFW) is the agency

assigned to regulate activities that would divert or obstruct the natural flow or otherwise substantially change the bed, channel, or bank of any river, stream, or lake. The Code also covers deposit or disposal of debris, waste, or other material where it may pass into any river, stream, or lake that supports fish or wildlife (Fish and Game Code, Section 1602). CDFW also has jurisdiction over riparian habitats adjoining watercourses. Any proponent of a project either to substantially divert or to obstruct natural water flow; to substantially change the bed, channel, or bank of any river, stream, or lake; or to use materials from a streambed must formally notify CDFW before beginning the project (Section 1602). If CDFW determines that the project may adversely affect existing fish and wildlife resources, a Lake or Streambed Alteration Agreement is required.

California Fish and Game Code, Sections 5650-5656, as Amended

This part of the Code prohibits any substance from being deposited in, permitted to pass into, or placed where the substance that is deleterious to fish, plant life, mammals, or bird life (Section 5650) can pass into waters of the state. This section does not apply to a discharge or a release that is:

1. expressly authorized and in compliance with the terms and conditions of waste discharge requirements pursuant to Section 13263 of the Water Code;
2. a waiver issued pursuant to subdivision (a) of Section 13269 of the Water Code issued by the State Water Resources Control Board (SWRCB) or a RWQCB after a public hearing; or
3. is certified pursuant to and in compliance with, the terms and conditions of a federal permit that the SWRCB or a RWQCB has, after a public hearing, under Section 13160 of the Water Code.

The California Department of Fish and Wildlife (CDFW) makes a final determination of effects on waters of the state after a project proponent makes a preliminary jurisdictional evaluation. If the CDFW determines that an action would impact waters of the state and could substantially adversely affect an existing fish and wildlife resources, the agency then requires a Streambed Alteration Agreement to comply with Section 1602. A Streambed Alteration Agreement is required in the event that the CDFW determines the activity.

Executive Order W-59-93

Executive Order W-59-93, signed by Governor Wilson on August 23, 1993, established state policy guidelines, with two primary goals, for wetlands conservation: to ensure no overall net loss, and to achieve a long-term net gain in the quantity, quality, and permanence of wetland acreage in the state. Currently, in fulfillment of the executive order, the SWRCB is drafting the *State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State* (the "Procedures") (formerly called the *Wetland and Riparian Protection Policy*). However, the Lahontan Basin Plan has established a "no net loss" policy for its wetland acreage, function, and value, with concurrence of the SWRCB.

E.3.2.2 Regional and Background Information

Groundwater

The majority of groundwater resources in the planning area are associated with the floodplain aquifer along the Mojave River. Precipitation occurring at the headwaters of the Mojave River near Cajon Pass, as well as further south at San Gorgonio Pass, generates the surface water flow in the Mojave River. As it flows more than 150 kilometers (km) east to Afton Canyon, this surface water infiltrates, recharging groundwater in the hydraulically connected basins along the way (Izbicki and others 2007). The Mojave River Basin has been adjudicated and is managed by Mojave Water Agency (MWA). Ground water withdrawals from the basin greater than 10 acre-feet/year require a Base Production Water-Right issued by the MWA.

Throughout the rest of the planning area, groundwater is also found in unconsolidated alluvial fan deposits, although locally floodplain and lacustrine (lake) beach deposits may yield water to wells. The valleys and basins are generally internally drained, with water from precipitation within the basin recharging the alluvial fan deposits, and then ultimately discharging to the land surface and evaporating within the basin. Groundwater is generally under unconfined, or water table, conditions at the margins of the basins, but as the unconsolidated deposits become finer grained toward the centers of the basins, the water becomes confined.

Dating of the water in the Mojave River floodplain aquifer using tritium and carbon-14 methods indicates that the water is relatively recent. In contrast, groundwater in the regional aquifers in the surrounding mountain and canyons is more than 20,000 years old (Izbicki and Michel 2004), suggesting much lower recharge rates.

Although there are vast quantities of water within the groundwater basins, some of the water is of poor quality. The mineral quality of the groundwater within the WEMO Planning area varies greatly. The geologic setting of the basins directly affects the degree of groundwater mineralization. In general, basins near the source of recharge are less mineralized than those that are more distant.

Surface Water

Surface water is very scarce in the WEMO Planning area. Streams that originate high in the surrounding mountains to the west and south may have perennial flow in the higher altitudes; at the lower altitudes and throughout the planning area virtually no water exists in streambeds or riverbeds, except locally after infrequent, heavy cloudbursts. The playas may be covered by water from runoff for as long as two months a year. There are many locally important creeks, springs, and seeps, most of which are associated with the mountain areas.

Very short flow paths generally characterize small local flow systems, usually no more than a few miles in length. Springs connected to these systems are usually located in or near the mountains and have highly variable annual ranges in discharge that respond to the precipitation that year or a few years previous. Discharge waters have small concentrations of dissolved sodium plus potassium and chloride plus sulfate, large concentrations of tritium, and water temperatures that commonly approach average air temperatures. These characteristics imply that the groundwater that feeds the springs is relatively recent, being recharged within a span of less than 70 years.

In contrast, large local flow systems are characterized by inter-basin flow or flow confined to one basin with longer flow paths. Springs connected to these systems have moderate concentrations of

the major salts, no significant concentrations of tritium and water temperatures from 50 to 60 degrees Fahrenheit, suggesting a much longer residence time in the aquifer.

Surface water was and is the major transport agent of the rock material from the mountains to the alluvial fans to the valleys. The intense short duration storms result in rapid floodwaters that have enough energy to transport rock material both in the water column and along the beds of the arroyos. Longer duration storms with less intensity still have the energy to transport finer sediment materials. All ephemeral streams in the planning area have naturally high sediment concentrations. Flows from groundwater sources have low sediment concentrations unless runoff water is dominating the flow. Playa water usually has a high concentration of very fine sediment mixed into the column by wind action and varying salt concentrations that depend on the geology of the area.

Riparian Areas and Springs

In the Remedy Order associated with 2005 WEMO Final EIS, BLM was required to perform new PFC Assessments for all springs and seeps in the WEMO Planning area. As of April, 2016, BLM has completed a total of 162 PFC assessments in the planning area. Table E.3-2 describes those seeps, springs, wetlands and creeks that have been assessed for PFC between 2011 and 2016.

Table E.3-2. Springs and Seeps Assessed in 2011 through 2016

Subregion	Location	Finding
Ridgecrest Field Office		
Sierra Canyon	Glass Canyon	Proper Functioning Condition
Sierra Canyon	Morris Spring	Proper Functioning Condition
Sierra Canyon	Big Spring	Proper Functioning Condition
Sierra Canyon	Nine Mile Canyon	Functional at risk
Sierra Canyon	Unnamed Canyon	Proper Functioning Condition
Sierra Canyon	Grapevine #1	Proper Functioning Condition
Sierra Canyon	Powers Holding Corral Spring	Proper Functioning Condition
Sierra Canyon	Stone Cabin Spring	Proper Functioning Condition
Sierra Canyon	S. Fork Sand Canyon	Proper Functioning Condition
Sierra Canyon	Nine Mile #2	Functional at risk
Sierra Canyon	Short Canyon Riparian	Proper Functioning Condition
Sierra Canyon	5-Mile Canyon – Upper	Proper Functioning Condition
Sierra Canyon	5-Mile Canyon - Lower	Proper Functioning Condition
Sierra Canyon	Indian Wells Canyon	Proper Functioning Condition
Sierra Canyon	Lower Five Mile Canyon	Proper Functioning Condition
Sierra Canyon	Mid Indian Wells Canyon	Proper Functioning Condition
Sierra Canyon	S. Fork Grapevine Canyon	Proper Functioning Condition
Sierra Canyon	Coyote Spring	Proper Functioning Condition
Sierra Canyon	N. Fork Grapevine Canyon	Functional at risk
Sierra Canyon	Grapevine #2	Proper Functioning Condition

Table E.3-2. Springs and Seeps Assessed in 2011 through 2016

Subregion	Location	Finding
Sierra Canyon	Indian Wells#2	Proper Functioning Condition
Sierra Canyon	Grant Spring	Functioning at risk: Drought
Sierra Canyon	Olancha Creek	Non-functional
Sierra Canyon	Indian Springs	Proper Functioning Condition
Sierra Canyon	Sacatar Canyon	Proper Functioning Condition
Sierra Canyon	Rose Spring	* Functioning at risk: Drought
Sierra Canyon	Coyote Spring	Proper Functioning Condition
El Paso Mountains	Coffee Can Spring	Proper Functioning Condition
El Paso Mountains	Bob Spring	Proper Functioning Condition
El Paso Mountains	Shelley Spring	Non-functional
El Paso Mountains	La Moureaux Springs	Proper Functioning Condition
El Paso Mountains	Midway Spring	Proper Functioning Condition
El Paso Mountains	Unnamed	Proper Functioning Condition
El Paso Mountains	Louise Spring	Proper Functioning Condition
El Paso Mountains	Sheep Spring 2	Proper Functioning Condition
El Paso Mountains	Sheep Spring	Proper Functioning Condition
El Paso Mountains	Upper Goler Canyon Holland Springs	Proper Functioning Condition
El Paso Mountains	Sheep Spring	Proper Functioning Condition
El Paso Mountains	Louise Spring	Proper Functioning Condition
El Paso Mountains	Petroglyph Spring	Proper Functioning Condition
El Paso Mountains	Holland Spring	Proper Functioning Condition
El Paso Mountains	Holland Spring South	Functional-At-Risk: Salt Cedar
El Paso Mountains	Cut Tree Spring	Proper Functioning Condition
El Paso Mountains	Easter Spring	* Proper Functioning Condition
El Paso Mountains	Mesa Spring	* Proper Functioning Condition
El Paso Mountains	Poison Spring	*Proper Functioning Condition
El Paso Mountains	Mesquite Spring	*Functioning at risk: Drought
Jawbone	Hoffman Spring	Proper Functioning Condition
Jawbone	Cabin Creek	Proper Functioning Condition
Jawbone	Cortez Creek	Proper Functioning Condition
Jawbone	Nudist Spring	Proper Functioning Condition
Jawbone	Sage Canyon Creek	Functional At Risk: lack of recruitment due to grazing
Jawbone	Boulder Canyon Creek	Proper Functioning Condition
Jawbone	Sage Canyon Spring	Proper Functioning Condition
Jawbone	Willow Spring	Proper Functioning Condition
Red Mountain	**RM01 Cuddeback Alkali Well 1	Proper Functioning Condition
Red Mountain	**RM02 Cuddeback Alkali Well 2	Functioning at risk

Table E.3-2. Springs and Seeps Assessed in 2011 through 2016

Subregion	Location	Finding
Red Mountain	**RM3 Steam Well	Non-functional
Jawbone	North Kelso Spring	Proper Functioning Condition
Jawbone	Lower Butterbredt Cyn.	Proper Functioning Condition
Jawbone	Mohawk Buddy Mine Spring (Butterbredt Cyn)	Proper Functioning Condition
Jawbone	Burning Moscow Spring	Functional -At- Risk
Jawbone	Tanager Spring	Functional -At- Risk
Jawbone	Dove Spring Wash	Non-functional: OHV use
Jawbone	Unnamed Near Burning Moscow Spr	Proper Functioning Condition
Jawbone	Lower Dove Wash	Proper Functioning Condition
Jawbone	Rock Spring	Proper Functioning Condition
Jawbone	Williams Spring	Non-functional
Jawbone	Unnamed SW of Cowboy Spr.	Proper Functioning Condition
Jawbone	Upper Jawbone Canyon	Proper Functioning Condition
Jawbone	Kelso Creek	Proper Functioning Condition
Jawbone	See Line Spring	* Proper Functioning Condition
Jawbone	Public Spring	*Functional -At- Risk: Drought
Darwin	Black Spring	Functional -At- Risk: Upward
Darwin	Lower Centennial Spring	Non-functional
Darwin	China Garden Spring	* Proper Functioning Condition
Darwin	Miller's Spring	* Proper Functioning Condition
North Searles	North Benko	Proper Functioning Condition
North Searles	South Benko	Proper Functioning Condition
North Searles	Ruth Spring	Proper Functioning Condition
North Searles	Skull Spring	Proper Functioning Condition
North Searles	Christmas Spring	* Proper Functioning Condition
North Searles	Nadeau Spring	* Proper Functioning Condition
North Searles	Austin Spring	* Functional -At- Risk: Burned in 2016
North Searles	Wilson Spring	* Proper Functioning Condition
North Searles	Cabin Spring	Proper Functioning Condition
Barstow Field Office		
Juniper Flats	*Furnace Spring	*Non-functional: Stop ongoing disturbance. 99% of the water captured in a pipeline system and is unavailable to wildlife.
Juniper Flats	Stone Spring	Proper Functioning Condition.
Juniper Flats	*TV Creek aka Veggie Burrito Spring	Proper Functioning Condition.
Juniper Flats	Arrastre Creek (VP Mine Reach)	Proper Functioning Condition.
Juniper Flats	Arrastre Creek (Tahiti Falls Reach)	Functioning at risk: Rip-rap needed.

Table E.3-2. Springs and Seeps Assessed in 2011 through 2016

Subregion	Location	Finding
Juniper Flats	Cottonwood Creek	Proper Functioning Condition.
Juniper Flats	Round Mountain Spring	Functioning at risk, stable: De-watering due to development.
Juniper Flats	*Greenwalt #1	*Functioning at risk, stable: Water diverted to private land.
Juniper Flats	*Dry Willow Seep	*Functioning at risk: Drought
Afton Canyon	Afton Canyon	Functioning at risk: Channelization.
Ord Mountain	**Aztec Spring (Man-made)*	Proper Functioning Condition
Ord Mountain	**Goat Spring (Man-made)*	Proper Functioning Condition
Ord Mountain	Lower Sweetwater Spring	Proper Functioning Condition
Rattlesnake Canyon	Willow Spring	Proper Functioning Condition
Rattlesnake Canyon	Vaughan Spring	Proper Functioning Condition
Rattlesnake Canyon	Unknown Spring (Section 22)	Proper Functioning Condition.
Rattlesnake Canyon	Rock Corral	Functioning at risk: Water diverted.
Rattlesnake Canyon	Dove Spring	Proper Functioning Condition
Rattlesnake Canyon	Two Hole Spring	Functioning at risk: Water diverted.
Rattlesnake Canyon	Rattlesnake Spring	Functioning at risk: Water diverted.
Rattlesnake Canyon	Mound Spring	Functioning at risk: Water diverted.
Rattlesnake Canyon	Kynna Spring	Nonfunctional; Needs to be located & re-assessed.
Rattlesnake Canyon	*Bobcat Scat Spring	*Functioning at risk: Drought
Stoddard Valley	*SV2630 (Seep) aka Johnson Road Seep	*Non-Functional. Need to close or re-engineer to prevent on-going impacts to the wetland!
Black Mountain	*Opal Spring	*Non-Functional: Needs to be re-develop to increase & enhance sustainability.
Cronese Lake	*Jack Spring	*Proper Functioning Condition.
Morongo Valley	Sherman Shady Spring	Functioning at risk: Land ownership & earth moving activities.
Rattlesnake Canyon	Bighorn Mountain Cherry Stem Spring	Functioning at risk: Grazing, camping and road encroachment.
Rattlesnake Canyon	Burns Spring	Functioning at risk: Road encroachment causing bifurcation of the spring.
Rattlesnake Canyon	Upper Rattle Spring	Non-Functional: Road encroachment & grazing
Rattlesnake Canyon	Seep Complex adjacent to One-Hole Bighorn Seep	Functional -At- Risk: Grazing, need exclusion fence.
Juniper Flats	Lower White Knob #1	Functioning at risk: Salt cedar.
Juniper Flats	Lower White Knob #2	Proper Functioning Condition
Juniper Flats	White Knob Tailings Spring	Proper Functioning Condition

Table E.3-2. Springs and Seeps Assessed in 2011 through 2016

Subregion	Location	Finding
Juniper Flats	White Knob 71A	Proper Functioning Condition
Juniper Flats	High Road Spring	Proper Functioning Condition
Juniper Flats	White Knob Milepost 61 West Spring	Proper Functioning Condition
Juniper Flats	BLM Silver Creek Spring	Functioning at risk: Road encroachment, water diversion
Stoddard Valley	Quail Spring	Proper Functioning Condition
Stoddard Valley	*Horse Spring	*Proper Functioning Condition
Stoddard Valley	*Horse Spring Southeast	*Functioning at risk: Stable
Stoddard Valley	Amaral Spring*	Proper Functioning Condition
Coolgardie	BAR14-01 Paradise Spring NW	Functioning at risk: Upward trend
Coolgardie	BAR14-02 Paradise Spring East	Functioning at risk: Upward trend
Coolgardie	BAR14-03 Paradise Spring Central	Functioning at risk: Stable
Calico Mountain	*BAR14-04 Sweetwater Spring (Non-Ord Mtn. source)	*Proper Functioning Condition
Coolgardie	*Deep Cave Spring	*Functioning at risk: Development
Coolgardie	**BAR14-05 Lane Well	Functioning at risk: Salt cedar
Coolgardie	**BAR14-06 Noble Well	Nonfunctional: Collapsed well
Coolgardie	**BAR14-07 Williams Well	Nonfunctional: Public hazard
Coolgardie	**BAR14-08 Unknown Well (trespass facility)	Functioning at risk: Stable
Stoddard Valley	BAR14-09 RZ Spring	Proper Functioning Condition
Stoddard Valley	BAR14-10 Stoddard Mtn. Spring	Proper Functioning Condition
Ord Mountain	BAR14-11Upper Sweet Water West	Proper Functioning Condition
Ord Mountain	BAR14-12 Upper Sweet Water East	Functioning at risk: Stable
Ord Mountain	*Willow Spring	*Functioning at risk: Stable
Ord Mountain	*Badger Spring (2002)	Functioning at risk: Stable
Ord Mountain	Fisher Spring	Functioning at risk: Stable
Rattlesnake Canyon	BAR14-13 One Hole Spring	Proper Functioning Condition
Rattlesnake Canyon	BAR14-14 Hidden Spring	Proper Functioning Condition
Rattlesnake Canyon	BAR14-15 Lower Rattle Spring	Private Land Functioning at risk: Road encroachment & grazing
Juniper Flats	BAR14-16 Andes Trail Spring	Proper Functioning Condition
Juniper Flats	BAR14-17 Lower Arrastre Creek	Proper Functioning Condition
Juniper Flats	*BAR14-18 Coxey Road North Seep aka 4600-ft. Spring	*Proper Functioning Condition
Juniper Flats	BAR14-19 Vine Spring	Proper Functioning Condition
Wonder Valley	BAR15-01 Mesquite Spring	Functioning at risk: Downward Trend
Needles South	BAR15-02 Bagdad Chase Mine Spring	Non-Functional (Drought)

Table E.3-2. Springs and Seeps Assessed in 2011 through 2016

Subregion	Location	Finding
Juniper Flats	BAR15-03 West Grapevine Cyn. Spring (Lovelace Cyn.)	Proper Functioning Condition
Stoddard Valley	BAR15-04 Milpas Dr. Spring	Functioning at risk: Water diverted.
Newberry-Rodman	*BAR15-05 Kane Spring	*Functioning at risk: Stable
Newberry-Rodman	BAR15-06 Sheep Spring	Proper Functioning Condition
Morongo Valley	BAR15-07 Pipes Canyon Preserve Springs	Functioning at risk: Stable
Calico Mountains	BAR16-01 Coyote Spring	Proper Functioning Condition
Morongo Valley	BAR16-02 Royal Spring	Proper Functioning Condition
Morongo Valley	BAR16-03 Little Morongo Spring	Proper Functioning Condition
Juniper Flats	BAR16-04 Grapevine Canyon	Proper Functioning Condition

* Zadon PFC Data
** Man-made Source

In addition to the 162 PFC assessments listed above in Table E.3-2, BLM conducted PFC assessments while conducting Rangeland Health Assessments on grazing allotments in preparation of grazing permit/lease renewals. Table E.3-3 summarizes the assessments that were conducted between 1999 and 2010.

Table E.3-3. PFC Assessments Conducted on Grazing Allotments

Subregion	Location	Findings
Ord Mountain	Lower Sweetwater Spring	Functioning at risk: Upward trend
Ord Mountain	Willow Spring	Functioning at risk: Upward trend
Newberry-Rodman	Kane Spring	Functioning at risk: Upward trend
Ord Mountain	Badger Spring	Non-functional: Unable to locate source
Rattlesnake Canyon	Vaughn Spring	Proper Functioning Condition
Rattlesnake Canyon	Lower Rattle Spring	Non-functional: Road encroachment & grazing
Rattlesnake Canyon	Mound Spring	Proper Functioning Condition
Rattlesnake Canyon	One Hole Spring	Functioning at risk: Upward trend
Rattlesnake Canyon	Two Hole Spring	Proper Functioning Condition
Rattlesnake Canyon	Rattlesnake Spring	Proper Functioning Condition
Rattlesnake Canyon	Dove Spring	Proper Functioning Condition
Rattlesnake Canyon	Willow Spring	Proper Functioning Condition
Rattlesnake Canyon	Viscera Spring (SBNF)	Functioning at risk: Upward trend
Juniper Flats	Cottonwood Creek	Proper Functioning Condition
Juniper Flats	Round Mountain Spring	Functioning at risk, stable: De-watering due to development.

Table E.3-3. PFC Assessments Conducted on Grazing Allotments

Subregion	Location	Findings
Juniper Flats	Stone Spring	Proper Functioning Condition
El Paso Mountains	Louise Spring	Proper Functioning Condition
El Paso Mountains	Sheep Spring 2	Proper Functioning Condition
El Paso Mountains	Sheep Spring	Proper Functioning Condition
El Paso Mountains	Cut Tree Spring	* Proper Functioning Condition
El Paso Mountains	Easter Spring	* Proper Functioning Condition
El Paso Mountains	Mesa Spring	* Proper Functioning Condition
El Paso Mountains	Poison Spring	* Proper Functioning Condition
El Paso Mountains	Mesquite Spring	* Functioning at risk: Drought
Jawbone	Cortez Spring	Proper Functioning Condition
Jawbone	Sage Canyon Creek	Functioning at risk
Jawbone	Nudist Spring	Proper Functioning Condition
Jawbone	Boulder Canyon Creek	Proper Functioning Condition
Jawbone	Sage Canyon Spring	Proper Functioning Condition
Jawbone	Nicoll Spring	Proper Functioning Condition
Jawbone	Willow Spring	Proper Functioning Condition
Jawbone	Burning Moscow Spring	Functioning at risk
Jawbone	Tanager Spring	Functioning at risk
Jawbone	Dove Spring Wash	Non-functional
Jawbone	Upper Jawbone Canyon	Proper Functioning Condition
Jawbone	Kelso Creek	Functioning at risk
Jawbone	Lower Dove Wash	Functioning at risk
Jawbone	Alphie Canyon	Non-functional
Jawbone	Rock Spring	Proper Functioning Condition
Jawbone	Unnamed Near Burning Moscow Spring	Proper Functioning Condition
Jawbone	Lower Butterbredt Canyon	Proper Functioning Condition
Jawbone	Mohawk Buddy Mine Spring	Functioning at risk
Jawbone	Butterbredt Spring	Proper Functioning Condition
Jawbone	Upper Shoemacher Spring	Functioning at risk
Jawbone	Williams Spring	Functioning at risk
Jawbone	Unnamed Southwest of Cowboy Spring	Proper Functioning Condition
Jawbone	Hoffman Well	** Non-functional
Jawbone	See Line Spring	* Proper Functioning Condition

Table E.3-3. PFC Assessments Conducted on Grazing Allotments

Subregion	Location	Findings
Darwin	Black Spring	Functioning at risk: Upward
Darwin	Lower Centennial Spring	Non-functional
Sierra Canyon	Grant Spring	*Functioning at risk: Drought
Sierra Canyon	Rose Spring	*Functioning at risk: Drought

Surface Water Quality

Surface water quality impacts associated with the transportation management system can occur in two primary ways:

- Releases of petroleum fuels from OHVs; and
- Increased sedimentation and erosion due to soil disturbance.

Any use of OHVs on the transportation network can potentially lead to releases of fuels used to power the vehicles. These releases can potentially occur at any location on the network due to vehicle accidents. However, any such releases are expected to be small in volume. Also, given the scarcity of surface water within the planning area, the potential for these releases to enter surface water bodies or otherwise affect sensitive receptors is low. The only exception may be associated with auxiliary fuel tanks used at organized events or remote locations. Some OHV users may carry additional fuel volume in separate tanks in order to re-fuel their vehicles without having to return to developed areas. In such cases, the potential volume of fuel that could be released would be higher, up to 100 or more gallons. The potential for releases from auxiliary fuel tanks to impact sensitive resources would be directly related to the proximity of the release to those resources.

In the impact analysis in Chapter 4, routes identified as having potential for water quality impacts due to erosion and sedimentation are those which are parallel to, or located within, desert washes. The analysis in Chapter 4 identifies the mileage of routes associated with washes for each of the four alternatives.

E.4 Biological Resources

E.4.1 Vegetation

E.4.1.1 Regulatory Framework

Federal

Executive Order 13112 – Invasive Species

Executive Order 13112 was signed in February 1999 and established the National Invasive Species Council. This Order requires agencies to identify actions that may affect the status of invasive species. It also directs federal agencies not to authorize, fund, or carry out actions that they believe are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere unless, pursuant to guidelines that the agency has prescribed, it has determined and

made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species; and that all feasible and prudent measures to minimize risk of harm will be taken in conjunction with the actions.

Plant Protection Act of 2000

The Plant Protection Act of 2000 (7 USC Ch. 104) established a federal program to control the spread of noxious weeds. The Secretary of Agriculture is authorized to publish a list of plants designated as noxious weeds (7 USC §7712(f)). The movement of all such weeds in interstate or foreign commerce is prohibited except under permit.

Lacey Act, as amended

The Lacey Act (16 USC §§3371-3378) protects plants and wildlife by creating civil and criminal penalties for a wide variety of violations including illegal take, possession, transport or sale of protected species.

Federal Endangered Species Act

The FESA (16 USC §1531 et seq.) designates threatened and endangered species, both animal and plant species, and provides measures for their protection and recovery. "Take" of listed wildlife, and of listed plant species located on federal land, is prohibited without obtaining a federal permit. Take is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." Harm includes any act that actually kills or injures fish or wildlife, including significant habitat modification or degradation that significantly impairs essential behavioral patterns of fish or wildlife. Activities that damage the habitat of (i.e., harm) listed wildlife species require approval from the USFWS for terrestrial species. The FESA also generally requires determination of critical habitat for listed species. If critical habitat has been designated, impacts to areas that contain the primary constituent elements identified for the species, whether or not it is currently present, is also prohibited. FESA §7 and §10 provide two pathways for obtaining authority to take listed species.

For projects proposed on federal lands, federal agencies, such as the BLM are required by the FESA to ensure that any action they authorize, implement, or fund, including energy developments, will not jeopardize the continued existence of any federally threatened or endangered species or destroy or adversely modify designated critical habitat. In a §7 consultation, the lead agency (e.g., BLM) prepares a BA that analyzes whether the project is likely to adversely affect listed wildlife or plant species or their critical habitat, and proposes suitable avoidance, minimization, or compensatory mitigation measures. If the action may adversely affect the species, the USFWS then has 135 days to respond to the BA by issuing its BO determining whether the project is likely to jeopardize the species or result in adverse modification of critical habitat.

If a "nonjeopardy" or "no adverse modification" opinion is provided by the USFWS, the action agency may proceed with the action as proposed. If a jeopardy or adverse modification opinion is provided, the USFWS may prepare a BO with reasonable and prudent measures to minimize take and associated, mandatory terms and conditions that describe the methods for accomplishing the reasonable and prudent measures. In a BO that results in a jeopardy or adverse modification

conclusion, the USFWS may develop mandatory reasonable and prudent alternatives to the proposed action.

BLM Sensitive Species

BLM Sensitive Species are species designated by the State Director that are not already federally listed, proposed, or candidate species, or state listed because of potential endangerment. BLM's policy is to "ensure that actions authorized, funded, or carried out do not contribute to the need to list any of these species as threatened or endangered." Various offices of the BLM maintain a list of special-status plant and wildlife species that are to be considered as part of the management activities carried out by the BLM on the lands that they administer.

California Desert Conservation Area Plan, 1980 as Amended

The CDCA Plan guides the management of all BLM-administered lands in the Mojave, Sonoran, and a small portion of the Great Basin Deserts. In total, the CDCA Plan includes an area of approximately 25 million acres, 12 million of which are public lands. The primary goal of the CDCA Plan is to provide guidance for the overall maintenance of the land while simultaneously planning for multiple uses and balancing the human needs with the need to protect the natural environment.

The CDCA Plan includes 12 elements: Cultural Resources; Native American; Wildlife; Vegetation; Wilderness; Wild Horse and Burro; Livestock Grazing; Recreation; Motorized Vehicle Access; Geology, Energy and Mineral Resources; Energy Production and Utility Corridors; and Land-Tenure Adjustment. Each of the elements contains goals and specific actions for the management, use, development, and protection of the resources and public lands within the CDCA, and is based on the concepts of multiple use, sustained yield, and maintenance of environmental quality. In addition, each element provides both a desert-wide perspective of the planning decisions for one major resource or issue of public concern as well as more specific interpretation of multiple-use class guidelines for a given resource and its associated activities.

California Desert Renewable Energy Conservation Plan

BLM issued the DRECP in October, 2016. The DRECP amends the CDCA Plan, specifically with respect to natural resource conservation and renewable energy development. The DRECP establishes Ecological and Cultural Conservation and Recreation Designations, and Renewable Energy Activities, Policies, and Allocations.

Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (16 USC §§661-666) applies to any federal project where the waters of any stream or other body of water are impounded, diverted, deepened, or otherwise modified. Project proponents are required to consult with the USFWS and the appropriate state wildlife agency. These agencies prepare reports and recommendations that document project effects on wildlife and identify measures that may be adopted to prevent loss or damage to wildlife resources. The term "wildlife" includes both animals and plants. Provisions of the Act are implemented through the NEPA process and §404 permit process.

Clean Water Act (33 U.S.C. § 1251 et seq.)

The Clean Water Act (CWA) is the principal federal statute protecting navigable waters and adjoining shorelines from pollution. The Clean Water Act is administered by the EPA and the United States Army Corps of Engineers (USACE). The USACE is responsible for regulating the discharge of fill material into waters of the United States. Waters of the United States include lakes, rivers, streams and their tributaries, as well as wetlands. Since its enactment, the CWA prohibits the discharge of pollutants into waters of the United States without a permit. Section 404 of the CWA provides that whenever any person discharges dredged or clean fill material into Waters of the United States including, without limitation, wetlands, streams, and bays (e.g., while undertaking road construction, bridge construction, or streambed alteration), a permit is required from the USACE. Through field reconnaissance surveys and analyses of National Wetlands Inventory (NWI) and watershed data, it is unlikely that there are any jurisdictional waters of the United States.

State

California Endangered Species Act

The CESA includes provisions for the protection and management of species listed by the State as endangered or threatened, or designated as candidates for such listings. CESA includes a requirement for consultation "to ensure that any action authorized by a state lead agency is not likely to jeopardize the continued existence of any endangered or threatened species… or result in the destruction or adverse modification of habitat essential to the continued existence of the species" (§ 2090). Plants of California declared to be endangered, threatened, or rare are listed at 14 California Code of Regulations (CCR) § 670.2. Animals of California declared to be endangered, threatened, or rare are listed at 14 CCR § 670.5. The administering agency for the above authority is the CDFW.

California Fish and Game Code Section 3503, 3511, 4700, 5050, and 5515

These California Fish and Game Code (FGC) sections list bird (primarily raptor), mammal, amphibian, and reptile species that are classified as fully protected in California. Fully protected species are prohibited from being taken or possessed except under specific permit requirements. These Codes also prohibit the take, possession, or needless destruction of the nests or eggs of any bird, including birds of prey or their nests or eggs, except as otherwise provided by the code or any regulation made pursuant thereto.

California Desert Native Plants Act

The California Desert Native Plants Act protects certain species of California desert native plants from unlawful harvesting on both public and privately owned lands. The law applies in the counties of Imperial, Inyo, Kern, Los Angeles, Mono, Riverside, San Bernardino, and San Diego. Within these counties, the CDNPA prohibits the cutting, removal, sale, or possession of specific native desert plants unless a person has a valid permit or wood receipt, and the required tags and seals. The appropriate permits, tags and seals must be obtained from the sheriff or commissioner of the county where collecting will occur, and the county will charge a fee.

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act provides State coordination with the CWA, which is described above. It provides a mechanism by which the Regional Water Quality Control Boards certify that federal actions that result in a discharge to waters, including federally issued CWA permits to ensure the compatibility of federal and State water quality guidelines, are in compliance with Section 401 of the CWA, which requires such federal actions to comply with state water quality standards. The act provides for the development and periodic review of water quality control plans (basin plans) that designate beneficial uses of California's major rivers and groundwater basins and establish narrative and numerical water quality objectives for those waters. Basin plans are primarily implemented by using the National Pollution Discharge Elimination System permitting system to regulate waste discharges to ensure that water quality objectives are met. Waste discharges may include fill, any material resulting from human activity, or any other "discharge" that may directly or indirectly impact Waters of the State relative to the implementation of Section 401 of the CWA. Waters regulated under Porter-Cologne include isolated waters that are no longer regulated by USACE. Developments which impact jurisdictional waters must demonstrate compliance with the goals of the Act by developing SWPPPs, Standard Urban Storm Water Mitigation Plans, and other measures in order to obtain a CWA §401 certification.

E.4.1.2 Regional and Background Information

Alkali Mariposa Lily *(Calochortus striatus)*

Background information for this species would not change from the previous analysis included in the affected environment of the 2005 WEMO Final EIS (BLM 2005). For a general discussion of this species, please refer to Section 3.3.8.1, pp. 3-184 to 3-185 of the 2005 WEMO Final EIS. The supplemental information presented below is based on the species accounts prepared for the March 2012 draft DRECP baseline biology report (Dudek and ICF International 2012) and recent BLM data.

Life History

Alkali mariposa lily grows in seasonally moist alkaline habitats with calcareous sandy soil within Mojavean desert scrub communities (Dudek and ICF International 2012). This species prefers claypans and sand dunes, especially along drainages, in halophytic (associated with saline soils) saltbush scrub (Dudek and ICF International 2012). It has been reported that periodic natural inundation is important to alkali mariposa lily, however, alkali mariposa lily has been reported as absent from areas with surface salts or areas with permanent standing surface water (Dudek and ICF International 2012). This species ranges in elevation from 224 to 5,240 feet (Dudek and ICF International 2012).

Some associated species include saltgrass (*Distichlis spicata*), rushes (*Juncus* spp.), sedges (*Carex* spp.), beardgrass (*Polypogon* sp.), dock (*Rumex* sp.), alkali sacaton (*Sporobolus airoides*), beardless wildrye (*Elymus triticoides*), dwarf checkerbloom (*Sidalcea malviflora*), rabbitbrush (*Chrysothamnus* sp.), Baltic rush (*Juncus balticus*), and yellow sweetclover (*Melilotus indicus*) (Dudek and ICF International 2012).

Regulatory Status

The regulatory status for the alkali mariposa lily has been updated from the 2005 WEMO Final EIS (BLM 2005) to eliminate the California Species of Special Concern status (as described in Section 3.3.8.1, pg. 3-185 of the 2005 WEMO Final EIS) and add a BLM sensitive designation.

Alkali mariposa lily is not federally or state listed, but is a BLM sensitive species. This species is also a CRPR 1B.2 species. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .2 are "seriously threatened in California, with 20% to 80% of occurrences threatened/moderate degree and immediacy of threat" (CNPS 2011). The alkali mariposa lily has a California Heritage Element Ranking of S2, indicating that it is "imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province" (CDFW 2012b).

Threats

The greatest threat to alkali mariposa lily is the lowering of water tables through hydrological alterations and water diversions, which alters the seasonally moist alkaline habitat that this species requires. Other threats include urbanization, grazing, trampling, road construction, dumping, and military operations (NatureServe 2011).

Big Bear Valley woollypod (*Astragalus leucolobus*)

This species was not analyzed previously in the 2005 WEMO Final EIS (BLM 2005) nor was it discussed in the March 2012 draft DRECP baseline biology report (Dudek and ICF International 2012). This species is being added as a result of a review of the current CNDB data base.

Life History

The Big Bear Valley woollypod is a perennial herb which is endemic (limited) to California (CalFlora 2017). It occurs within Inyo, Kern, Los Angeles, Riverside, San Bernardino, San Benito, San Diego, and Ventura counties (CNPS 2017). This species generally blooms from May through July (CNPS 2017). This species often occurs in rocky areas associated with the following habitat types: lower montane coniferous forest, pebble (pavement) plain, pinyon and juniper woodland, and upper montane coniferous forest (CNPS 2017). This species ranges in elevation from 1100 to 2885 meters (CNPS 2017). Known from about 35 extant occurrences and about 3500 individuals (NatureServe 2017).

Regulatory Status

The Big Bear Valley woollypod is not federally or state listed, but is a BLM sensitive species.

This species is also a CRPR 1B.2 species. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .2 are "fairly threatened in California with 20-80% occurrences threatened/moderate degree and immediacy of threat" (CNPS 2011). The Big Bear Valley woollypod has a California Heritage Element Ranking of S2, indicating that it is "imperiled in the state because of rarity due to very

restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province" (CDFW 2012b).

Threats

The Big Bear Valley woollypod is threatened by development, recreational activities, and vehicles (CNPS 2017).

Barstow Woolly Sunflower *(Eriophyllum mohavense)*

The information from the 2005 WEMO Final EIS (BLM 2005) (Section 3.3.8.2, pp. 3-185) is supplemented by the following updated information from the DRECP Baseline Biology Report (March 2012).

Life History

Barstow woolly sunflower is in the aster family (Asteraceae) (Jepson Flora Project 2011). It is an annual herb standing approximately 1 to 2.5 centimeters (0.4 to 1 inch) in height that blooms from March to April or May, then goes to fruit in May (CNPS 2011; Jepson Flora Project 2011; NatureServe 2011). Plants tend to be clumped together. As an annual, germination and establishment of this species depends on the amount and timing of winter and spring rains. There is no information available regarding pollinators, seed dispersal, seed germination, or seedling establishment.

Barstow woolly sunflower prefers sandy or rocky areas within chenopod scrub, Mojavean desert scrub, creosote bush scrub, and also occurs on playas (NatureServe 2011; CNPS 2011; Jepson Flora Project 2011). This species prefers bare areas with little soil that frequently contain a shallow subsurface caliche layer (BLM 2005).

Regulatory Status

Barstow woolly sunflower is not federally or state listed, but is a BLM sensitive species. Barstow woolly sunflower has a CRPR of 1B.2. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .2 are "seriously threatened in California, with 20% to 80% of occurrences threatened/moderate degree and immediacy of threat" (CNPS 2011). The Barstow woolly sunflower has a California Heritage Element Ranking of S2, indicating that it is "imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province" (CDFW 2012b).

Threats

Threats to Barstow woolly sunflower include energy and subdivision development, sheep grazing, off-road vehicle use, highway and road improvements and building, mining, dumping, and pipeline construction (NatureServe 2011; CNPS 2011). Of these threats, those of primary concern include energy development, sheep grazing, off-road vehicles, and highway improvements (NatureServe 2011). According to NatureServe (2010), several Barstow woolly sunflower sites may be

extirpated, but their status has not been reported to the CNDDB. Currently, only one CNDDB occurrence is recorded as possibly extirpated (CDFW 2012b).

California alkali grass (*Puccinellia simplex*)

This species was not analyzed previously in the 2005 WEMO Final EIS (BLM 2005) nor was it discussed in the March 2012 draft DRECP baseline biology report (Dudek and ICF International 2012). This species is being added as a result of a review of the current CNDB data base.

Life History

The California alkali grass is an annual herb which is endemic (limited) to California (CalFlora 2017). It occurs within Alameda, Butte, Contra Costa, Colusa, Fresno, Glenn, Kings, Kern, Lake, Los Angeles, Madera, Merced, Napa, San Bernardino, Santa Clara, Santa Cruz, San Luis Obispo, Solano, Stanislaus, Tulare, and Yolo counties (CNPS 2017). This species generally blooms March through May (CNPS 2017). This species occurs in alkaline, vernally mesic sinks, flats, and lake margins associated with the following habitat types: chenopod scrub, meadows and seeps, valley and foothill grassland, and vernal pools (CNPS 2017). This species ranges in elevation from 2 to 930 meters (CNPS 2017).

Regulatory Status

The California alkali grass is not federally or state listed, but is a BLM sensitive species. This species is also a CRPR 1B.2 species. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .2 are "fairly threatened in California with 20-80% occurrences threatened/moderate degree and immediacy of threat" (CNPS 2011). The California alkali grass has a California Heritage Element Ranking of S2, indicating that it is "imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province" (CDFW 2012b).

Threats

The California alkali grass is threatened by hydrological alterations, urbanization, agricultural conversion, development, and habitat fragmentation, disturbance, alteration, and loss; resulting in extirpation of some occurrences (CNPS 2017). This species is also possibly threatened by solar energy development, grazing and proximity to roads (CNPS 2017).

Chaparral sand-verbena (*Abronia villosa* var. *aurita*)

This species was not analyzed previously in the 2005 WEMO Final EIS (BLM 2005) nor was it discussed in the March 2012 draft DRECP baseline biology report (Dudek and ICF International 2012). This species is being added as a result of a review of the current CNDB data base.

Life History

The chaparral sand-verbena is an annual herb which is not endemic (limited) to California (CalFlora 2017). It occurs within Imperial, Los Angeles, Orange, Riverside, San Bernardino, San Diego, and Ventura counties in California as well as in Arizona and Baja California (CNPS 2017). This species generally blooms from March through September (CNPS 2017), with some blooming as early as January. This species occurs in sandy areas associated with the following habitat types: chaparral, coastal scrub, and desert dunes. (CNPS 2017). This species ranges in elevation from 75 to 1600 meters (CNPS 2017). Known from around 80 occurrences in California (NatureServe 2017).

Regulatory Status

The chaparral sand-verbena is not federally or state listed, but is a BLM sensitive species.

This species is also a CRPR 1B.1 species. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .1 are "seriously threatened in California with over 80% of occurrences threatened/high degree and immediacy of threat" (CNPS 2011). The chaparral sand-verbena has a California Heritage Element Ranking of S2, indicating that it is "imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province" (CDFW 2012b).

Threats

The chaparral sand-verbena is threatened by non-native plants, alteration of fire regimes, road maintenance, flood control activities, vehicles, and development (CNPS 2017).

Charlotte's Phacelia *(Phacelia nashiana)*

The information from the 2005 WEMO Final EIS (BLM 2005) (Section 3.3.8.4, pp. 3-186 and 3-187) is supplemented by the following updated information from the DRECP Baseline Biology Report (March 2012).

Life History

Charlotte's phacelia is an annual herb in the borage or waterleaf family (Boraginaceae) that is endemic to California. Charlotte's phacelia is typically 3 to 18 centimeters (1.2 to 7.1 inches) tall (Jepson Flora Project 2011). Flowering periods have been variously reported between March and June and Charlotte's phacelia can be found in flower by late March at lower elevations (White 2006a; CCH 2011). However, specimens collected by Chester, Kay, and Madore from Borrego Palm Canyon were also flowering in February (CCH 2011).

Some *Phacelia* species, such as Parry's phacelia, are fire-adapted, but it is unknown whether Charlotte's phacelia has any similar adaptation trigger. The habitats occupied by Charlotte's phacelia are frequently open and sparse, and the elevation ranges are higher than other *Phacelia* species, which could suggest that a similar, fire-adapted lineage is not likely (White 2006a). Pollination vectors and seed dispersal remain unknown for the species. Population data collected in

a few known locations over time appear to fluctuate widely (CDFW 2012b), and hydrology could be key in both distribution and population size.

Regulatory Status

Charlotte's phacelia is not federally or state listed, but is a BLM sensitive species. Charlotte's phacelia has a CRPR of 1B.2. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .2 are "seriously threatened in California, with 20% to 80% of occurrences threatened/moderate degree and immediacy of threat" (CNPS 2011). The Barstow woolly sunflower has a California Heritage Element Ranking of S2, indicating that it is "imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province" (CDFW 2012b).

Threats

Impacts to Charlotte's phacelia from grazing and off-road vehicles are the most frequently noted threats in the CNDDB records (CDFW 2012b). Trampling and collecting by hikers were also listed as threats to populations that occur along trails and within parks and recreational areas. Mining activities were noted as threats in a few locations, and activities and/or expansion of facilities at China Lake Naval Air Weapons Center could also pose a threat to populations near Volcano Peak outside of the planning area and Indian Wells within the planning area.

Chimney Creek nemacladus (*Nemacladus calcaratus*)

This species was not analyzed previously in the 2005 WEMO Final EIS (BLM 2005) nor was it discussed in the March 2012 draft DRECP baseline biology report (Dudek and ICF International 2012). This species is being added as a result of a review of the current CNDB data base.

Life History

The Chimney Creek nemacladus is an annual herb which is endemic (limited) to California (CalFlora 2017). It occurs within Inyo, and Tulare counties (CNPS 2017). This species generally blooms May through June (CNPS 2017). This species occurs in granitic flats associated with the following habitat types: pinyon and juniper woodland (CNPS 2017). This species ranges in elevation from 1900 to 2100 meters (CNPS 2017). This species is thus far known only from three specimens found in the Chimney Creek area in Tulare County at the southern end of the Pacific Crest (NatureServe 2017).

Regulatory Status

The Chimney Creek nemacladus is not federally or state listed, but is a BLM sensitive species. This species is also a CRPR 1B.2 species. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .2 are "fairly threatened in California with 20-80% occurrences threatened/moderate degree and immediacy of threat" (CNPS 2011). The Chimney Creek nemacladus has a California Heritage Element Ranking of S1, indicating that it is "critically imperiled in the state because of extreme

rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province" (CDFW 2012b).

Threats

The Chimney Creek nemacladus is possibly threatened by foot traffic and grazing (CNPS 2017).

Clokey's Cryptantha *(Cryptantha clokeyi)*

Life History

Clokey's cryptantha is an annual herb in the borage or waterleaf family (Boraginaceae) that is endemic to California. Clokey's cryptantha is typically 8 to 15 centimeters (3.1 to 5.9 inches) tall (Jepson Flora Project 2013). Flowering period is from April to May (Jepson Flora Project 2013).

Clokey's cryptantha is found on slopes and ridge crests. Substrates may be sandy, rocky, or gravelly (CNPS 2013; Jepson Flora Project 2013). This species is found in desert woodland vegetation communities. The elevation range of Clokey's cryptantha is 3,445 to 5,413 feet amsl (Jepson Flora Project 2013).

Regulatory Status

Clokey's cryptantha is not a federal or state listed species (CNPS 2013), but is a BLM sensitive species. Clokey's cryptantha has a CRPR of 1B.2 (CNPS 2013). CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .2 are "seriously threatened in California, with 20% to 80% of occurrences threatened/moderate degree and immediacy of threat" (CNPS 2011). Clokey's cryptantha has a California Heritage Element Ranking of S2, indicating that it is "imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province" (CDFW 2012b).

Threats

Clokey's cryptantha is threatened by military activities and alteration of fire regimes (CNPS 2013).

Creamy blazing star (*Mentzelia tridentata*)

This species was not analyzed previously in the 2005 WEMO Final EIS (BLM 2005) nor was it discussed in the March 2012 draft DRECP baseline biology report (Dudek and ICF International 2012). This species is being added as a result of a review of the current CNDB data base.

Life History

The creamy blazing star is an annual herb which is endemic (limited) to California (CalFlora 2017). It occurs within Imperial, Inyo, Kern, Riverside, San Bernardino, and San Diego counties (CNPS 2017). This species generally blooms from March through May (CNPS 2017). This species occurs in rocky, gravely, and sandy areas associated with the following habitat types:

Mojavean desert scrub (CNPS 2017). This species ranges in elevation from 700 to 1175 meters (CNPS 2017). Only 12 specimens are currently known and all other site locations are considered historic since they are from over 20 years ago (NatureServe 2017). Likely range-wide population is less than 1,000 individuals, though there are no current counts (NatureServe 2017).

Regulatory Status

The creamy blazing star is not federally or state listed, but is a BLM sensitive species. This species is also a CRPR 1B.3 species. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .3 are "not very threatened in California with <20% of occurrences threatened/low degree and immediacy of threat or no current threats known" (CNPS 2011). The creamy blazing star has a California Heritage Element Ranking of S3, indicating that it is "vulnerable in the state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation" (CDFW 2012b).

Threats

The creamy blazing star is threatened by vehicles, mining, and grazing (CNPS 2017).

Curved-pod milk-vetch (*Astragalus mohavensis* var. *hemigyrus*)

This species was not analyzed previously in the 2005 WEMO Final EIS (BLM 2005) nor was it discussed in the March 2012 draft DRECP baseline biology report (Dudek and ICF International 2012). This species is being added as a result of a review of the current CNDB data base.

Life History

The curved-pod milk-vetch is an annual herb which is not endemic (limited) to California (CalFlora 2017). It occurs within Inyo County in California as well as in Nevada (CNPS 2017). This species generally blooms from April through June (CNPS 2017). This species often occurs in carbonate areas associated with the following habitat types: Joshua tree woodland and Mojavean desert scrub (CNPS 2017). This species ranges in elevation from 1250 to 1620 meters (CNPS 2017). Known only from the Charleston Mountains of southern Nevada and one occurrence in California where it was rediscovered in 2001 (NatureServe 2017).

Regulatory Status

The curved-pod milk-vetch is not federally or state listed, but is a BLM sensitive species.

This species is also a CRPR 1B.1 species. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .1 are "seriously threatened in California with over 80% of occurrences threatened/high degree and immediacy of threat" (CNPS 2011). The curved-pod milk-vetch has a California Heritage Element Ranking of S1, indicating that it is "critically imperiled in the state because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province" (CDFW 2012b).

Threats

The curved-pod milk-vetch is potentially threatened by mining (CNPS 2017).

Cushenbury Buckwheat *(Eriogonum ovalifolium var. vineum)*

The information from the 2005 WEMO Final EIS (BLM 2005) (Section 3.3.8.3, pp. 3-186) is supplemented by the following updated information from the DRECP Baseline Biology Report (March 2012).

Life History

Cushenbury buckwheat is in the buckwheat family (Polygonaceae) (Jepson Flora Project 2011). It is a mound-forming perennial herb approximately 1.5 to 2.5 decimeters (5.9 to 9.8 inches) in diameter (Sanders 2003).

A study of the Cushenbury buckwheat's reproduction patterns found it to be an outcrossed species with high levels of diversity, low levels of inbreeding among maternal individuals, and selection against homozygous offspring (Neel and others 2001). The main flowering period is May and June, and fruits ripen in about July and prepare for germination during any summer rains in August and September (Sanders 2003). There can also be later flowering in September. It is probably pollinated by small insects and possibly by generalist flower visitors rather than a specialist (Sanders 2003). A personal communication to Sanders (2003) by Morita indicated that nearly 100 insect species visited flowers, including potential pollinators and plant feeders. Insect taxa visiting flowers included many flies (particularly tachinids), bee-flies (Bombylidae), and smaller species such as chloropids (Sanders 2003). A reintroduction study onto a disturbed site by Mistretta and White (2001) showed about 77% survival from 1991 to 1998 and successful reproduction within 6.6 feet of planting areas. Mistretta and White (2001) suggested that Cushenbury buckwheat does not depend on specialized pollinators or soil microorganisms due to the success of the species at the disturbed site, as well as in botanical gardens. Short dispersals likely are wind-aided, with the dried tepals (a division of the perianth where the petals and sepals are indistinguishable) acting as wings (Sanders 2003). Long-distance seed dispersal by this species has not been directly studied, but buckwheat seeds are thought to be dispersed by birds; however, there is no evidence of long-distance dispersal by Cushenbury buckwheat given its restricted distribution (Sanders 2003). As noted previously, Mistretta and White (2001) documented progeny within 6.6 feet of planting areas and no individuals were found more than 98 feet from planting areas.

The species *Eriogonum ovalifolium* is not well adapted to competing for light due to its low stature, but it competes well on sites with moisture and nutrient deficiencies, wind, and winter cold due to its compact "cushion" habit (Sanders 2003). The dense covering wool on its leaves, which reduces water loss, indicates that moisture and light are not controlling factors for this species. Tall, fast-growing species that may out compete *Eriogonum ovalifolium* for light do not grow well on limestone sites with nutrient deficiencies and high pH, which interferes with mineral uptake (Sanders 2003).

Cushenbury buckwheat does not appear to tolerate high or continuing levels of anthropogenic or natural disturbance (e.g., washes and canyon bottoms), but has been observed colonizing abandoned haul roads (Sanders 2003). Mistretta and White (2001) were able to successfully reintroduce it to a barren cut slope above a quarry haul road where no habitat enhancements were

made other than irrigation the first summer and fall after planting and use of the potting soil mix surrounding the roots of the plantings.

Cushenbury buckwheat is closely associated with carbonate substrates on stable slopes with bedrock outcrops and elevations between about 4,600 and 7,900 feet (Sanders 2003; USFWS 2009d; CDFW 2012b). It has never been found away from carbonate substrates and appears to be more closely associated with limestone than dolomite, but this preference needs confirmation (Sanders 2003). General vegetation communities associated with the species are pinyon-juniper woodland, Joshua tree woodland, and Mojavean desert scrub (CNPS 2011; CDFW 2012b). Sanders (2003) notes that it also has been observed in Jeffrey pine-western juniper woodland. It occurs in open areas on gentle to steep slopes with north or west aspects, little accumulation of organic material, open canopy cover (generally less than 15%), and powdery fine soils with rock cover exceeding 50% (USFWS 2009d). Although it may be locally common, individuals tend to occur in scattered distributions (Sanders 2003), and only about 25% of less than 20 occurrence locations known in 1984 supported more than 1,000 individuals (USFWS 2009d).

Regulatory Status

Cushenbury buckwheat is federally listed as endangered but is not state listed. A recovery plan addresses this species: *San Bernardino Mountains Carbonate Plants Draft Recovery Plan* (USFWS 1997b). Cushenbury buckwheat has a CRPR of 1B.1. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .1 are "seriously threatened in California, with over 80% of occurrences threatened/high degree and immediacy of threat" (CNPS 2011). The Cushenbury buckwheat has a California Heritage Element Ranking of S1, indicating that it is "critically imperiled in the state because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province" (CDFW 2012b).

Threats

The main threat to Cushenbury buckwheat when it was federally listed in 1994 was mining (USFWS 2009d). Other threats at the time included OHV use, a hydroelectric project, and a 115-kilovolt power line proposed for construction through Cushenbury Canyon (USFWS 2009d). About 75% of occupied habitat was under threat as a result of being under claim for mining, in private ownership and subject to mining, or as a result of other disturbances (USFWS 2009d). Mining continues to be the primary threat to the species, but other threats include energy development and OHV use, which can result in direct ground disturbance and dust generation (USFWS 2009d). Further, dispersed target shooting, dispersed camping areas, and fuelwood collection can result in trampling of Cushenbury buckwheat and impact its habitat through ground disturbance or dust creation (USFWS 2009d). Padgett and others (2007) conducted a study examining dust deposition from mining activities and potential effects to Cushenbury buckwheat and other carbonate plant species. This study documented lower photosynthetic activity and less growth for plants near mining activities due to dust. Fire suppression activities can result in ground disturbance through fire line construction, retardant and water drops, and establishment of fire camps (USFWS 2009d). Artificial lighting is also cited as a potential threat due to potential impacts on the behavior of pollinators or seed dispersers, or by altering photoperiod responses (USFWS 2009d).

The specific potential effects of climate change on Cushenbury buckwheat are unknown, but if climate change caused a shift to higher elevations due to warmer and drier conditions, as has occurred with other plant species on the Santa Rosa Mountains of Southern California (Kelley and Goulden 2008), this endemic species could be concentrated in a smaller area and more vulnerable to extinction (USFWS 2009d).

Cushenbury Milk-vetch *(Astragalus albens)*

The information from the 2005 WEMO Final EIS (BLM 2005) (Section 3.3.8.3, pp. 3-186) is supplemented by the following updated information from the DRECP Baseline Biology Report (March 2012).

Life History

Cushenbury milk-vetch is a member of the legume family (Fabaceae). It is a prostrate annual or perennial plant with stems approximately 2 to 30 centimeters (0.8 to 12 inches) in length (MacKay 2003). Individual plants may be annual or perennial (MacKay 2003; Hickman 1996), but otherwise little is known of its natural history, including reproduction (MacKay 2003). Flowering occurs from late March to mid-June and pods ripen as early as May (MacKay 2003). It is probably pollinated by small bees given flower shape and color (MacKay 2003; USFWS 2009e). It is unknown whether plants flower and fruit in their first year, how long they live, or what conditions cause them to be annuals or perennials (MacKay 2003). They reproduce by seed and seeds have been shown to have high viability (MacKay 2003). Seeds require scarification (cutting of the outer seed coat) to germinate and may remain dormant in the soil during drought years (MacKay 2003). The length of time seeds can remain viable, the characteristics of seed banks (e.g., size, kinds of seeds), and the type and extent of seed predation and/or dispersal are unknown (MacKay 2003). However, populations increase in response to rainy seasons after droughts, indicating that seed banks persist and seeds remain viable for at least several years (MacKay 2003).

Other than their association with carbonate soils and some other habitat features such as canopy, litter, and slope described in Habitat Requirements, little is known of the life history and ecological relationships of Cushenbury milk-vetch. Pollinators are probably small bees and seeds appear to have high viability and resistance to drought (MacKay 2003). Dispersal mechanisms are unknown. Of particular interest is the factor(s) related to whether individuals are annual or perennial. A factor potentially related to conservation and management of the species is its apparent ability to colonize slightly disturbed sites such as little used roads and long abandoned quarries, but it does not appear to tolerate high or continuing levels of disturbance (MacKay 2003).

Cushenbury milk-vetch is closely associated with carbonate and carbonate-related soils (limestone and dolomite) and outcrops at elevations between 4,000 and 6,600 feet (MacKay 2003). General vegetation communities associated with the species are pinyon-juniper woodland, Joshua tree woodland, and Mojave desert scrub (CNPS 2011). Most occurrences are between 5,000 and 6,600 feet for soils deriving from decomposed limestone (USFWS 2009e). In some cases, the species has been found in carbonate alluvium that was deposited over granitic rocks or has fallen into other soils as a result of a debris slide (MacKay 2003).

Regulatory Status

Cushenbury milk-vetch is federally listed as endangered but is not state listed. Critical habitat was designated on December 24, 2002 (67 FR 78570–78610). A recovery plan addresses this species, *San Bernardino Mountains Carbonate Plants Draft Recovery Plan* (USFWS 1997b). Cushenbury milk-vetch has a CRPR of 1B.1. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .1 are "seriously threatened in California, with over 80% of occurrences threatened/high degree and immediacy of threat" (CNPS 2011). The Cushenbury milk-vetch has a California Heritage Element Ranking of S1.1, indicating that it is "critically imperiled in the state because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province" (CDFW 2012b).

Threats

The main threat to Cushenbury milk-vetch when it was federally listed in 1994 was mining (USFWS 2009e). Other threats at the time included OHV use, a hydroelectric project, and a 115-kilovolt power line proposed for construction through Cushenbury Canyon (USFWS 2009e). About 97% of occupied habitat was under threat as a result of being under claim for mining, in private ownership and subject to mining, or as a result of other disturbances (USFWS 200e). Mining continues to be the primary threat to the species, but other threats include energy development and OHV use, which can result in direct ground disturbance and dust generation (USFWS 2009e). Further, dispersed target shooting, dispersed camping areas, and fuel wood collection can result in trampling of Cushenbury milk-vetch and impact its habitat through ground disturbance or dust creation (USFWS 2009e). Dust can reduce plant viability by altering soil chemistry and light penetration into the seed banks (USFWS 2009e). Fire suppression activities can result in ground disturbance through fire line construction, retardant and water drops, and establishment of fire camps (USFWS 2009e). Artificial lighting is also cited as a potential threat due to potential impacts on the behavior of pollinators or seed dispersers, or by altering photoperiod responses (USFWS 2009e).

The specific potential effects of climate change on Cushenbury milk-vetch are unknown, but if climate change caused a shift to higher elevations due to warmer and drier conditions, as has occurred with other plant species on the Santa Rosa Mountains of Southern California (Kelley and Goulden 2008), this endemic species could be concentrated in a smaller area and more vulnerable to extinction (USFWS 2009e).

Cushenbury Oxytheca *(Acanthoscyphus parishii var. goodmaniana)*

The information from the 2005 WEMO Final EIS (BLM 2005) (Section 3.3.8.3, pp. 3-186) is supplemented by the following updated information from the DRECP Baseline Biology Report (March 2012).

Life History

Cushenbury oxytheca is a small annual plant approximately 0.5 to 3 decimeters (2 to 12 inches) in size that germinates in late fall, producing a relatively long taproot and basal rosette of leaves that remain until the inflorescence develops and flowers bloom from May to October (Sanders 2007).

Observations suggest that it is pollinated by generalist insects, such as small flies and small beetles (S. Morita, cited in Sanders 2007). Little is known about seed bank, seedling establishment, or population structure (USFWS 2009f).

Other than Cushenbury oxytheca's association with carbonate soils, little is known of the life history and ecological relationships of this species. What is known of its life history is based on personal observations and museum records; little information has been published on the species (Sanders 2007). Gonella and Neel (1995) noted its presence/absence on plots in relation to Cushenbury buckwheat and Cushenbury milk-vetch; generally is does not co-occur with these two species.

Cushenbury oxytheca is an annual herb that generally grows on limestone or a mixture of limestone and dolomite soils. This species is most commonly found on talus slopes within pinyon and juniper woodland (Hickman 1996, p. 886; CNPS 2011; CDFW 2012b; USFWS 2009f). Slope where it occurs are usually steep and almost always on loose scree or talus (Sanders 2007). Habitat preferences include an open canopy structure with little or no accumulation of organic material at the soil surface.

Dominant species within pinyon and juniper woodland include single-leaf pinyon pine (*Pinus monophylla*), Utah juniper (*Juniperus osteosperma*), and more rarely California juniper and western juniper (*Juniperus occidentalis*). Understory species within pinyon and juniper woodland are more variable, but may include mountain-mahogany (*Cercocarpus ledifolius*), Mormon tea (*Ephedra viridis*), Mojave yucca (*Yucca schidigera*), Joshua tree, and brittlebush. Cushenbury oxtheca co-occurs with another carbonate endemic, Parish's daisy (*Erigeron parishii*). Its presence, however, appears to be negatively related to at least two other carbonate soils species that tend to occur on stable slopes. Gonella and Neel (1995) never found Cushenbury oxytheca on sample plots centered on Cushenbury milk-vetch (*Astragalus albens*), but it was fairly regularly found on plots without the milk-vetch. Cushenbury milk-vetch is a species typical of stable, often bedrock, slopes. Cushenbury oxytheca also appears to be negatively correlated with the presence of Cushenbury buckwheat (*Eriogonum ovalifolium* var. *vineum*). However, later surveys conducted by Rancho Santa Ana Botanic Garden for the USFS did find Cushenbury oxytheca growing with Cushenbury milk-vetch and Cushenbury buckwheat in some areas (V. Sosa, cited in Sanders 2007).

Regulatory Status

Cushenbury oxytheca is federally listed as endangered but is not state listed. Critical habitat was designated on December 24, 2002 (67 FR 78570–78610). A recovery plan addresses this species: *San Bernardino Mountains Carbonate Plants Draft Recovery Plan* (USFWS 1997b). Cushenbury oxytheca has a CRPR of 1B.1. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .1 are "seriously threatened in California, with over 80% of occurrences threatened/high degree and immediacy of threat" (CNPS 2011). The Cushenbury oxytheca has a California Heritage Element Ranking of S1.1, indicating that it is "critically imperiled in the state because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province" (CDFW 2012b).

Threats

According to a variety of sources, the primary threat to Cushenbury oxytheca is limestone mining (CDFW 2012b; Sanders 2007; Hickman 1996). Besides direct impacts, dust and artificial lighting can affect the species through dust impacts on soil chemistry and potential lighting impacts on seedbanks and pollinators and seed dispersers (USFWS 2009f). The USFWS (2009f) reports that 79% of known occupied habitat is currently subject to mining claims. Additional threats are non-native plant encroachment, power line maintenance, a hydroelectric project, and OHVs (CNPS 2011; USFWS 2009f).

Death Valley Sandpaper-plant *(Petalonyx thurberi ssp. gilmanii)*

Life History

Death Valley sandpaper-plant is a perennial subshrub in the loasa family (Loasaceae) that is native and endemic to California. Death Valley sandpaper-plant is typically less than 100 centimeters (39.4 inches) tall (Jepson Flora Project 2013) and flowers from May to June and September to November (Calflora 2013; Jepson Flora Project 2013).

Death Valley sandpaper-plant is found on dunes and in sandy washes (Jepson 2013); and within sagebrush scrub, Joshua tree woodlands, and pinyon-juniper woodlands in the vicinity of Panamint and Death Valleys. Substrates are sandy (CNPS 2013). This species is found in desert dunes and Mojavean desert scrub vegetation communities (CNPS 2013). Elevation range reported as 0 to 3,937 (Jepson 2013) and 853 to 4,741 feet amsl (CNPS 2013).

Regulatory Status

Death Valley sandpaper-plant is not a federal or state listed species (CNPS 2013), but is a BLM sensitive species. Death Valley sandpaper-plant has a CRPR of 1B.3 (CNPS 2013). CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .3 are "not very threatened in California, with less than 20% of occurrences threatened/low degree and immediacy of threat or no current threats known" (CNPS 2011).The Death Valley sandpaper-plant has a California Heritage Element Ranking of S2.3, indicating that it is "imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province" (CDFW 2012b).

Threats

Death Valley sandpaper-plant has no known threats (CNPS 2013).

Dedecker's Clover *(Trifolium dedeckerae also Trifolium kingii ssp. Dedeckerae)*

Life History

Dedecker's clover is a perennial herb in the legume family (Fabaceae) that is endemic to California. Flowering period is from May to July (Calflora 2013).

Dedecker's clover is found on alpine crests and in rock crevices (Jepson 2013). Substrates are granitic and rocky (CNPS 2013). This species is found in lower montane coniferous forest, pinyon and juniper woodland, subalpine coniferous forest, and upper montane coniferous forest vegetation communities (CNPS 2013). Elevation range reported as 6,890 to 11,483 feet amsl (CNPS 2013).

Regulatory Status

Dedecker's clover is not a federal or state listed species (CNPS 2013), but is a BLM sensitive species. Dedecker's clover has a CRPR of 1B.3 (CNPS 2013). CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .3 are "not very threatened in California, with less than 20% of occurrences threatened/low degree and immediacy of threat or no current threats known" (CNPS 2011). Dedecker's clover has a California Heritage Element Ranking of S2.3, indicating that it is "imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province" (CDFW 2012b).

Threats

Dedecker's clover is possibly threatened by mining and grazing (CNPS 2013).

Desert Cymopterus *(Cymopterus deserticola)*

The information from the 2005 WEMO Final EIS (BLM 2005) (Section 3.3.8.6, pp. 3-187 and 3-188) is supplemented by the following updated information from the DRECP Baseline Biology Report (March 2012).

Life History

Desert cymopterus is in the carrot family (Apiaceae) (Jepson Flora Project 2011). Desert cymopterus is a tap-rooted perennial about 15 centimeters (5.9 inches) in height (Jepson Flora Project 2011). As a taprooted perennial, desert cymopterus does not appear to reproduce vegetatively, but rather reproduces via seeds. Seedling establishment has not been reported for this species. Establishment of new individuals in a population may be infrequent given that many reported desert cymopterus populations are highly dispersed and low density (NatureServe 2011).

Depending on the year, desert cymopterus flowers between early March and mid-May, and may not flower at all in unfavorable years. Poor seed production or seed survival may be a factor in infrequent establishment observed in field studies. Fruits of desert cymopterus are fairly large and do not seem well adapted for dispersal over long distances. Fruits generally seem to fall relatively close to the parent plant. However, the fruits have a marginal wing that may facilitate dispersal by wind. In addition, the fruits mature late in the season, typically after the end of the rainy season, so they remain dry and light. Therefore, given that wind is relatively common in the open sandy habitats where this species is found, it could easily push the fruits along the soil surface, although the fruits probably don't become airborne (NatureServe 2011).

Because of the annual variability in rainfall, the underground parts of herbaceous desert perennials, including desert cymopterus, must be able to maintain the populations over time with frequent

years of reproductive failure; in addition, they must be able to survive prolonged periods of low soil moisture and entire years without aboveground photosynthetic activity (NatureServe 2011). In dry years, desert cymopterus may not produce flowers or fruit and may even remain dormant underground during the usual growing season. In very wet years, however, they may produce flowers and fruits abundantly.

Population sizes appear to vary greatly from year to year, evidently in response to the amount and timing of winter and spring rainfall, making it difficult to determine population trends (NatureServe 2011).

Desert cymopterus grows in Joshua tree woodland, saltbush scrub, and Mojavean desert scrub communities on loose, sandy soils. The sandy soils required by this species occur on alluvial fans and basins, stabilized sand fields, and occasionally sandy slopes of desert dry lake basins (69 FR 64884–64889).

Regulatory Status

Desert cymopterus (*Cymopterus deserticola*) is not federally or state listed, but is a BLM sensitive species. Desert cymopterus has a CRPR of 1B.2. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .2 are "fairly threatened in California, with 20% to 80% of occurrences threatened/moderate degree and immediacy of threat" (CNPS 2011). Desert cymopterus has a California Heritage Element Ranking of S2, indicating that it is "imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province" (CDFW 2012b).

Threats

Desert cymopterus is potentially threatened by habitat alteration and destruction resulting from military activities on Edwards Air Force Base, the expansion of Fort Irwin, oil and gas development, utility construction, renewable energy development, off-road vehicle use, sheep grazing, Land Tenure Adjustment, and urban development (69 FR 64884–64889; CNPS 2011). However, according to the proposed rule (69 FR 64884–64889), the magnitude and relative importance of most of these potential threats were unknown. Grazing by native and non-native herbivores—presumably including mammals, insects, and desert tortoise—is also a threat to this species. This may contribute to the low density, dispersed nature of the majority of reported desert cymopterus populations by limiting the plants' reproductive potential and reducing their vigor (Bagley 2006).

Gilman's goldenbush (*Ericameria gilmanii*)

This species was not analyzed previously in the 2005 WEMO Final EIS (BLM 2005) nor was it discussed in the March 2012 draft DRECP baseline biology report (Dudek and ICF International 2012). This species is being added as a result of a review of the current CNDB data base.

Life History

The Gilman's goldenbush is a perennial shrub which is endemic (limited) to California (CalFlora 2017). It occurs within Inyo, Kern, and Tulare counties (CNPS 2017). This species generally blooms from August through September (CNPS 2017). This species occurs in carbonate or granitic areas associated with the following habitat types: subalpine coniferous forest and upper montane coniferous forest. This species ranges in elevation from 2100 to 3400 meters (CNPS 2017). There are six known occurrences for this species and only one has been seen in the past 20 years (NatureServe 2017).

Regulatory Status

The Gilman's goldenbush is not federally or state listed, but is a BLM sensitive species.

This species is also a CRPR 1B.3 species. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .3 are "not very threatened in California with <20% of occurrences threatened/low degree and immediacy of threat or no current threats known" (CNPS 2011). The Gilman's goldenbush has a California Heritage Element Ranking of S2, indicating that it is "imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province" (CDFW 2012b).

Threats

There are six historic populations of Gilman's goldenbush known, but only 1 has been seen in the past 20 years. This single site is on USFWS lands and seems unthreatened at this time NatureServe 2017). Only 11 plants occur at this site (NatureServe 2017), so low population size is a concern.

Grey-leaved violet (*Viola pinetorum* ssp. *grisea*)

This species was not analyzed previously in the 2005 WEMO Final EIS (BLM 2005) nor was it discussed in the March 2012 draft DRECP baseline biology report (Dudek and ICF International 2012). This species is being added as a result of a review of the current CNDB data base.

Life History

The grey-leaved violet is a perennial herb which is endemic (limited) to California (CalFlora 2017). It occurs within Fresno, Inyo, Kern, Los Angeles, Madera, San Bernardino, Tulare, and Ventura counties (CNPS 2017). This species generally blooms April through July (CNPS 2017). This species occurs in the following habitat types: meadows and seeps, subalpine coniferous forest, and upper montane coniferous forest (CNPS 2017). This species ranges in elevation from 1500 to 3400 meters (CNPS 2017). This species is known from just over 50 populations (NatureServe 2017).

Regulatory Status

The grey-leaved violet is not federally or state listed, but is a BLM sensitive species. This species is also a CRPR 1B.2 species. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .2 are "fairly threatened in California with 20-80% occurrences threatened/moderate degree and immediacy of threat" (CNPS 2011). The grey-leaved violet has a California Heritage Element Ranking of S2, indicating that it is "imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province" (CDFW 2012b).

Threats

The grey-leaved violet is threatened by grazing, trampling, and vehicles and possibly threatened by recreational activities (CalFlora 2017). Other threats mentioned include grazing and OHVs (NatureServe 2017).

Hall's Daisy *(Erigeron aequifolius)*

Life History

Hall's daisy is perennial herb in the sunflower family (Asteraceae) that is endemic to California. Hall's daisy is typically 10 to 20 centimeters (3.9 to 7.9 inches) tall (Jepson Flora Project 2013). Flowering period is from June to August (Calflora 2013).

Hall's daisy is found on rock ledges and in crevices (Jepson Flora Project 2013). Substrates are granitic and rocky (CNPS 2013). This species is found in broad-leafed upland forest, lower montane coniferous forest, pinyon and juniper woodland, and upper montane coniferous forest vegetation communities. The elevation range of Hall's daisy is 4,921 to 8,005 feet amsl (CNPS 2013).

Regulatory Status

Hall's daisy is not a federal or state listed species (CNPS 2013), but is a BLM sensitive species. Hall's daisy has a CRPR of 1B.3 (CNPS 2013). CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .3 are "not very threatened in California, with less than 20% of occurrences threatened/low degree and immediacy of threat or no current threats known" (CNPS 2011). Hall's daisy has a California Heritage Element Ranking of S2.3, indicating that it is "imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province" (CDFW 2012b).

Threats

Hall's daisy has no known threats (CNPS 2013).

Harwood's eriastrum (*Eriastrum harwoodii*)

This species was not analyzed previously in the 2005 WEMO Final EIS (BLM 2005) nor was it discussed in the March 2012 draft DRECP baseline biology report (Dudek and ICF International 2012). This species is being added as a result of a review of the current CNDB data base.

Life History

The Harwood's eriastrum is an annual herb which is endemic (limited) to California (CalFlora 2017). It occurs within Riverside, San Bernardino, and San Diego counties (CNPS 2017). This species generally blooms from March through June (CNPS 2017). This species occurs in desert dunes associated with the following habitat types: desert playa, North American warm desert dunes and sand flats, lower bajada and fan Mojavean-Sonoran desert scrub, and Madrean warm semi-desert wash woodland/scrub (CNPS 2017). This species ranges in elevation from 125 to 915 meters (CNPS 2017).

Regulatory Status

The Harwood's eriastrum is not federally or state listed, but is a BLM sensitive species.

This species is also a CRPR 1B.2 species. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .2 are "fairly threatened in California with 20-80% occurrences threatened/moderate degree and immediacy of threat" (CNPS 2011). The Harwood's eriastrum has a California Heritage Element Ranking of S2, indicating that it is "imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province"(CDFW 2012b).

Threats

The Harwood's eriastrum is potentially impacted by solar energy development by grazing and trampling (CNPS 2017). More likely threats include mining, non-native plant competition, and vehicles (CNPS 2017).

Horn's milk-vetch (*Astragalus hornii* var. *hornii*)

This species was not analyzed previously in the 2005 WEMO Final EIS (BLM 2005) nor was it discussed in the March 2012 draft DRECP baseline biology report (Dudek and ICF International 2012). This species is being added as a result of a review of the current CNDB data base.

Life History

The Horn's milk-vetch is an annual herb which is not endemic (limited) to California (CalFlora 2017). It occurs within Inyo, Kern, San Bernardino, and Tulare counties in California as well as Nevada (CNPS 2017). This species generally blooms from May through October (CNPS 2017). This species often occurs along lake margins or alkaline areas associated with the following habitat types: meadows and seeps, and playas (CNPS 2017). This species ranges in elevation from 60 to

850 meters (CNPS 2017). NatureServe currently does not have occurrence data for this species (NatureServe 2017).

Regulatory Status

The Horn's milk-vetch is not federally or state listed, but is a BLM sensitive species. This species is also a CRPR 1B.1 species. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .1 are "seriously threatened in California with over 80% of occurrences threatened/high degree and immediacy of threat" (CNPS 2011). The Horn's milk-vetch has a California Heritage Element Ranking of S1, indicating that it is "critically imperiled in the state because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province" (CDFW 2012b).

Threats

The Horn's milk-vetch was subject to eradication efforts in early 1900's because it was poisonous to sheep and is now threatened by habitat alteration (CNPS 2017).

Kelso Creek Monkeyflower *(Mimulus shevockii)*

The information from the 2005 WEMO Final EIS (BLM 2005) (Section 3.3.8.7, pp. 3-188) is supplemented by the following updated information from the DRECP Baseline Biology Report (March 2012).

Life History

Kelso Creek monkeyflower is a tiny ephemeral winter annual herb in the lopseed family *(Phrymaceae*), which was recently segregated from the figwort family (*Scrophulariaceae*) (Jepson Flora Project 2011; Beardsley and Olmstead 2002). Kelso Creek monkeyflower stands approximately 2 to 12 centimeters (0.8 to 4.7 inches) in height (Jepson Flora Project 2011; Elvin 2006). Kelso Creek monkeyflower blooms from March to May (CNPS 2011). It is unknown whether Kelso Creek monkeyflower is self-sterile or self-fertile (Elvin 2006). Given the relative size of its corolla, the nectar guide patterning, and corolla colors, Kelso Creek monkeyflower is probably outcrossing, and is probably pollinated by small solitary native bees; soft-wing flower beetles (*Trichochrous* sp.) have been observed visiting flowers (Fraga 2007).

It fruits from April to June (Fraga 2007). The fruit is a 0.25-inch capsule that contains more than 100 seeds and is dehiscent at the end and along both sutures (Heckard and Bacigalupi 1986). Although not directly observed, water is a likely seed dispersal mechanism since Kelso Creek monkeyflower occurs in washes (Elvin 2006).

The role of the seedbank is probably very important for the long-term survival of populations. It is known from similar annual *Mimulus* species that even in high rainfall years, some fraction of seed stays dormant and remains in the seed bank (Fraga 2007). Kelso Creek monkeyflower does not germinate at all in drought years. The amount and timing of rainfall affect the number of seeds that germinate, the timing of germination, and the size and longevity of desert annuals (Fraga 2007).

Although Kelso Creek monkeyflower is highly restricted in distribution, it appears to be common where it occurs in years of ample rain (Fraga 2007). It does not appear to have very exacting habitat requirements (Fraga 2007), although there appears to be hundreds of acres of apparently suitable habitat that are unoccupied (Heckard and Bacigalupi 1986). In wet years, Kelso Creek monkeyflower can form carpets on the desert floor, but can be difficult to locate in drier years (CPC 2011).

Kelso Creek monkeyflower hybridizes with its closest relative Tehachapi monkeyflower (*Mimulus androsaceus*) (Audubon 2011; CDFW 2012b). This suggests that the Kelso Creek monkeyflower may have evolved from Cyrus Canyon and spread southward to other locations in the Kern and Kelso Valleys (Audubon 2011).

Kelso Creek monkeyflower occurs predominately in loamy, coarse sands on alluvial fans, dry streamlets, or washes and granitic deposits within Joshua tree or California juniper xeric woodlands (59 FR 50540–50550; Heckard and Bacigalupi 1986). Substrates where Kelso Creek monkeyflower are found are generally granitic or metamorphic, and sandy or gravelly (CNPS 2011). However, the population near Cyrus Flat grows on finer soils developed from metasedimentary rocks (CDFW 2012b; Heckard and Bacigalupi 1986). The California Native Plant Society (CNPS) (2011) reports an elevation range for this species from 800 to 1,340 meters (2,625 to 4,396 feet). However, the CNDDB (CDFW 2012b) includes one occurrence at 4,500 feet. Species strongly associated with Kelso Creek monkeyflower include pygmy poppy (*Canbya candida)*, silver cholla (*Cylindropuntia echinocarpa)*, purple sage (*Salvia dorrii*), golden gilia (*Leptosiphon aureus*), Tehachapi monkeyflower, Fremont's monkeyflower (*Mimulus fremontii*), and white burrobrush (*Ambrosia salsola* var. *pentalepis*) (Heckard and Bacigalupi 1986).

Regulatory Status

Kelso Creek monkeyflower (*Mimulus shevockii*) is not federally or state listed, but is a BLM sensitive species. It was proposed for federal listing in 1994 (59 FR 50540–50550), but the proposal was withdrawn in 1998 when it was determined that the species was not threatened with extinction and therefore did not meet the definition of a threatened or endangered species (63 FR 49065–49075). Kelso Creek monkeyflower has a CRPR of 1B.2. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .2 are "fairly threatened in California, with 20% to 80% of occurrences threatened/moderate degree and immediacy of threat" (CNPS 2011). The Kelso Creek monkeyflower has a California Heritage Element Ranking of S2, indicating that it is "imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province" (CDFW 2012b).

Threats

Threats to Kelso Creek monkeyflower have not changed since the 2005 WEMO Final EIS (BLM 2005). The information from the 2005 WEMO Final EIS (BLM 2005) (Section 3.3.8.7, pp. 3-188) is supplemented by the following updated information from the DRECP Baseline Biology Report (March 2012).

Kelso Creek monkeyflower is threatened by urbanization, OHV use, agricultural land conversion, road maintenance, cattle grazing, habitat loss from water inundation, fire suppression activities,

and competition from non-native species (59 FR 50540–50550; CNPS 2011; NatureServe 2011). The extremely limited distribution of this plant puts it at risk of stochastic extinction events (Elvin 2006).

This species is primarily threatened by the current or potential destruction, modification, or curtailment of its habitat or range. Mobile home and subdivision development and associated grading threaten or have impacted 6 of the 11 occurrences (CDFW 2012b). Cattle grazing, introduction of non-native plant species, and conversion of habitat to orchards have begun to modify the landscape and threaten Kelso Creek monkeyflower occurrences and limited natural habitat (Elvin 2006; CDFW 2012b).

Of the seven occurrences within the planning area, three are entirely on BLM Ridgecrest RA lands, two are partially on BLM Ridgecrest RA lands and partially on private lands, and two are partially on BLM land outside of Ridgecrest RA and partially on private lands (CDFW 2012b). Although occurrences on BLM lands are provided some protection, there are still documented threats to these populations (Elvin 2006). All of the populations on private land are at risk of mobile home or subdivision development. Populations located on BLM lands adjacent to private property are also affected by this threat (Elvin 2006).

The effect that highway and road maintenance has on populations on or adjacent to private property is twofold: improved access has increased development and the additional traffic has created pressure to add or widen roads. At least one population has been bisected by road development. OHV use directly impacts or threatens approximately half of the known occurrences throughout its range (Elvin 2006). At least one population site has been highly disturbed, probably from uncontrolled overgrazing during drought (CDFW 2012b). Water developments and impoundments also potentially threaten this species (Elvin 2006).

Kern Buckwheat *(Eriogonum kennedyi var. pinicola)*

The information from the 2005 WEMO Final EIS (BLM 2005) (Section 3.3.8.8, pp. 3-189) is supplemented by the following updated information from the DRECP Baseline Biology Report (March 2012).

Life History

Kern buckwheat is a perennial herb in the buckwheat family (Polygonaceae) (CNPS 2011; Reveal 2003). Kern buckwheat stands approximately 0.5 to 1.3 decimeters (2.0 to 5.1 inches) in height (Jepson Flora Project 2011). The species blooms from May to June (CNPS 2011; Jepson Flora Project 2011). The fruit ripens and is dispersed around July. Sexual reproduction in Kern buckwheat is probably both selfing and outcrossing (NatureServe 2011) considering the federally listed variety *E. k.* var. *austromontanum* produces seeds by self-pollinating and insect-mediated outcrossing (71 FR 67712–67754).

Eriogonum species generally attract small generalist pollinators. Visitors, and potential pollinators, of the species *Eriogonum kennedyi* are small wasps, flies, bees, butterflies, and ants (O'Brien 1980). A small, silvery-white, iridescent butterfly has been observed pollinating this variety (Hare, pers. obs., cited in Sanders and Greene 2006). Kern buckwheat flowers change to red when pollinated suggesting that bees are important pollinators.

Though seed dispersal for this taxon has not been studied, birds may play a role in the dispersal of all *Eriogonum* seeds. Although there is little information available, wind, rain and streams may also act as dispersal agents (Sanders and Greene 2006).

Kern buckwheat appears to share many general ecological characteristics with other varieties of *E. kennedyi*. It occurs in open areas and prefers full sunlight, appearing to be intolerant of extensive shading. Although not well adapted to competing for light, it is very competitive on sites where tall and fast-growing species are excluded by moisture deficiencies, wind, and cold (Walter 1973, cited in Sanders and Greene 2006). Its compact cushion-like habit probably helps to reduce moisture loss (Walter 1973, cited in Sanders and Greene 2006). Therefore, this variety appears to favor sites where moisture stress is combined with high insulation (Sanders and Greene 2006).

Moisture rather than light is probably a controlling factor for Kern buckwheat. The foliage is densely covered with tomentum (wool) that substantially reduces the amount of light that strikes the leaf tissue. Although pubescence may affect photosynthesis, it also forms a layer of dead air at the leaf surface, which can reduce water loss from wind (Johnson 1975, cited in Sanders and Greene 2006).

Kern buckwheat is found in poorly draining depressions in white bentonite clay soils that are derived from volcanic ash (Sanders and Greene 2006). The depressions have pebbles, gravel, and rock cemented into the soil surface that form exposed open flats located on ridge tops and saddles between knolls (Sanders and Greene 2006).

This species occurs in chaparral and pinyon and juniper woodland (CDFW 2012b; CNPS 2011). Associated species include California sagebrush (*Artemisia californica*), Great Basin sagebrush (*Artemisia tridentata*), adobe yampah (*Perideridia pringlei*), fivetooth spineflower (*Chorizanthe watsonii*), and old fallen Jeffrey pines (CDFW 2012b; CCH 2011).

Regulatory Status

Kern buckwheat (*Eriogonum kennedyi* var. *pinicola*) is not federally or state listed, but is a BLM sensitive species. Kern buckwheat has a CRPR of 1B.1. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .1 are "seriously threatened in California, with over 80% of occurrences threatened/high degree and immediacy of threat" (CNPS 2011). The Kern buckwheat has a California Heritage Element Ranking of S1.1, indicating that it is "critically imperiled in the state because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province" (CDFW 2012b).

Threats

Current threats to Kern buckwheat are wind energy development on private land and vehicles (CNPS 2011). OHVs have already destroyed plants and habitat in one of the occurrences on BLM land. The highly restricted distribution and small number of remaining plants make this species vulnerable to stochastic extinction (Sanders and Greene 2006).

Approximately half of the 1-acre population on private land on Sweet Ridge was destroyed by the construction of wind energy facilities. Suitable habitat and plants were destroyed with the construction of access roads to newly subdivided lots and the construction of a ramp to a proposed

campsite along the Pacific Crest Trail. Illegal grading has resulted in an erosion problem that threatens part of one population (Hare 1995 and Rutherford 1998, cited in Sanders and Greene 2006). Although cattle grazing is not known around the populations now, the area has been grazed in the past (Sanders and Greene 2006).

Based on observations, Kern buckwheat has been unable to recolonize disturbed areas (Hare 1995, cited in Sanders and Greene 2006).

Kern Plateau bird's-beak (*Cordylanthus eremicus ssp. Kernensis*)

This species was not analyzed previously in the 2005 WEMO Final EIS (BLM 2005) nor was it discussed in the March 2012 draft DRECP baseline biology report (Dudek and ICF International 2012). This species is being added as a result of a review of the current CNDB data base.

Life History

The Kern Plateau bird's-beak is an annual herb which is endemic (limited) to California (CalFlora 2017). It occurs on the Kern Plateau within Inyo, Kern, and Tulare counties (CNPS 2017). This species generally blooms from July through September, which some blooming taking place as early as May (CNPS 2017). This species occurs in wetlands, and occasionally non-wetlands (CalFlora 2017) associated with the following habitat types: Great Basin scrub, Joshua tree woodland, pinion and juniper woodland, and upper montane coniferous forest (CNPS 2017). This species ranges in elevation from 1675 to 3000 meters (CNPS 2017). Known from 14 sites in California (NatureServe 2017).

Regulatory Status

The Kern Plateau bird's-beak is not federally or state listed, but is a BLM sensitive species.

This species is also a CRPR 1B.3 species. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .3 are "not very threatened in California with <20% of occurrences threatened/low degree and immediacy of threat or no current threats known" (CNPS 2011). The Kern Plateau bird's-beak has a California Heritage Element Ranking of S2, indicating that it is "imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province" (CDFW 2012b).

Threats

The Kern Plateau bird's-beak is potentially impacted by trail maintenance, foot traffic, and OHV use (CNPS 2017).

Kern River evening-primrose (*Camissonia integrifolia*)

This species was not analyzed previously in the 2005 WEMO Final EIS (BLM 2005) nor was it discussed in the March 2012 draft DRECP baseline biology report (Dudek and ICF International 2012). This species is being added as a result of a review of the current CNDB data base.

Life History

The Kern River evening-primrose is an annual herb which is endemic (limited) to California (CalFlora 2017). It occurs within Kern County (CNPS 2017). This species generally blooms in May but may also bloom in April (CNPS 2017). This species occurs in chaparral (CNPS 2017). This species ranges in elevation from 700 to 1000 meters (CNPS 2017). Known from three occurrences in California (NatureServe 2017).

Regulatory Status

The Kern River evening-primrose is not federally or state listed, but is a BLM sensitive species.

This species is also a CRPR 1B.3 species. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .3 are "not very threatened in California with <20% of occurrences threatened/low degree and immediacy of threat or no current threats known" (CNPS 2011). The Kern River evening-primrose has a California Heritage Element Ranking of S2, indicating that it is "imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province" (CDFW 2012b).

Threats

The Kern River evening-primrose is potentially threatened by road maintenance (CNPS 2017).

Lane Mountain Milk-vetch *(Astragalus jaegerianus)*

The information from the 2005 WEMO Final EIS (BLM 2005) (Section 3.3.8.9, pp. 3-189 and 3-190) is supplemented by the following updated information from the DRECP Baseline Biology Report (March 2012).

Life History

Lane Mountain milk-vetch is a member of the legume family (Fabaceae). It is a perennial herb approximately 3 to 7 decimeters (11.8 to 27.6 inches) in size (Charis 2002). It flowers in April and May and fruits ripen from the end of April to the end of May (Charis 2002). Work on pollinators indicates the species most likely to be effective pollinators include the megachilid bees *Anthidium dammersi*, *A. emarginatum*, and *Osmia latisculata* (Hopkins 2005; USFWS 2008c).

Greenhouse studies have shown higher rates of seed production in individuals that are self and cross-pollinated compared with unpollinated individuals, so pollination appears to be important for reproduction by this species (Rundel and others 2005, cited in USFWS 2008c). Genetic studies indicate that Lane Mountain milk-vetch is a facultative outcrosser (i.e., cross-pollinator) that relies more on outcrossing within dense populations than within low-density populations (Walker and Metcalf 2008). Dispersal mechanisms in Lane Mountain milk-vetch are unknown, although Charis (2002) suggests that dispersal may be by gravity, but notes that seeds and pods of other *Astragalus* species are fed upon by various birds, rabbits, and rodents.

Lane Mountain milk-vetch exhibits a relatively low recruitment rate; less than 2% of the 4,888 individuals detected by Charis (2002) were seedlings. Field and greenhouse studies by Rundel and others (2007) found that key factors for seedling growth and survival include the amount, frequency, and timing of precipitation. Generally, seed germination may be high under controlled greenhouse conditions, but much lower in the wild (Rundel and others 2007).

Community structure and the availability of suitable host plants for Lane Mountain milk-vetch appear to be important ecological factors. Charis (2002) found that Lane Mountain milk-vetch occurs in Mojave creosote scrub and Mojave mixed woody scrub with widely scattered Joshua trees. It does not occur in creosote scrub habitat dominated by creosote and white bursage. More than 99% of mature individuals were found on host plants, and the association with host plants appears to be non-random, with turpentinebroom accounting for about 20% of the host records, and white bursage, Mojave Desert California buckwheat, Cooper's goldenbush, Nevada jointfir, and "dead shrub" accounting for about 10% each (Charis 2002). Some common shrubs, such as creosote bush and white bursage, are used less frequently as host plants in relation to their abundance.

The growth patterns and distribution of Lane Mountain milk-vetch also appear to be related to the availability of moisture. Individuals annually go dormant during the hot, dry summer season and respond with vegetative growth to winter rains, or possibly also in response to temperature and photoperiod (Charis 2002). In very dry years, the species may have little vegetative growth, flowering, or fruiting (Bagley 1989, cited in Charis 2002). The greater presence of Lane Mountain milk-vetch on shallow ridges where soils are thinner and bedrock much closer to the surface, as opposed to deeper alluvial soils, suggests that occupied sites have a better moisture supply (Charis 2002).

Precipitation amounts, timing, and frequency are key factors in seedling growth and survival of Lane Mountain milk-vetch. In the wild, wet years are critical for seedling growth and survival, but invasive species may also proliferate in wet years, and may compete with and promote herbivory of milk-vetch (Rundel and others 2007). Even in a wet year (2004–2005), on a study plot, seedling survival to the following year was only 16% (8 of 49 individuals) (Rundel and others 2007). Rundel and others (2007) suggest that summer rains may be critical for seedling establishment and survival. More recent information indicates that drought over the last decade has had severe adverse effects on Lane Mountain milk-vetch populations, because of low seedling survival and depleted seed banks.

Lane Mountain milk-vetch occurs in Mojave creosote scrub and Mojave mixed woody scrub with widely scattered Joshua trees, and intergrades of the two communities that have relatively high shrub diversity (Charis 2002). The California Native Plant Society (CNPS 2011) also lists Joshua tree woodland as habitat occupied by the species, but the Charis (2002) study indicates that Joshua trees are widely scattered in occupied habitat. The species does not occur in areas dominated by creosote bush and white bursage (Charis 2002). Occupied habitat is characterized by gentle slopes and low ridges 6.5 to 8.8 feet high, with shallow and lighter granitoid soils (Charis 2002). The species' distribution suggests that it may be responding to water supply (Charis 2002). It occurs at elevations of 3,100 to 4,200 feet above MSL (Charis 2002).

Lane Mountain milk-vetch typically occurs in patchy (i.e., clustered) distributions, but also occurs less commonly in distributions of a few scattered individuals over a broader area. It almost always is associated with a host2 shrub, which the Lane Mountain milk-vetch uses as a trellis. Of 4,888

mature plants recorded by Charis (2002), less than 0.5% were found growing alone. The six most frequent host plants accounted for approximately 75% of the records, with turpentinebroom (*Thamnosma montana*) accounting for about 20% of the host records, and white bursage, Eastern Mojave buckwheat (*Eriogonum fasciculatum* ssp. *polifolium*), Cooper's goldenbush (*Ericameria cooperi*), Nevada jointfir (*Ephedra nevadensis*), and "dead shrub" accounting for about 10% each (Charis 2002). Host-specific selection was apparent because some relatively frequent shrubs had extremely low frequencies as hosts, including creosote bush, littleleaf rhatany (*Krameria erecta*), Johnson's indigo bush (*Psorothamnus arborescens* var. *minutifolius*), desert peppergrass (*Lepidium fremontii*), and peach thorn (*Lycium cooperi*).

Regulatory Status

Lane Mountain milk-vetch (*Astragalus jaegerianus*) is federally listed as endangered but is not state listed. The final rule for critical habitat for Lane Mountain milk-vetch was published May 19, 2011 (76 FR 29108–29129). Lane Mountain milk-vetch has a CRPR of 1B.1. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .1 are "seriously threatened in California, with over 80% of occurrences threatened/high degree and immediacy of threat" (CNPS 2011). The Lane Mountain milk-vetch has a California Heritage Element Ranking of S1.1, indicating that it is "critically imperiled in the state because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province" (CDFW 2012b).

Threats

The main anthropogenic threats to Lane Mountain milk-vetch are surface mining, OHV recreation, and military training activities (USFWS 2008c). The Coolgardie Mesa area has high mineral potential, with several small recreational mining operations that may have cumulative effects (USFWS 2008c). Unauthorized OHV use increased in one portion of the Coolgardie Mesa site in the 2000s, creating a barren area of approximately 20 acres where the species formerly occurred (USFWS 2008c). In the critical habitat rule, the USFWS also acknowledged the potential effects of climate change on Lane Mountain milk-vetch, but there is no information specific to this species indicating what areas may become important in the future in response to climate change (76 FR 29108–29129). The USFWS (2008c) also identifies two other threats to Lane Mountain milk-vetch: wildfires and nonnative species.

Latimer's woodland-gilia (*Saltugilia latimeri*)

This species was not analyzed previously in the 2005 WEMO Final EIS (BLM 2005) nor was it discussed in the March 2012 draft DRECP baseline biology report (Dudek and ICF International 2012). This species is being added as a result of a review of the current CNDB data base.

Life History

The Latimer's woodland-gilia is an annual herb which is endemic (limited) to California (CalFlora 2017). It occurs within Inyo, Kern, Riverside, and San Bernardino (SBD) counties (CNPS 2017). This species generally blooms March through June (CNPS 2017). This species occurs in rocky or

sandy, often granitic, soils associated with the following habitat types: chaparral, Mojavean desert scrub, and pinyon and juniper woodland (CNPS 2017). This species ranges in elevation from 400 to 1900 meters (CNPS 2017). This species is known from San Bernardino and Riverside counties with outlier populations in Kern and Inyo counties. There is a disjunct population in Inyo County, some 120 miles from the other known occurrences (NatureServe 2017). As of 2005, there were 16 occurrences known for this species (NatureServe 2017).

Regulatory Status

The Latimer's woodland-gilia is not federally or state listed, but is a BLM sensitive species. This species is also a CRPR 1B.2 species. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .2 are "fairly threatened in California with 20-80% occurrences threatened/moderate degree and immediacy of threat" (CNPS 2011). The Latimer's woodland-gilia has a California Heritage Element Ranking of S3, indicating that it is "vulnerable in the state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation" (CDFW 2012b).

Threats

The Latimer's woodland-gilia is possibly threatened by recreation. (CNPS 2017).

Little San Bernardino Mountains Linanthus *(Linanthus maculates)*

The information from the 2005 WEMO Final EIS (BLM 2005) (Section 3.3.8.10, pp. 3-190) is supplemented by the following updated information from the DRECP Baseline Biology Report (March 2012).

Life History

Little San Bernardino Mountains linanthus is an annual herb in the phlox (*Polemoniaceae*) family. It is a diminutive, densely hairy, alternate-leaved annual species approximately 1 to 3 centimeters (0.4 to 1.2 inches) in height (Jepson Flora Project 2011; Patterson 1989). It reproduces via seed, but otherwise its ecology has not been well studied. As such, little is known about the plant's pollinator relationships, seed viability, or seed germination (Patterson 1989; Sanders 2006; CVAG 2006). The flower is white with a vermilion spot on each spreading lobe on most individuals, suggesting that the species is almost certainly insect-pollinated (Munz 1974; Sanders 2006). The flowering time for this species is March through May (CNPS 2011). A review of the collections shows that approximately one-third of the specimens were collected in March, two-thirds in April, and only a few in February and May (CCH 2011).

Little San Bernardino Mountains linanthus grows on loose, well-aerated, open sandy benches and flats on the margins of desert washes (Sanders 2006; Jepson Flora Project 2011). This plant is always found in open areas that receive no shade from nearby shrubs and is associated with other small annual species, such as sigmoid threadplant (*Nemacladus sigmoideus*), blushing threadplant (*N. rubescens*), evening primrose (*Camissonia pallida*), common loeflingia (*Loeflingia squarrosa*), Arizona nest straw (*Filago arizonica*), and Wallace's woolly sunflower (*Eriophyllum wallacei*) (Sanders 2006).

Regulatory Status

Little San Bernardino Mountains linanthus (*Linanthus maculatus*) is not federally or state listed and has no other federal designations (e.g., BLM or USFS sensitive). Little San Bernardino Mountains linanthus has a CRPR of 1B.2. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .2 are "fairly threatened in California, with 20% to 80% of occurrences threatened/moderate degree and immediacy of threat" (CNPS 2011). Little San Bernardino Mountains linanthus has a California Heritage Element Ranking of S2, indicating that it is "imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province" (CDFW 2012b).

Threats

Little San Bernardino Mountains linanthus is potentially threatened by habitat disturbance and destruction due to urban expansion, OHV use, flood control activities, illegal dumping, and an increase in invasive non-native species (CNPS 2011). The largest populations are adjacent to communities, such as Yucca Valley, Joshua Tree, and Desert Hot Springs, that have grown substantially in the last two decades. Additional development pressures associated with the expansion of these communities could impact core populations (Sanders 2006).

Flood control maintenance activities pose a specific threat to the species as these activities change the hydrological regime and sediment-carrying capacity of flows within wash systems. In particular, flood control activities pose a substantial threat to populations of Little San Bernardino Mountains linanthus in the Whitewater Canyon, Mission Creek, and Dry Morongo Canyon Wash areas (CVAG 2006).

OHV use is a threat to Little San Bernardino Mountains linanthus because the species grows only in desert wash areas, which are favored by OHV users because they are so sparsely vegetated (Sanders 2006).

Mojave Monkeyflower *(Mimulus mohavensis)*

The information from the 2005 WEMO Final EIS (BLM 2005) (Section 3.3.8.11, pp. 3-190 and 3-191) is supplemented by the following updated information from the DRECP Baseline Biology Report (March 2012).

Life History

Most members of the lopseed family are insect pollinated (Beardsley and Olmstead 2002); and given the showy flowers, Mojave monkeyflower pollinators are probably Hymenoptera (bees, wasps, ants, and sawflies) or Lepidoptera (butterflies and moths). MacKay (2006) hypothesized that the white margin of the corolla reflects ultraviolet light, and the maroon veins extending into this margin act as nectar guides to facilitate pollination.

Small seeds and an annual habit suggest that dispersal of Mojave monkey flower is mostly abiotic (MacKay 2006; NatureServe 2011). For populations located on rocky slopes above washes, it is probable that gravity carries seeds down into the washes and intermittent water flow may carry

seeds further down washes. Although biotic vectors of seed transport are unknown, granivorous ants or rodents may transport seeds over short distances and birds may transport seeds longer distances (MacKay 2006).

Although suitable habitat for this species appears to be fairly abundant, it is quite restricted geographically. Population sizes fluctuate substantially from year to year, probably in response to the amount and timing of precipitation; as an annual, germination and establishment are dependent on the timing and amount of spring rains (MacKay 2006; NatureServe 2011). Unknown unusual germination and establishment requirements may account for the considerable variability in population sizes from year to year (MacKay 2006).

This species occurs in Joshua tree woodland and Mojavean desert scrub, specifically creosote bush scrub (MacKay 2006; CNPS 2011). Mojave monkeyflower is associated with the following species or genera, among others: creosote bush, desert senna (*Senna armata*), white burrobrush, ratany (*Krameria erecta* and *K. grayi*), chollas (*Cylindropuntia* spp.), white bursage, prairie-clovers (*Dalea* spp.), catclaw, Bigelow's monkeyflower (*Mimulus bigelovii*), desert bells (*Phacelia campanularia*), desert fivespot (*Eremalche rotundifolia*), spiny hopsage (*Grayia spinosa*), and desert trumpet (*Eriogonum inflatum* var. *inflatum*) (MacKay 2006; CDFW 2012b).

Mojave monkeyflower commonly occurs in areas that are not subject to regular water flow (MacKay 2006). These areas include the gravelly banks of desert washes with granitic soils and rocky slopes above washes, as well as the sandy openings of creosote bush scrub (MacKay 2006).

Regulatory Status

Mojave monkeyflower is not federally or state listed, but is a BLM sensitive species. Mojave monkeyflower has a CRPR of 1B.2. CRPR 1B species are considered “rare, threatened, or endangered in California and elsewhere” (CDFW 2012b). CRPR species with a threat rank of .2 are “fairly endangered in California, with 20%–80% of occurrences threatened/moderate degree and immediacy of threat” (CNPS 2011). Mojave monkeyflower has a California Heritage Element Ranking of S2, indicating that it is considered imperiled in California (CDFW 2012b).

Threats

Threats to Mojave monkeyflower include development, mining, non-native plants, solar and wind energy projects, grazing, vehicles, and road development (CNPS 2011; NatureServe 2011; MacKay 2006). Additional potential threats include pipeline installation and quarries and test pits adjacent to populations (MacKay 2006). Mojave monkeyflower is also under threat by the potential for the BLM to convert land occupied by this species to private lands, which could then be developed (MacKay 2006; CDFW 2012b). The area under consideration for disposal or land exchange is located between Barstow and Victorville (CDFW 2012b).

Because population sizes fluctuate considerably annually in response to environmental conditions, Mojave monkeyflower is susceptible to depletion of the seed bank after a series of drought years. In addition, small population sizes increase the risk of inbreeding, which may result in reduced seed set or reduced seed viability (MacKay 2006).

Mojave Tarplant *(Deinandra mohavensis)*

The information from the 2005 WEMO Final EIS (BLM 2005) (Section 3.3.8.12, pp. 3-191) is supplemented by the following updated information from the DRECP Baseline Biology Report (March 2012).

Life History

Mojave tarplant is in the sunflower family (Asteraceae) (Jepson Flora Project 2011). The plant was thought to be extinct at one time but was rediscovered in 1994 by A. Sanders in the San Jacinto Mountains, in Riverside County (Sanders and others 1997). Mojave tarplant is an annual plant approximately 1 to 10 decimeters (3.9 to 39 inches) in height. Mojave tarplant and the closely related Red Rock tarplant (*Deinandra arida*) are the only two self-compatible species in the genus *Deinandra* (Tanowitz 1982; Baldwin pers. comm. 1997, cited in Sanders 2006b). This may be the result of genetic drift and/or the relative isolation of these two species, which occur on the edge of the desert as local populations (Sanders 2006b). Pollination studies have not been conducted for this Mojave tarplant; however, Faull (1987) has observed small beetles and honey bees visiting Red Rock tarplant flowers.

Mojave tarplant is known to reproduce easily in cultivation (B. Baldwin, pers. comm. 1998, cited in Sanders 2006a) and at a botanical garden has been known to escape into disturbed places (S. Boyd, pers. comm. 1998, cited in Sanders 2006a).

Mojave tarplant blooms from June through January (CNPS 2011). Flowering peaks between August and October. Once flowering has begun, it continues until the plants begin to senesce. Fruit maturity and dispersal are continuous as well. Seed dispersal vectors have not been reported for this species; however, the seeds are relatively heavy and may just fall to the ground around the source plant. The seeds are not armed with any obvious mechanisms, such as hooks or wings, for long-distance dispersal (Sanders 2006a). Baldwin (pers. comm., cited in Sanders 2006b) reports that *Hemizonia* (now *Deinandra*) ray achenes maintain some degree of dormancy while the disk achenes freely germinate.

Mojave tarplant is associated with seasonally saturated clay or silty soils on gentle slopes or low gradient streams, with few shrubs and trees. These saturated areas are typically dry at the surface but provide a substantial water source at depth through summer (Sanders and others 1997). This species has a discontinuous and possibly relictual distribution (Sanders 2006a), and little is known of its life history and ecological relationships.

The Mojave tarplant occurs in open moist sites in arid regions near the margins of the desert, within chaparral, coastal scrub, and riparian scrub (CNPS 2011; Sanders 2006a). Plants are typically observed at seeps and along grassy swales and intermittent creeks. The most suitable habitat occurs in mountainous areas within microhabitats of low gradient streams and on gentle slopes with few shrubs and trees. This species is associated with clay or silty soils that are saturated with water early in the year. Mojave tarplant prefers areas that are dry at the surface but which have a substantial water source at depth through summer. Dwarfed plants occasionally are found in drier sites near occupied moist areas (Sanders and others 1997). This cycle of early saturation with later desiccation may reduce competition from other plant species; dryness during drought years may further reduce competition (Sanders 2006a).

At the type locality, Mojave tarplant was known to occur along a sandy intermittent creek; however, this habitat is now believed to be atypical and not sufficient to maintain a permanent population. Sanders and others (1997) does note that there are some occurrences of Mojave tarplant associated with sand, where the sand is adjacent to more typical habitat.

Regulatory Status

Mojave tarplant (*Deinandra mohavensis*) is not federally listed, but is California endangered and a BLM sensitive species. Mojave tarplant has a CRPR of 1B.3. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .3 are "not very threatened in California, with less than 20% of occurrences threatened/low degree and immediacy of threat or no current threats known" (CNPS 2011). Mojave tarplant has a California Heritage Element Ranking of S2, indicating that it is considered imperiled in California (CDFW 2012b).

Threats

Mojave tarplant is threatened by grazing, recreational activities, development, hydrological alterations, road maintenance, and vehicles (CNPS 2011). The type locality was modified by construction of the Mojave River Forks Dam. Within the planning area cattle grazing occurs at some of the Mojave tarplant occupied areas, and in some areas is locally intense and may pose a threat. However, plants of the genus *Deinandra* may not be palatable to cattle, so grazing may not be a major threat. Trampling by cattle may be a threat around limited watering sources in dry areas (Sanders 2006a).

Muir's tarplant (*Carlquistia muirii*)

This species was not analyzed previously in the 2005 WEMO Final EIS (BLM 2005) nor was it discussed in the March 2012 draft DRECP baseline biology report (Dudek and ICF International 2012). This species is being added as a result of a review of the current CNDB data base.

Life History

The Muir's tarplant is a perennial rhizomatous herb which is endemic (limited) to California (CalFlora 2017). It occurs within Fresno, Kern, Monterey, and Tulare counties (CNPS 2017). This species generally blooms July through August but may also bloom in October (CNPS 2017). This species occurs in granitic soils associated with the following habitat types: chaparral (montane), lower montane coniferous forest, and upper montane coniferous forest (CNPS 2017). This species ranges in elevation from 755 to 2500 meters (CNPS 2017). Known from fourteen occurrences in California which comprise of approximately 1,600 individuals (NatureServe 2017).

Regulatory Status

The Muir's tarplant is not federally or state listed, but is a BLM sensitive species. This species is also a CRPR 1B.3 species. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .3 are "not very threatened in California with <20% of occurrences threatened/low degree and immediacy of threat

or no current threats known" (CNPS 2011). The Muir's tarplant has a California Heritage Element Ranking of S2, indicating that it is "imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province" (CDFW 2012b).

Threats

The Muir's tarplant is potentially threatened by recreational activities. (CNPS 2017). Some populations are threatened by road maintenance and timber harvesting (NatureServe 2017).

Nine Mile Canyon Phacelia *(Phacelia novenmillensis)*

Life History

Nine Mile Canyon phacelia is an annual herb in the borage or waterleaf family (Boraginaceae) that is endemic to California. Nine Mile Canyon phacelia is typically 5 to 10 centimeters (2.0 to 3.9 inches) tall (Jepson Flora Project 2013). Flowering period is from May to June (Calflora 2013) or February to June (CNPS 2013).

Nine Mile Canyon phacelia is found in open foothills. Substrates are sandy to gravelly (Jepson Flora Project 2013). This species is found in broad-leafed upland forest, Cismontane woodland, pinyon and juniper woodland, and upper montane coniferous forest vegetation communities (CNPS 2013). Elevation range reported as 5,397 to 8,661 feet amsl (CNPS 2013).

Regulatory Status

Nine Mile Canyon phacelia is not a federal or state listed species (CNPS 2013), but is a BLM sensitive species. Nine Mile Canyon phacelia has a CRPR of 1B.2 (CNPS 2013). CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .2 are "fairly endangered in California, with 20%–80% of occurrences threatened/moderate degree and immediacy of threat" (CNPS 2011). Nine Mile Canyon phacelia has a California Heritage Element Ranking of S2.2, indicating that it is considered imperiled in California (CDFW 2012b).

Threats

Nine Mile Canyon phacelia is threatened by grazing and recreation (CNPS 2013).

Owens Peak Lomatium *(Lomatium shevockii)*

Life History

Owens Peak lomatium is a perennial herb in the carrot family (Apiaceae) that is endemic to California. Owens Peak lomatium is typically 4 to 12 centimeters (1.6 to 4.7 inches) tall with an elongated taproot (Jepson Flora Project 2013). Flowering period is from April to May (Calflora 2013).

Owens Peak lomatium is found on rocky slopes and talus. Substrates are rocky (Jepson Flora Project 2013). This species is found in lower montane coniferous forest and upper montane

coniferous forest vegetation communities (CNPS 2013). Elevation range is 5,807 to 7,218 feet amsl (CNPS 2013) or 7,218 to 8,202 feet amsl (Jepson Flora Project 2013).

Regulatory Status

Owens Peak lomatium is not a federal or state listed species (CNPS 2013), but is a BLM sensitive species. Owens Peak lomatium has a CRPR of 1B.3 (CNPS 2013). CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .3 are "not very threatened in California, with less than 20% of occurrences threatened/low degree and immediacy of threat or no current threats known" (CNPS 2011). Owens Peak lomatium has a California Heritage Element Ranking of S2, indicating that it is considered imperiled in California (CDFW 2012b).

Threats

Threats to Owens Peak lomatium are not described (CNPS 2013).

Owens Valley checkerbloom (*Sidalcea covillei*)

This species was not analyzed previously in the 2005 WEMO Final EIS (BLM 2005) nor was it discussed in the March 2012 draft DRECP baseline biology report (Dudek and ICF International 2012). This species is being added as a result of a review of the current CNDB data base.

Life History

The Owens Valley checkerbloom is a perennial herb which is endemic (limited) to California (CalFlora 2017). It occurs within Inyo County (CNPS 2017). This species generally blooms April through June (CNPS 2017). This species occurs in alkaline, mesic soils associated with the following habitat types: chenopod scrub, and meadows and seeps (CNPS 2017). This species ranges in elevation from 1095 to 1415 meters (CNPS 2017). Several large populations of over 100,000 individuals exist and over 2 million plants were reported in 2004 (NatureServe 2017).

Regulatory Status

The Owens Valley checkerbloom is not federally or state listed, but is a BLM sensitive species. This species is also a CRPR 1B.1 species. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .1 are "seriously threatened in California with over 80% of occurrences threatened/high degree and immediacy of threat" (CNPS 2011). The Owens Valley checkerbloom has a California Heritage Element Ranking of S2, indicating that it is "imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province" (CDFW 2012b).

Threats

The Owens Valley checkerbloom is possibly threatened by ground water pumping, ground and surface water diversions, and long-term drought (NatureServe 2017). Other possible threats identified include non-native plants, grazing, and meadow succession (CalFlora 2017).

Pale-yellow layia (*Layia heterotricha*)

This species was not analyzed previously in the 2005 WEMO Final EIS (BLM 2005) nor was it discussed in the March 2012 draft DRECP baseline biology report (Dudek and ICF International 2012). This species is being added as a result of a review of the current CNDB data base.

Life History

The pale-yellow layia is an annual herb which is endemic (limited) to California (CalFlora 2017). It occurs within Kern County (CNPS 2017). This species generally blooms from March through June (CNPS 2017). This species occurs in alkaline or clay areas associated with the following habitat types: cismontane woodland, coastal scrub, pinyon and juniper woodland, and valley and foothill grassland (CNPS 2017). This species ranges in elevation from 300 to 1705 meters (CNPS 2017). There are 30 recently verified populations of this species identified throughout its range with several thousand individuals in total (NatureServe 2017).

Regulatory Status

The pale-yellow layia is not federally or state listed, but is a BLM sensitive species. This species is also a CRPR 1B.1 species. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .1 are "seriously threatened in California with over 80% of occurrences threatened/high degree and immediacy of threat" (CNPS 2011). The pale-yellow layia has a California Heritage Element Ranking of S2, indicating that it is "imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province" (CDFW 2012b).

Threats

The pale-yellow layia is threatened by agricultural conversion and previous construction of San Antonio Reservoir, grazing, non-native plants, and vehicles. It is also potentially threatened by road maintenance and wind energy development (CNPS 2017).

Palmer's mariposa-lily (*Calochortus palmeri* var. *palmeri*)

This species was not analyzed previously in the 2005 WEMO Final EIS (BLM 2005) nor was it discussed in the March 2012 draft DRECP baseline biology report (Dudek and ICF International 2012). This species is being added as a result of a review of the current CNDB data base.

Life History

The Palmer's mariposa-lily is a perennial bulbiferous herb which is endemic (limited) to California (CalFlora 2017). It occurs within Kern, Los Angeles, Riverside, Santa Barbara, San Bernardino, San Luis Obispo, and Ventura counties (CNPS 2017). This species generally blooms from April through July (CNPS 2017). This species often occurs in mesic areas associated with the following habitat types: chaparral, lower montane coniferous forest, and meadows and seeps

(CNPS 2017). This species ranges in elevation from 710 to 2390 meters (CNPS 2017). Known from seven counties and may be declining but field surveys are needed to confirm this determination (NatureServe 2017).

Regulatory Status

The Palmer's mariposa-lily is not federally or state listed, but is a BLM sensitive species. This species is also a CRPR 1B.2 species. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .2 are "fairly threatened in California with 20-80% occurrences threatened/moderate degree and immediacy of threat" (CNPS 2011). The Palmer's mariposa-lily has a California Heritage Element Ranking of S2, indicating that it is "imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province" (CDFW 2012b).

Threats

The Palmer's mariposa-lily occurs in wet meadows which are threatened by grazing, recreational activities, non-native species, and many other site specific threats (NatureServe 2017).

Parish's Daisy *(Erigeron parishii)*

The information from the 2005 WEMO Final EIS (BLM 2005) (Section 3.3.8.3, pp. 3-186) is supplemented by the following updated information from the DRECP Baseline Biology Report (March 2012).

Life History

Parish's daisy is in the Asteraceae family (IPNI 2011). It is an herbaceous, long-lived perennial subshrub approximately 7 to 30 centimeters (3 to 12 inches) in height from its taproot (Mistretta and White 2001; Sanders 2006). It flowers from May through August (CNPS 2011), peaking mid-May to mid-June (Sanders 2006). Based on the conspicuous flowers, pollinators are probably insects and likely include bees, butterflies, and other known pollinators of similar and related species (Sanders 2006). Parish's daisy produces plumed achenes adapted for wind dispersal (Mistretta and White 2001) and does not appear to have a seed dormancy mechanism (Mistretta 1994). Based on observations of seedlings at several sites (Krantz 1979), reproduction is probably primarily by seed rather than vegetatively by rhizomes or stolons. A recent study by Neel and Ellstrand (2001) found no evidence of vegetative reproduction, concluding that the species probably primarily reproduces sexually through outcrossing.

Recent research on allozyme diversity showed that genetic diversity was high (compared to many narrowly endemic plant taxa) and populations were only moderately differentiated, suggesting that gene flow among populations is still high and any recent fragmentation has not yet affected genetic diversity (Neel and Ellstrand 2001).

Parish's daisy occurs in Mojavean desert scrub and pinyon and juniper woodlands (CNPS 2011) and is largely restricted to loose, carbonate alluvium, although it is occasionally found on other rock types (Sanders 2006). Populations of Parish's daisy are most commonly found along washes

on canyon bottoms or on loose alluvial deposits on adjacent benches, but they are also occasionally found on steep rocky slopes (Sanders 2006). Based on this species' occurrence on noncarbonate granitic soils, it is possible that the apparent carbonate preference is due to reduced competition from other plants, although reports of this species on noncarbonate soils are few (Sanders 2006). It has also been observed at sites where soils have been found to be strongly alkaline, implying that the noncarbonated granitic soils may have been influenced in their soil chemistry by adjacent carbonate slopes (Sanders 2006).

Specific plant species associated with Parish's daisy have not been described in the literature, but dominant species within pinyon and juniper woodland where Parish's daisy is typically found include single-leaf pinyon pine, Utah juniper, and more rarely California juniper and western juniper. Understory species within pinyon and juniper woodland are more variable, but may include mountain-mahogany (*Cercocarpus ledifolius*), Mormon tea (*Ephedra viridis*), Mojave yucca, Joshua tree, and brittlebush.

Parish's daisy co-occurs with another carbonate endemic, Cushenbury oxtheca (*Acanthoscyphus parishii var. goodmaniana*). Its presence, however, appears to be negatively related to at least two other carbonate soils species - Cushenbury milk-vetch (*Astragalus albens*), and Cushenbury buckwheat (*Eriogonum ovalifolium* var. *vineum*), which tend to occur on more stable slopes.

Regulatory Status

Parish's daisy is federally listed as threatened, but is not state listed. Critical habitat was designated on December 12, 2002 (67 FR 78570–78610). A recovery plan addresses this species, *San Bernardino Mountains Carbonate Plants Draft Recovery Plan* (USFWS 1997b). As of 2010, no status changes for Parish's daisy were indicated by USFWS (75 FR 28636–28642). Parish's daisy has a CRPR of 1B.1. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .1 are "seriously threatened in California, with over 80% of occurrences threatened/high degree and immediacy of threat" (CNPS 2011). The Parish's daisy has a California Heritage Element Ranking of S2S3, indicating that it is somewhere between "imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province" and "vulnerable in the state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation" (CDFW 2012b).

Threats

The main threat to Parish's daisy is limestone mining because this species is mostly restricted to carbonate deposits (USFWS 2009g). Besides direct impacts, dust and artificial lighting can affect the species through dust impacts on soil chemistry and lighting availability for seeds and the impacts of artificial lighting on growing conditions (USFWS 2009g). Sanders (2006) notes that that after moistening, the mining dust appears to harden into a cement-like coating. Additional threats listed by USFWS and CNPS include energy development projects, OHVs, grazing, fuel-wood collection, fire suppression activities, camping, target shooting, road construction, and residential developments, but these threats are relatively low compared to mining (USFWS 2009g; CNPS 2011).

The specific potential effects of climate change on Parish's daisy are unknown, but if climate change caused a shift to higher elevations due to warmer and drier conditions, as has occurred with other plant species on the Santa Rosa Mountains of Southern California (Kelley and Goulden 2008), this endemic species could be concentrated in a smaller area and more vulnerable to extinction (USFWS 2009g).

Parish's Phacelia *(Phacelia parishii)*

The information from the 2005 WEMO Final EIS (BLM 2005) (Section 3.3.8.14, pp. 3-192) is supplemented by the following updated information from the DRECP Baseline Biology Report (March 2012).

Life History

Parish's phacelia is a low-growing, annual herb in the borage or waterleaf family (Boraginaceae) ranging in height from 5 to 15 centimeters (0.2 to 0.5 inch) (Jepson Flora Project 2011). The comparatively simple, toothed to shallowly lobed leaves, and the unequal sepal size in fruit distinguish Parish's phacelia from many other phacelias; other species within its range that also have unequal sepals and have much showier flowers. The flowering season for Parish's phacelia is reported as April to July (CNPS 2011; Jepson Flora Project 2011), but all of the California collections have been made between April and May (White 2006b). The Mojave Desert flowering period is earlier than that of the Great Basin, and Smith (1997) reported that the California populations were fruiting by late April; the later dates have generally been for collections made in White Pine County, Nevada, at much higher elevation and latitude than the California occurrences.

Not much is known about the reproductive biology of the species, but it likely depends on wind and rain for seed dispersal. Given its restriction in California to seasonally wet alkaline flats, and its many small seeds, its seed dispersal range is probably quite short, but seeds may occasionally be ingested by shorebirds or picked up with mud on their feet and carried long distances (White 2006b).

Although some precipitation data are known for the Nevada populations of Parish's phacelia (Smith 1997), there is little information on the ecology of the species in California. In Nevada at one of the Pahrump Valley sites, bees are thought to contribute to pollination, and at another Nevada site (Indian Springs Valley), moths are believed to be at least partially involved with pollination (Smith 1997).

Typical habitat for Parish's phacelia includes clay and alkaline soils, and dry lake margins at elevations of 1,772 to 3,937 feet. In California, the species has been documented in central San Bernardino County on playas and valley floors that are relatively unvegetated and have few associated species. Habitats are creosote bush scrub and alkali sinks. According to White (2006b), all the known occurrences of Parish's phacelia in California occur on sparsely vegetated alkaline flats, generally in dry, cracked mud flats of seasonal pools, and growth is apparently controlled by water level as plants may appear within different levels of the pools, depending on the hydrologic conditions and the timing of rainfall. Smith (1997) reports that the species tends to occupy flat, open expanses, but may also occur on gentle slopes.

Regulatory Status

Parish's phacelia (*Phacelia parishii*) is not federally or state listed. This species was previously classified as a Category 2 Candidate for Listing under the federal ESA as amended in 1988 (58 FR 51144–51190). Parish's phacelia has a CRPR of 1B.1. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). Parish's phacelia has a California Heritage Element Ranking of S1.1, indicating that it is "critically imperiled in the state because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province" (CDFW 2012b).

Threats

The known California populations of Parish's phacelia are confined to a relatively small area, which makes the species vulnerable to extinction. With the exception of the Stewart Valley site, all occurrences of the species are within the vicinity of the Fort Irwin Military Base and could be extirpated if the populations are disturbed by military exercises, or by the expansion of the current military facilities in the area (White 2006b).

Populations that occur southeast of Coyote Lake in the Fort Irwin area are threatened by tank use and other off-road vehicles (CDFW 2012b). White (2006b) notes that other reports have indicated that access road construction and the establishment of power line corridors could disrupt the local hydrology, and that these potential activities threaten current populations. The BLM's special-status plant management program also lists overgrazing by cattle and horses as a threat to populations in the Barstow area (BLM 2005).

Red Rock Poppy *(Eschscholzia minutiflora ssp. twisselmannii)*

The information from the 2005 WEMO Final EIS (BLM 2005) (Section 3.3.8.16, pp. 3-193) is supplemented by the following updated information from the DRECP Baseline Biology Report (March 2012).

Life History

Red Rock poppy is a small annual herb in the poppy family (*Papaveraceae*) that stands approximately 2 to 14 inches tall (BLM 2010b; Jepson Flora Project 2011). It blooms from March to May (CNPS 2011). Red Rock poppy has a relatively large colorful flower, so it is most likely probably insect pollinated. Potential pollinators of Red Rock poppy that have been recorded on Edwards Air Force Base include solitary bees (*Dufourea desertorum, D. malacothricis, D. vernalis*), a hersperapis bee (*Hesperapis parva*), and miner bees (*Perdita carinata, P. inflexa, P. mortuaria, P. mucronata, P. robustula*) (Buchman and others 2010).

Information on the natural history of Red Rock poppy, such as seed germination, and seed dispersal has not been reported. However, it is a desert annual that reproduces by seed. In addition, the soil seed bank is probably important for the long-term survival of populations, as it is for many other desert annuals.

Red Rock poppy is associated with bajadas and alluvial fans, flats, washes, and slopes in Mojavean desert scrub communities on volcanic tuff (CNPS 2011; CDFW 2012b). It has a very limited

geographic distribution, and little is known of its life history and ecological relationships. As an annual species the population numbers vary widely from year to year in response to annual rainfall. Plants may not appear at all in low rainfall years (CDFW 2012b).

Red Rock poppy occurs on volcanic tuff in Mojavean desert scrub on desert washes, flats, and slopes (CNPS 2011; CDFW 2012b). It has been recorded on bajadas and alluvial fans, flats, washes, and slopes (CDFW 2012b). The subspecies may be specific to rhyolite tuffs and granitic derived soils (Clark and Faull 1991), but these are common in the area where Red Rock poppy occurs (Sanders and Pitzer 2006). Red Rock poppy has also been reported on sedimentary mounds, limestone, metamorphic rocks, and rocky basalt (CDFW 2012b). Aspects are generally west, southwest, or south (CDFW 2012b). Associated species include a variety of common Mojave desert scrub shrubs and herbs (CDFW 2012b). The subspecies ranges in elevation from 680 to 1,230 meters (2,231 to 4,035 feet) according to CNPS (2011), but one occurrence is at 4,040 feet (CDFW 2012b).

Regulatory Status

Red Rock poppy is not federally or state listed, but is a BLM sensitive species. Red Rock poppy has a CRPR of 1B.2. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .2 are "fairly endangered in California, with 20%–80% of occurrences threatened/moderate degree and immediacy of threat" (CNPS 2011). Red Rock poppy has a California Heritage Element Ranking of S2.2, indicating that it is considered imperiled in California (CDFW 2012b).

Threats

Red Rock poppy is primarily threatened by OHV activity (CNPS 2011; CDFW 2012b). In Red Rock Canyon State Park, habitat for Red Rock poppy occurs along the main routes of travel (Sampson 2007). OHVs disrupt the surface soil and compact the surface soil and subsoil, leading to soil loss. The most significant long term effect is the accelerated erosion and associated inability of areas subject to heavy OHV use to support natural revegetation. OHV use also directly damages and destroys plants. Plant rehabilitation efforts are often marginally successful or unsuccessful (as cited in Sampson 2007).

Red Rock Canyon monkeyflower (*Erythranthe rhodopetra*)

This species was not analyzed previously in the 2005 WEMO Final EIS (BLM 2005) nor was it discussed in the March 2012 draft DRECP baseline biology report (Dudek and ICF International 2012). This species is being added as a result of a review of the current CNDB data base.

Life History

The Red Rock Canyon monkeyflower is an annual herb which is endemic (limited) to California (CalFlora 2017). It occurs within Kern County (CNPS 2017). This species generally blooms from March through April (CNPS 2017). This species occurs in sandy areas and canyon washes associated with the following habitat types: Mojavean desert scrub (CNPS 2017). This species ranges in elevation from 610 to 915 meters (CNPS 2017).

Regulatory Status

The Red Rock Canyon monkeyflower is not federally or state listed, but is a BLM sensitive species. This species is also a CRPR 1B.1 species. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .1 are "seriously threatened in California with over 80% of occurrences threatened/high degree and immediacy of threat" (CNPS 2011). The Red Rock Canyon monkeyflower has a California Heritage Element Ranking of S1, indicating that it is "critically imperiled in the state because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province"(CDFW 2012b).

Threats

The Red Rock Canyon monkeyflower is possibly threatened by mining, vehicles, recreational activities, foot traffic, and non-native plants (CNPS 2017).

Red Rock Tarplant *(Deinandra arida)*

The information from the 2005 WEMO Final EIS (BLM 2005) (Section 3.3.8.17, pp. 3-193) is supplemented by the following updated information from the DRECP Baseline Biology Report (March 2012).

Life History

Red Rock tarplant is an annual herb in the sunflower family (Asteraceae) that stands approximately 2 to 8 decimeters (7.9 to 32 inches) in height. Red Rock tarplant blooms from April through November (CNPS 2011). Pollination studies have not been conducted for this species; however, Faull (1987) has observed small beetles and honey bees visiting Red Rock tarplant flowers.

Red Rock tarplant does not appear to reproduce vegetatively, but rather by seeds.

However, seed germination and seedling establishment has not been reported for this species. Baldwin reports that *Hemizonia* (now *Deinandra*) ray achenes maintain some degree of dormancy while the disk achenes freely germinate (Sanders 2006). Red Rock tarplant consistently produces fertile ray achenes (but few to zero fertile disk achenes). Sanders (2006) suggests that the ray achenes could contribute to the persistence of a Red Rock tarplant seed bank through difficult climatic cycles vegetatively.

Red Rock tarplant and Mojave tarplant (*Deinandra mohavensis*) are the only two self-compatible species of *Hemizonia* (now *Deinandra*) (Tanowitz 1982; Sanders 2006). This may be the result of genetic drift and/or the relative isolation of these two species, which occur on the edge of the desert as local populations (Sanders 2006).

Red Rock tarplant grows in Mojavean desert scrub communities on clay soils and volcanic tuff (CNPS 2011). In general, this species is associated with seeps and seasonally moist substrates along ephemeral streams (sandy and gravelly washes), low ridges, and road shoulders (CDFW 2012b). Faull (1987) found that Red Rock tarplant habitat consists of the following:

1. Sandy to gravelly ephemeral alluvial washes, sometimes exhibiting surface platey structure;
2. Moist alkaline fringes of seeps and springs along alluvial flats and washes;
3. Relatively shallow, dry, sandy alluvial and colluvial slopes at the base of ridges and cliffs and associated erosional ravines; and
4. Ledges of dry colluvium suspended on steep cliff slopes up to 160 feet above the valley floor by ribs of resistant bedrock.

Preferred habitat appears to be adjacent to seeps and along washes (Sanders 2006). From a geologic substrate perspective, Red Rock tarplant appears to prefer erosional remnants of the Ricardo Group, but also occurs on Quaternary alluvium (Faull 1987). Associated species in moister locations include the seep-spring monkeyflower (*Mimulus guttatus*) and Palmer's monkeyflower (*Mimulus palmeri*) (Faull 1987).

Regulatory Status

Red Rock tarplant is not federally or state listed, but is a BLM sensitive species. Red Rock tarplant was previously a candidate for federal listing (58 FR 64828–64845), but was removed from candidacy on February 28, 1996, in a notice of review (61 FR 7597–7613). Red Rock tarplant has a CRPR of 1B.2. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .2 are "fairly endangered in California, with 20%–80% of occurrences threatened/moderate degree and immediacy of threat" (CNPS 2011). Red Rock tarplant has a California Heritage Element Ranking of S1.2, indicating that it is considered critically imperiled in California (CDFW 2012b).

Threats

The primary threat appears to be OHV use and colonization by invasive non-natives such as shrub tamarisk (*Tamarisk ramosissima*) (Faull 1987). Red Rock tarplant are vulnerable to anthropogenic disturbances such as OHV use (Faull 1987). Camping and vehicle parking at Red Cliffs in Red Rock Canyon may also be threats. Measures to control these threats have been implemented by the DPR in the past (Faull 1987), but current management is uncertain. Faull (1987) observed that Red Rock tarplant experiences herbivory by rabbits (and possibly ground squirrels): the main stems and branches of up to 75% of plants at one location were observed to have been removed by herbivores.

Robbins' nemacladus (*Nemacladus secundiflorus* var. *robbinsii*)

This species was not analyzed previously in the 2005 WEMO Final EIS (BLM 2005) nor was it discussed in the March 2012 draft DRECP baseline biology report (Dudek and ICF International 2012). This species is being added as a result of a review of the current CNDB data base.

Life History

The Robbins' nemacladus is an annual herb which is endemic (limited) to California (CalFlora 2017). It occurs within Los Angeles, Santa Barbara, San Benito, San Luis Obispo, and Ventura

counties (CNPS 2017). This species generally blooms April through June (CNPS 2017). This species occurs in openings associated with the following habitat types: chaparral and valley and foothill grassland (CNPS 2017). This species ranges in elevation from 350 to 1700 meters (CNPS 2017). This species is found in the South Coast Ranges with one population found in the Green Mountains in Tulare County (Nature Serve 2017).

Regulatory Status

The Robbins' nemacladus is not federally or state listed, but is a BLM sensitive species. This species is also a CRPR 1B.2 species. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .2 are "fairly threatened in California with 20-80% occurrences threatened/moderate degree and immediacy of threat" (CNPS 2011). The Robbins' nemacladus has a California Heritage Element Ranking of S2, indicating that it is "imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province" (CDFW 2012b).

Threats

The Robbins' nemacladus is possibly threatened by road maintenance and widening (CNPS 2017).

Robison's Monardella *(Monardella robisonii)*

Life History

Robinson's monardella is a perennial subshrub or shrub in the mint family (*Lamiaceae*) that is endemic to California. Robinson's monardella is typically 15 to 50 centimeters (5.9 to 19.7 inches) tall and it has an erect, multi-branched habit (Jepson Flora Project 2013). Flowering period is from April to September (Calflora 2013) or February to October (CNPS 2013).

Robinson's monardella is found among granite boulders (Jepson Flora Project 2013). This species is found in desert scrub (Jepson 2013) and pinyon and juniper woodland vegetation communities (CNPS 2013). Elevation range is 2,001 to 4,921 feet amsl (CNPS 2013).

Regulatory Status

Robinson's monardella is not a federal or state listed species (CNPS 2013), but is a BLM sensitive species. Robinson's monardella has a CRPR of 1B.3 (CNPS 2013). CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .3 are "not very threatened in California, with less than 20% of occurrences threatened/low degree and immediacy of threat or no current threats known" (CNPS 2011). Robinson's monardella has a California Heritage Element Ranking of S3, indicating that it is "vulnerable in the state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation" (CDFW 2012b).

Threats

Robinson's monardella threats are not described (CNPS 2013).

Rose-flowered larkspur (*Delphinium purpusii*)

This species was not analyzed previously in the 2005 WEMO Final EIS (BLM 2005) nor was it discussed in the March 2012 draft DRECP baseline biology report (Dudek and ICF International 2012). This species is being added as a result of a review of the current CNDB data base.

Life History

The Rose-flowered larkspur is a perennial herb which is endemic (limited) to California (CalFlora 2017). It occurs within Kern and Tulare counties (CNPS 2017). This species generally blooms from April through May, which some blooming taking place as early as March (CNPS 2017). This species occurs in rocky, often carbonate soils, associated with the following habitat types: chaparral, cismontane woodland, and pinyon and juniper woodland (CNPS 2017). This species ranges in elevation from 300 to 1340 meters (CNPS 2017). The California Native Plant Society indicates that this species is found in a limited number of occurrences and that precise location and endangerment information is needed (NatureServe 2017).

Regulatory Status

The Rose-flowered larkspur is not federally or state listed, but is a BLM sensitive species.

This species is also a CRPR 1B.2 species. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .2 are "fairly threatened in California with 20-80% occurrences threatened/moderate degree and immediacy of threat" (CNPS 2011). The Rose-flowered larkspur has a California Heritage Element Ranking of S3, indicating that it is "vulnerable in the state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation" (CDFW 2012b).

Threats

Specific threats have not been identified for this species, but they are likely similar to other plant species listed here.

San Bernardino aster (*Symphyotrichum defoliatum*)

This species was not analyzed previously in the 2005 WEMO Final EIS (BLM 2005) nor was it discussed in the March 2012 draft DRECP baseline biology report (Dudek and ICF International 2012). This species is being added as a result of a review of the current CNDB data base.

Life History

The San Bernardino aster is a perennial rhizomatous herb which is endemic (limited) to California (CalFlora 2017). It occurs within Imperial, Kern, Los Angeles, Orange, Riverside, San

Bernardino, San Diego, and San Luis Obispo counties (CNPS 2017). This species generally blooms July through November (CNPS 2017). This species occurs near ditches, streams, springs associated with the following habitat types: cismontane woodland, coastal scrub, lower montane coniferous forest, meadows and seeps, marshes and swamps, and valley and foothill grassland (vernally mesic) (CNPS 2017). While this species usually occurs in meadows, springs, and streams, it also occurs in upland habitat (NatureServe 2017). This species ranges in elevation from 2 to 2040 meters (CNPS 2017). This species has been seldom reported in recent years (NatureServe 2017).

Regulatory Status

The San Bernardino aster is not federally or state listed, but is a BLM sensitive species. This species is also a CRPR 1B.2 species. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .2 are "fairly threatened in California with 20-80% occurrences threatened/moderate degree and immediacy of threat" (CNPS 2011). The San Bernardino aster has a California Heritage Element Ranking of S2, indicating that it is "imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province" (CDFW 2012b).

Threats

The San Bernardino aster is possibly threatened by non-native plants (CalFlora 2017) and development of private lands (NatureServe 2017).

San Bernardino milk-vetch (*Astragalus bernardinus*)

This species was not analyzed previously in the 2005 WEMO Final EIS (BLM 2005) nor was it discussed in the March 2012 draft DRECP baseline biology report (Dudek and ICF International 2012). This species is being added as a result of a review of the current CNDB data base.

Life History

The San Bernardino milk-vetch is a perennial herb which is endemic (limited) to California (CalFlora 2017). It occurs within Riverside and San Bernardino counties (CNPS 2017). This species generally blooms from April through June (CNPS 2017). This species often occurs in granitic or carbonate areas associated with the following habitat types: Joshua tree woodland and pinyon and juniper woodland (CNPS 2017). This species ranges in elevation from 900 to 2000 meters (CNPS 2017). Known from forty-two occurrences in California (NatureServe 2017).

Regulatory Status

The San Bernardino milk-vetch is not federally or state listed, but is a BLM sensitive species. This species is also a CRPR 1B.2 species. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .1 are "fairly threatened in California with 20-80% occurrences threatened/moderate degree and immediacy of threat" (CNPS 2011). The San Bernardino milk-vetch has a California Heritage

Element Ranking of S3, indicating that it is "vulnerable in the state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation" (CDFW 2012b).

Threats

The San Bernardino milk-vetch is threatened by mining, grazing, development, and recreation (CNPS 2017).

Sanicle Cymopterus *(Cymopterus ripleyi var. saniculoides)*

Life History

Sanicle cymopterus is a small perennial herb in the carrot family (Apiaceae) that is known from California and Nevada. Sanicle cymopterus is typically 10 to 15 centimeters (3.9 to 5.9 inches) tall, sprouting from a buried root crown (Jepson Flora Project 2013). Flowering period is from April to June (Calflora 2013).

Sanicle cymopterus is found on gravelly, sandy, or carbonate substrates (Jepson Flora Project 2013). This species is found in Joshua tree woodland and Mojavean desert scrub vegetation communities (CNPS 2013). Elevation range is 3,609 to 5,446 feet amsl (CNPS 2013).

Regulatory Status

Sanicle cymopterus is not a federal or state listed species (CNPS 2013), but is a BLM sensitive species. Sanicle cymopterus has a CRPR of 1B.2 (CNPS 2013). CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .2 are "fairly endangered in California, with 20%–80% of occurrences threatened/moderate degree and immediacy of threat" (CNPS 2011). Sanicle cymopterus has a California Heritage Element Ranking of S1, indicating that it is "critically imperiled in the state because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province" (CDFW 2012b).

Threats

Sanicle cymopterus is threatened by cattle grazing on BLM land at Lee Flat, as well as by vehicles and mining (CNPS 2013).

Short-joint Beavertail *(Opuntia basilaris var. brachyclada)*

Background information for the short-joint beavertail would not change from the previous analysis included in the affected environment of the 2005 WEMO Final EIS (BLM 2005). For a general discussion of this species, please refer to Section 3.3.8.20, pgs. 3-194 and 3-195. The supplemental information presented below is based on the species account from the California Native Plant Society (CNPS 2014) and recent BLM data.

Life History

Short-joint beavertail cactus is mostly associated with Joshua tree, pinyon pine, and juniper woodlands, although it also occurs in chaparral and Mojave desert scrub communities. It has been reported from a wide variety of well-drained soils, from sandy to rocky, in open streambeds and on rocky slopes. Flowering period is from April to August (CNPS 2014). It occurs between elevations of 3000 – 6500 feet.

Regulatory Status

The short-joint beavertail is not federally or state listed, but is a BLM sensitive species and has a CRPR of 1B.2 (CNPS 2013). CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .2 are "fairly endangered in California, with 20%–80% of occurrences threatened/moderate degree and immediacy of threat" (CNPS 2011). Short-joint beavertail has a California Heritage Element Ranking of S3, indicating that it is "vulnerable in the state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation" (CDFW 2012b).

Threats

This species is threatened by urbanization, mining, horticultural collecting, grazing, and vehicles (CNPS 2014). Other possible threats include powerline construction and non-native plant encroachment (CNPS 2014).

Spanish Needle Onion *(Allium shevockii)*

The Spanish Needle onion was not included in the 2005 WEMO Final EIS (BLM 2005), but is considered to potentially occur within the planning area based on recent documentation (Dudek and ICF International 2012) and consultation with BLM biologists. The information presented below is based on the species accounts prepared for the March 2012 draft DRECP baseline biology report (Dudek and ICF International 2012).

Life History

Spanish Needle onion is a perennial bulbiferous herb that stands approximately 10 to 20 centimeters (3.9 to 7.9 inches) tall (Jepson Flora Project 2011). It grows each year from an underground bulb, with the leaves withering after flowering, which is given variously as May to June (CNPS 2011) and June to July (Jepson Flora Project 2011). This information probably comes from the original Spanish Needle Peak population, because the lower elevation Tehachapi populations flower as early as late April.

Like several other onion species in California, Spanish Needle onion appears to reproduce mostly vegetatively, by production of new bulbs that form on short rhizomes growing from the base of the parent bulb (McNeal 1987), at least as indicated by the Spanish Needle Peak population (Pitzer 2006). The flowers, however, are large and distinctive and are probably attractive to insect pollinators, and plants in the Horse Canyon area have been reported to produce seed (Hare pers.

comm. 1997, cited in Pitzer 2006). There has been no research on pollinators, seed production, establishment of bulbs, or other aspects of its reproduction (Pitzer 2006).

Spanish Needle onion grows in rocky soil and at the edge of rock outcrops and talus derived from volcanic and metamorphic rock (Pitzer 2006; CDFW 2012b; Jepson Flora Project 2011). The rocky sites inhabited by Spanish Needle onion are sparsely vegetated; the occurrences are surrounded by sparse pinyon-juniper woodland with pinyon pine, California juniper, chaparral yucca (*Hesperoyucca whipplei*), and narrowleaf goldenbush (*Ericameria linearifolia*) (CDFW 2012b). An elevation range of 2,000 to 2,500 meters (6,560 to 8,200 feet) is given in recent literature (Jepson Flora Project 2011), whereas CNPS (2011) provides a low elevation of 850 meters (2,790 feet). The Horse Canyon occurrences are at 4,800 to 5,225 feet, and recent records in the CNDDB give much lower elevations for the Jawbone Canyon occurrences: 1,050 and 3,000 feet (CDFW 2012b). Therefore, based on records in the CNDDB, its elevation range in the planning area appears to be 1,050 to 5,400 feet (CDFW 2012b).

Regulatory Status

Spanish Needle onion (*Allium shevockii*) is not federally or state listed, but is a BLM sensitive species. Spanish needle onion has a CRPR of 1B.3. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b).

Threats

Because of the relatively remote and rugged character of its habitat, threats to the species are considered minimal (Pitzer 2006; CDFW 2012b). However, because it occurs in relatively small numbers at each known occurrence, it may be vulnerable to local extirpation from random events. Potential threats mentioned by surveyors are wind energy development, grazing, OHV use, and road/trail construction (CDFW 2012b), but there is no evidence that these threats are causing actual damage to any populations. An additional potential threat comes from the showy flowers that could attract collectors, but so far, there is no evidence that bulb collection is occurring (Pitzer 2006).

Sweet-smelling monardella (*Monardella beneolens*)

This species was not analyzed previously in the 2005 WEMO Final EIS (BLM 2005) nor was it discussed in the March 2012 draft DRECP baseline biology report (Dudek and ICF International 2012). This species is being added as a result of a review of the current CNDB data base.

Life History

The sweet-smelling monardella is a perennial rhizomatous herb which is endemic (limited) to California (CalFlora 2017). It occurs within Inyo, Kern, and Tulare counties (CNPS 2017). This species generally blooms from June through September (CNPS 2017). This species occurs in granitic areas associated with the following habitat types: alpine boulder and rock field, subalpine coniferous forest, and upper montane coniferous forest (CNPS 2017). This species ranges in elevation from 2475 to 3500 meters (CNPS 2017). Known from only three occurrences on the eastern crest of the Sierra Nevada (NatureServe 2017).

Regulatory Status

The sweet-smelling monardella is not federally or state listed, but is a BLM sensitive species. This species is also a CRPR 1B.3 species. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .3 are "not very threatened in California with <20% of occurrences threatened/low degree and immediacy of threat or no current threats known" (CNPS 2011). The creamy blazing star has a California Heritage Element Ranking of S2, indicating that it is "Imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province" (CDFW 2012b).

Threats

The sweet-smelling monardella is known only from the eastern Sierran crest. Remoteness of occurrences limits disturbance. However this species hybridizes with *M. linoides* ssp. *Linoides* and M. *odoratissima* ssp. *pallida* (CNPS 2017).

Tehachapi monardella (*Monardella linoides* ssp. *oblonga*)

This species was not analyzed previously in the 2005 WEMO Final EIS (BLM 2005) nor was it discussed in the March 2012 draft DRECP baseline biology report (Dudek and ICF International 2012). This species is being added as a result of a review of the current CNDB data base.

Life History

The Tehachapi monardella is a perennial rhizomatous herb which is endemic (limited) to California (CalFlora 2017). It occurs within Kern, Los Angeles, Tulare, and Ventura counties (CNPS 2017). This species generally blooms June through August with some blooming starting as early as May (CNPS 2017). This species occurs in the following habitat types: lower montane coniferous forest, pinyon and juniper woodland, and upper montane coniferous forest (CNPS 2017). This species ranges in elevation from 900 to 2470 meters (CNPS 2017).

Regulatory Status

The Tehachapi monardella is not federally or state listed, but is a BLM sensitive species. This species is also a CRPR 1B.3 species. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .3 are "not very threatened in California with <20% of occurrences threatened/low degree and immediacy of threat or no current threats known" (CNPS 2011). The Tehachapi monardella has a California Heritage Element Ranking of S2, indicating that it is "imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province" (CDFW 2012b).

Threats

The Tehachapi monardella is threatened by road maintenance, ORVs, and wind energy (NatureServe 2017).

White-bracted spineflower (*Chorizanthe xanti* var. *leucotheca*)

This species was not analyzed previously in the 2005 WEMO Final EIS (BLM 2005) nor was it discussed in the March 2012 draft DRECP baseline biology report (Dudek and ICF International 2012). This species is being added as a result of a review of the current CNDB data base.

Life History

The white-bracted spineflower is an annual herb which is endemic (limited) to California (CalFlora 2017). It occurs within Los Angeles, Riverside, San Bernardino, and San Diego counties (CNPS 2017). This species generally blooms April through June (CNPS 2017). This species occurs in sandy or gravelly soils associated with the following habitat types: coastal scrub (alluvial fans), Mojavean desert scrub, and pinyon and juniper woodland (CNPS 2017). This species ranges in elevation from 300 to 1200 meters (CNPS 2017). Known from fifty occurrences in California (NatureServe 2017).

Regulatory Status

The White-bracted spineflower is not federally or state listed, but is a BLM sensitive species.

This species is also a CRPR 1B.2 species. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .2 are "fairly threatened in California with 20-80% occurrences threatened/moderate degree and immediacy of threat" (CNPS 2011). The White-bracted spineflower has a California Heritage Element Ranking of S3, indicating that it is "vulnerable in the state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation" (CDFW 2012b).

Threats

The White-bracted spineflower is threatened by development, flood control projects, mining, and vehicles (CNPS 2017). Other threats include grazing and weeds (NatureServe 2017).

White-margined Beardtongue *(Penstemon albomarginatus)*

The information from the 2005 WEMO Final EIS (BLM 2005) (Section 3.3.8.22, pp. 3-195 and 3-196) is supplemented by the following updated information from the DRECP Baseline Biology Report (March 2012).

Life History

White-margined beardtongue is a short-lived perennial member of the plantain family (*Plantaginaceae*) that is 15 to 35 centimeters (5.9 to 13.8 inches) tall (CNPS 2011; Jepson Flora

Project 2011). It appears to reproduce primarily through production and dispersal of seed (Etyemezian and others 2010) and blooms between March and May (Jepson Flora Project 2011). Peak flowering appears to occur in April of most years (Etyemezian and others 2010).

Like many Mojave Desert perennial plants, white-margined beardtongue reproductive events are rare and episodic and may require a combination of successive wet years that favor seed production, seed germination, and seedling growth (Etyemezian and others 2010). Andre (2010) notes that this species maintains a substantial soil seed bank and survives underground as a subterranean heterotrophy (root/caudex) during dry years (Andre 2010). Even during average years of precipitation, a large percentage of the seed bank will not germinate and many living plants remain dormant underground. Only a subset of plants will put on above ground growth, and an even fewer number flower and set seed. Seed banks can persist in the soil for many decades before germinating (Andre 2010).

Andre (2010) also has observed and documented frequent localized extinctions of cohorts with rapid establishment of plants in previously unoccupied areas. He concludes that plants at the California occurrence behave like biennials or short-lived perennials, relying upon the maintenance of a viable seed bank, and over time exhibit a shifting distribution within the aeolian sands where they occur (Andre 2010).

Etyemezian and others (2010) observed very limited seed production and dispersal of whitemargined beardtongue at study sites in Nevada during the drought years of 2008–2009. They attributed the lack of reproductive success to drought and insect herbivory at two sites, but did observe seed dispersal at one site in 2009. Seed dispersal distances ranged from 1 to 15 centimeters (0.4 to 6 inches) at this site.

MacKay (2006) noted that white-margined beardtongue is present in some washes but absent in other drainages nearby, and suggests that might be due to both limited seed dispersal distances and the lack of suitable stabilized deep sand in those other drainages (MacKay 2006). She suggests that the small seeds could be scattered short distances by ants or rodents, or may get transported by water in very wet years.

The tendency for plants to occur in scattered groups of up to 20 individuals, and the fact that young cuttings produce adventitious roots in experiments (Scogin 1989, as cited in MacKay 2006), suggest that vegetative reproduction may occur in this species in its natural habitat, even though attempts to propagate from cuttings at the garden failed (Scogin 1989, as cited in MacKay 2006).

The success of white-margined beardtongue is dependent upon a variety of interactions with pollinators and other nearby plant species, as well as a variety of ecological processes. The showy flowers are visited by several insects, including small carabid beetles, large flies, and vespid wasps with orange abdomens. Pollen was observed on upper-body surfaces of the vespids, making them the most likely pollinator of white-margined beardtongue (Scogin 1989, as cited in MacKay 2006).

White-margined beardtongue establishment is much more likely in canopy inter-spaces than under plant canopies, but Etyemezian and others (2010) could not determine whether competition with other perennial species or other micro-environmental factors were responsible for this phenomenon (Etyemezian and others 2010). For the few individuals they noticed growing in under canopy locations, the overstory species was equally likely to be white bursage or big galleta grass (only in Clark County), but never creosote bush.

The CNDDB element occurrence information cites the habitat requirements of whitemargined beardtongue as Mojave Desert scrub and desert dunes, specifically in deep, stabilized desert sand, and in washes and along roadsides (CDFW 2012b). Within California, Andre (2010) notes that this species occurs on mostly "fine alluvial sands within a sparse creosote bush scrub community."

White-margined beardtongue occurs from 635 to 1,065 meters (2,083 to 3,494 feet) (CDFW 2012b). There are additional records in the CCH database that, if verified, would extend this elevation range to as low as 426 meters (1,398 feet) (Jepson Flora Project 2011).

Regulatory Status

White-margined (*Penstemon albomarginatus*) beardtongue is not federally or state listed, but is a BLM sensitive species. White-margined beardtongue has a CRPR of 1B.1. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .1 are "seriously threatened in California, with over 80% of occurrences threatened/high degree and immediacy of threat" (CNPS 2011). White-margined beardtongue has a California Heritage Element Ranking of S1, indicating that it is "critically imperiled in the state because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province" (CDFW 2012b).

Threats

At the time of the 2006 WEMO Plan analysis, all of the white-margined beardtongue occurrences in California were located within or adjacent to BLM verified solar and wind project applications, the BLM Pisgah Solar Energy Zone, approved solar projects, or on military bases. The proposed solar projects have been withdrawn from consideration for a variety of reasons and the Pisgah SEZ was eliminated from further consideration in the Final Solar PEIS. These locations are also near possible military base expansion lands, including Fort Irwin Army Base and the Twenty-Nine Palms MCAGCC (29 Palms). According to the 29 Palms Land Acquisition/Airspace Establishment Study FEIS (29 Palms FEIS), white-margined beardtongue is located in the Lavic Lake Training Area, but it was not observed or discussed as potentially occurring in the expansion areas to the west, south, and east of the existing combat center (Department of the Navy 2011b). However, the 29 Palms FEIS also reports potential habitat (i.e., creosote bush scrub and/or desert dunes) for white-margined beardtongue in all three expansion areas, so there is likely some risk to this species that would result from these expansion plans.

This species is also potentially threatened by the presence of I-40 and numerous utility access roads that facilitate movement of people and OHVs to the occupied habitat areas. MacKay (2006) notes that repeated destruction of above-ground plants may use up nutrient stores within the long taproot of the plant and result in declines of this species. Large, organized off-road races also create massive dust clouds and are held in areas adjacent to white-margined beardtongue habitat areas in Nevada. The dust has been seen rising hundreds of feet into the air (Mangrich, pers. obs. 2009), and poses a potential threat to the Nevada population's pollinators, as well as the plant's photosynthetic capacity (Mangrich, pers. obs. 2009). Although there are no known organized off-road races held near occupied habitat within the planning area, OHV activity in the planning area could pose similar, albeit somewhat less severe, threats.

Other threats include the presence of power lines and pipelines that bring human disturbance into areas of occupied habitat (MacKay 2006). Military activities (e.g., camping) have also been observed in the vicinity of occupied habitat areas, which could increase trampling damage to the species (MacKay 2006).

Although white-margined beardtongue is a showy plant, it does not appear that there is a threat resulting from horticultural efforts because it doesn't propagate well from cuttings, and transplantation efforts have been unsuccessful (Scogin 1989, as cited in MacKay 2006).

Beaver dam Scurfpea/Beaver dam breadroot/ Beaver indian breadroot (*Pediomelum castoreum*)

This species was not analyzed previously in the 2005 WEMO Final EIS (BLM 2005) nor was it discussed in the November 2012 DRECP baseline biology report (Dudek and ICF International 2012). This species is being added as a result of a review of the current CNDDB database.

Life History

The Beaver dam breadroot, a dicot, and a perennial herb that is native to California and is also found outside of California, but is confined to western North America (CalFlora 2017). It is native to the deserts around the intersection of California, Nevada, and Arizona, where it grows in local habitat including disturbed areas (CNPS 2017). Found in open areas and on roadcuts (Jepson 2013) and in washes. Substrate is sandy. Found in Joshua tree woodland and Mojavean desert scrub vegetation communities. Elevation range 2,001 to 5,003 feet amsl (CNPS 2013) or < 5,741 feet amsl (Jepson 2013). Flowering April to May (Calflora 2013).

Regulatory Status

The Beaver dam breadroot is not federally or state listed, but is a BLM sensitive species. This species is also a CRPR 1B.2 species. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .2 are "fairly threatened in California with 20-80% occurrences threatened/moderate degree and immediacy of threat" (CNPS 2011). The Beaver dam breadroot has a California Heritage Element Ranking of S2, indicating that it is "imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province" (CDFW 2012b).

Threats

The Beaver dam breadroot is potentially impacted by vehicles and road widening (CNPS 2011).

Boyd's monardella (*Monardella boydii*)

This species was not analyzed previously in the 2005 WEMO Final EIS (BLM 2005) nor was it discussed in the November 2012 DRECP baseline biology report (Dudek and ICF International 2012). This species is being added as a result of a review of the current CNDDB database.

Life History

The Boyd's monardella is a dicot, and an annual herb that is native to California (CalFlora 2017). Endemic to California (San Bernardino County) (CNPS 2013) in the south-central Mojave Desert (Jepson 2013). Present in the Project Area (pers. comm. Chavez 2013). Known occurrences within the Project Area are clustered to the southeast of Barstow, near Ord Mountain, Camp Rock Mine, and Silver Bell Mine (CNPS 2013). Found on rocky slopes and in canyon bottoms or washes (Jepson 2013). Substrate is usually alluvial soils and bedrock cracks. Found in Mojavean desert scrub, pinyon and juniper woodland, and desert riparian scrub vegetation communities. Elevation range 4,593 to 5,413 feet amsl (CNPS 2013). Flowering August to October (Calflora 2013).

Regulatory Status

The Boyd's monardella is not federally or state listed, but is a BLM sensitive species. This species is also a CRPR 1B.2 species. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .2 are "fairly threatened in California with 20-80% occurrences threatened/moderate degree and immediacy of threat" (CNPS 2011). The Boyd's monardella has a California Heritage Element Ranking of S1, indicating that it is "critically imperiled in the state because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province" (CNPS 2017).

Threats

The Boyd's monardella is potentially impacted by mining, vehicles, wind and solar energy development, trampling, and climate change (CNPS 2017).

Mojave menodora (*Menodora spinescens var. mohavensis*)

This species was not analyzed previously in the 2005 WEMO Final EIS (BLM 2005) nor was it discussed in the November 2012 DRECP baseline biology report (Dudek and ICF International 2012). This species is being added as a result of a review of the current CNDDB database.

Life History

The Mojave menodora is a dicot, and a shrub that is native to California (CalFlora 2017). Endemic to California (Inyo and San Bernardino Counties) (CNPS 2013) on the north slope of the San Bernardino Mountains (Jepson 2013). Wide-spread distribution in Project Area (pers. comm. Chavez 2013). Known occurrences within the Project Area occur in the general vicinity of Barstow and on the north side of Joshua Tree NP into the Yucca Valley (CNPS 2013). Found on rocky desert hillsides and in canyons (Jepson 2013). Substrate is andesite gravel. Found in Mojavean desert scrub vegetation communities. Elevation range 2,264 to 6,562 feet amsl (CNPS 2013).

Regulatory Status

The Mojave menodora is not federally or state listed, but is a BLM sensitive species. This species is also a CRPR 1B.3 species. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .3 are "not very

threatened in California with <20% of occurrences threatened/low degree and immediacy of threat or no current threats known" (CNPS 2011). The Mojave menodora has a California Heritage Element Ranking of S2S3, indicating uncertainty whether it is "imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province," and/or indicating that it is "vulnerable in the state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation" (CDFW 2012b).

Threats

The Mojave menodora is potentially impacted by vehicles (CNPS 2011).

Piute Mountains jewelflower (*Streptanthus cordatus var. piutensis*)

This species was not analyzed previously in the 2005 WEMO Final EIS (BLM 2005) but was discussed in the November 2012 DRECP baseline biology report (Dudek and ICF International 2012). This species is being added as a result of a review of the current CNDB database.

Life History

The Piute Mountains jewelflower is a dicot, and perennial herb that is native to California and is endemic (limited) to California (CalFlora 2017). Endemic to California (Kern County) in the southern Sierra Nevada. Known occurrences within the project area are concentrated near Sweet Ridge, south of Cache Peak near the City of Mojave (CNPS 2017). Found on metamorphic rocks and sandy slopes, though the limited distribution makes it difficult to generalize these observations. Found in broadleaf upland forests, closed-cone coniferous forest, and pinyon-juniper woodland vegetation communities and is associated with species including associated with Bodfish Piute cypress (*Cupressus nevadensis*) and California juniper (*Juniperus californica*). Elevation range 3,592 to 7,000 feet amsl. Flowering June to July (Jepsen 2017).

Regulatory Status

The Piute Mountains jewelflower is not federally or state listed, but is a BLM sensitive species. This species is also a CRPR 1B.2 species. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .2 are "fairly threatened in California with 20-80% occurrences threatened/moderate degree and immediacy of threat" (CNPS 2011). The Piute Mountains jewelflower has a California Heritage Element Ranking of S1, indicating that it is of S1, indicating that it is "critically imperiled in the state because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province" (CDFW 2012b).

Threats

The Piute Mountains jewelflower is potentially impacted by wind energy development (CNPS 2015).

Triple-ribbed milkvetch (*Astragalus tricarinatus*)

This species was not analyzed previously in the 2005 WEMO Final EIS (BLM 2005) but was discussed in the November 2012 DRECP baseline biology report (Dudek and ICF International 2012). This species is being added as a result of a review of the current CNDDB database.

Life History

The Triple-ribbed milkvetch is a dicot, is a perennial herb that is native to California and is endemic (limited) to California. (CalFlora 2017). Known from California (Riverside and San Bernardino Counties), mainly in the eastern San Bernardino Mountains/Whitewater Canyon area, Morongo Canyon, and the western part of the Little San Bernardino Mountains, with disjunctive occurrences in the Orocopia and Santa Rosa mountain ranges (CNPS 2017). On edge of Project Area, no designated routes in habitat (pers. comm. Chavez 2013). Known occurrences within the Project Area are in Big Morongo Canyon and adjacent canyons. Found commonly on rocky slopes and ridges that are mostly barren. Substrate is coarse and granitic. Found in Joshua tree woodland and Sonoran desert scrub vegetation communities with associated species including associated plants including giant needlegrass (*Achnatherum coronatum*), California buckwheat (*Eriogonum fasciculatum*), ceanothus (*Ceanothus greggii*), bush poppy (*Dendromecon rigida*), bigberry manzanita (*Arctostaphylos glauca*), bitter snakewood (*Condalia globosa*), yerba santa (*Eriodictyon trichocalyx*), and Spanish bayonet (*Yucca schidigera*). Elevation range 2,300 to 4,000 feet amsl. Flowering February to May (Jepsen 2017).

Regulatory Status

The Triple-ribbed milkvetch is federal but not state listed species. It is also a BLM sensitive species. This species is also a CRPR 1B.2 species. CRPR 1B species are considered "rare, threatened, or endangered in California and elsewhere" (CDFW 2012b). CRPR species with a threat rank of .2 are "fairly threatened in California with 20-80% occurrences threatened/moderate degree and immediacy of threat" (CNPS 2011). The Triple-ribbed milkvetch has a California Heritage Element Ranking of S1, indicating that it is "critically imperiled in the state because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province" (CDFW 2012b).

Threats

The Triple-ribbed milkvetch is potentially impacted by pipeline maintenance and vehicles (CNPS 2010).

E.4.2 Wildlife

E.4.2.1 Regulatory Framework

Federal Endangered Species Act

The ESA includes provisions for protection and management of species that are federally listed as threatened or endangered or proposed for such listing and of designated critical habitat for these species. The administering agency for the above authority for non-marine species is the USFWS.

BLM Sensitive Species

BLM Sensitive Species are species designated by the State Director that are not already federally listed, proposed, or candidate species, or state-listed because of potential endangerment. BLM's policy is to "ensure that actions authorized, funded, or carried out do not contribute to the need to list any of these species as threatened or endangered." Various offices of the BLM maintain a list of special-status plant and wildlife species that are to be considered as part of the management activities carried out by the BLM on the lands that they administer.

California Desert Conservation Area Plan, 1980 as Amended

The CDCA Plan guides the management of all BLM-administered lands in the Mojave, Sonoran, and a small portion of the Great Basin Deserts. In total, the CDCA Plan includes an area of approximately 25 million acres, 12 million of which are public lands. The primary goal of the CDCA Plan is to provide guidance for the overall maintenance of the land while simultaneously planning for multiple uses and balancing the human needs with the need to protect the natural environment.

The CDCA Plan includes 12 elements: Cultural Resources; Native American; Wildlife; Vegetation; Wilderness; Wild Horse and Burro; Livestock Grazing; Recreation; Motorized Vehicle Access; Geology, Energy and Mineral Resources; Energy Production and Utility Corridors; and Land-Tenure Adjustment. Each of the elements contains goals and specific actions for the management, use, development, and protection of the resources and public lands within the CDCA, and is based on the concepts of multiple use, sustained yield, and maintenance of environmental quality. In addition, each element provides both a desert-wide perspective of the planning decisions for one major resource or issue of public concern as well as more specific interpretation of multiple-use class guidelines for a given resource and its associated activities.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) includes provisions for protection of migratory birds, including basic prohibitions against any taking not authorized by federal regulation. The administering agency for the above authority is the USFWS. The law contains no requirement to prove intent to violate any of its provisions. Wording in the MBTA makes it clear that most actions that result in "taking" or possession (permanent or temporary) of a protected species can be a violation of the act. The word "take" is defined as "pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect (including nests, eggs, and feathers)."

Lacey Act

The Lacey Act, as amended (16 USC 3371-3378) protects plants and wildlife by creating civil and criminal penalties for a wide variety of violations including illegal take, possession, transport, or sale of protected species.

The Bald and Golden Eagle Protection Act

Bald eagle protection began in 1940 with the passage of the Eagle Protection Act, which was later amended to include golden eagle and was renamed. The Bald and Golden Eagle Protection Act makes it unlawful to import, export, take, sell, purchase, or barter any bald eagle or golden eagle, their parts, products, nests, or eggs. Take includes pursuing, shooting, poisoning, wounding, killing, capturing, trapping, collecting, molesting, or disturbing. Exceptions may be granted by USFWS for scientific or exhibition use, or for traditional and cultural use by Native Americans. However, no permits may be issued for import, export, or commercial activities involving eagles.

Wild Horse and Burro Act of 1971, as amended

Herd Areas are those geographic areas where wild horses and/or burros were found at the time of the passage of the Wild Horse and Burro Act in 1971. Herd Management Areas are those areas within Herd Areas where the decision has been made, through Land Use Plans, to manage for populations of wild horses and/or burros. Herd Areas boundaries may only be changed when it is determined that areas once listed as Herd Areas are later found to be used only by privately owned horses or burros, or the Herd Area boundary does not correctly portray where wild horses and burros were found in 1971.

California Desert Renewable Energy Conservation Plan

BLM issued the DRECP in October, 2016. The DRECP amends the CDCA Plan, specifically with respect to natural resource conservation and renewable energy development. The DRECP establishes Ecological and Cultural Conservation and Recreation Designations, and Renewable Energy Activities, Policies, and Allocations.

State

California Endangered Species Act

The CESA includes provisions for the protection and management of species listed by the State as endangered or threatened, or designated as candidates for such listings. CESA includes a requirement for consultation "to ensure that any action authorized by a state lead agency is not likely to jeopardize the continued existence of any endangered or threatened species… or result in the destruction or adverse modification of habitat essential to the continued existence of the species" (§ 2090). Plants of California declared to be endangered, threatened, or rare are listed at 14 California Code of Regulations (CCR) § 670.2. Animals of California declared to be endangered, threatened, or rare are listed at 14 CCR § 670.5. The administering agency for the above authority is the CDFW.

Other Provisions of the California Fish and Game Code

These California Fish and Game Codes (CFGC) list bird (primarily raptor), mammal, amphibian, and reptile species that are classified as fully protected in California. Fully protected species are prohibited from being taken or possessed except under specific permit requirements. These Codes also prohibit the take, possession, or needless destruction of the nests or eggs of any bird, including birds of prey or their nests or eggs, except as otherwise provided by the code or any regulation made pursuant thereto.

E.4.2.2 Regional and Background Information

The 22 special status wildlife species identified as potentially affected by the proposed action or alternatives within the planning area are described in the following section.

The majority of the updated summaries of species are based on the Species Accounts prepared for the March 2012 draft DRECP Baseline Biology Report (Dudek and ICF International 2012) baseline biology report. The WEMO Planning area exists within the boundaries of the DRECP LUPA planning area.

Mammals

Mohave Ground Squirrel

The information from the 2005 WEMO Final EIS (BLM 2005)is supplemented by the following updated information from the DRECP Baseline Biology Report (March 2012). All other background information for this species would not change from the previous analysis included in the affected environment of the 2005 WEMO Final EIS (BLM 2005) and is not discussed further in this supplemental EIS. For a general discussion of this species, please refer to Section 3.3.3, pp. 3-144 to 3-169 of the 2005 WEMO Final EIS.

Life History

There is little direct information on the potential role of MGS in maintaining ecological relationships and processes. Their burrow systems likely provide refuge for other species that do not dig their own burrows such as snakes and lizards and potentially other small rodents. The range of the MGS is entirely overlapped by the diurnal white-tailed antelope squirrel, but there appears to be little direct competition between the two species (MGSWG 2011). They are probably prey for several natural predators, such as coyote, American badger, bobcat, red-tailed hawk, golden eagle, prairie falcon, common raven, and Mojave rattlesnake (Best 1995).

MGS maintain three types of burrows within their home ranges: (1) home burrows that are used overnight during the active season and usually located at the edge of a home range; (2) aestivation burrows; and (3) accessory burrows that are used during social interactions or for escape and thermoregulation during the midday (Best 1995). Burrows are typically constructed under large shrubs (MGSWG 2011).

Harris and Leitner (2004) conducted a 5-year radiotelemetry study of home range use by MGS in the Coso Range in Inyo County. At this study site, individual MGS home ranges (calculated using both minimum convex polygon and adaptive kernel methods) varied substantially by year,

individual, sex, and season (i.e., mating season vs. post-mating season). Generally, males have larger home ranges than females, with the most pronounced differences during the mating season.

Harris and Leitner (2005) used radiotelemetry to track dispersal movements by juvenile MGS in their first year to hibernation sites. Most juveniles dispersed relatively long distances from their natal burrow area, and exhibited dispersal that is farther than other squirrels and other mammals in proportion to home range sizes (Harris and Leitner 2005).

The MGS breeding season is from mid-February to mid-March (Best 1995; Laabs 2006). Males emerge from hibernation in February, up to two weeks before females, and during this time they may be territorial (Best 1995). Females generally only occupy male territories for one or two days then establish their own home ranges after copulation. Males stake out the overwintering sites of females to mate with them when they emerge (MGSWG 2011).

Pregnant females are present from February to May and gestation lasts from 29 to 30 days (Best 1995). Litter sizes range from four to nine (Best 1995), though mortality of juveniles is high during the first year, especially for juvenile males (MGSWG 2011). Parental care and lactation continues through mid-May and juveniles emerge above ground from 10 days to 2 weeks later. Litters generally appear above ground in early May (Harris and Leitner 2004). Females will breed at 1 year of age if environmental conditions are suitable, but males do not mate until 2 years of age (MGSWG 2011).

Threats

Threats to the Mohave ground squirrel would not change from the previous analysis provided by the 2005 WEMO Final EIS (BLM 2005) within the planning area. For a discussion of these threats, please refer to Section 3.3.3.5, pg. 3-157 to 167.

Bats

The information from the 2005 WEMO Final EIS (BLM 2005)is supplemented by the following updated information from the DRECP Baseline Biology Report (March 2012). All other background information for this species would not change from the previous analysis included in the affected environment of the 2005 WEMO Final EIS (BLM 2005) and is not discussed further in this supplemental EIS. For a general discussion of these species, please refer to Section 3.3.4, pp. 3-169 to 3-170 of the 2005 WEMO Final EIS.

The information from the 2005 WEMO Final EIS (BLM 2005) (Section 3.3.4, pg. 3-169 to 3-170) is supplemented by the following updated information from the DRECP Baseline Biology Report (Dudek and ICF International 2012).

Life History

Five species occurring within the planning area could potentially be affected by the proposed action or alternatives: spotted bat, pallid bat, western mastiff bat, fringed myotis, and western small-footed myotis.

The fringed myotis and western small-footed myotis were not included in the 2005 WEMO Final EIS (BLM 2005). The fringed myotis and western small-footed myotis occur within a wide variety of habitats, but use caves, mines, buildings, and crevices as roost sites. Hibernation lasts

from October/November through March. Mating occurs in the fall and the young are born from May through July (Zeiner, D.C. et al 1988-1990).

The fringed myotis is widespread in California and the western small-footed myotis is a common resident of arid uplands in California occurring from on the west and east sides of the Sierra Nevada, and in Great Basin and desert habitats from Modoc to Kern and San Bernardino counties. The range for both species occurs along the western and northern boundaries of the planning area (Zeiner, D.C. et al 1988-1990).

All other life history information for the other three species would not change from the previous analysis included in the affected environment of the 2005 WEMO Final EIS (BLM 2005) and is not discussed further in this supplemental EIS. For a general discussion of these species, please refer to Section 3.3.4, pp. 3-169 to 3-170 of the 2005 WEMO Final EIS.

Regulatory Status

The regulatory status for the five bat species would not change from the previous analysis included in the affected environment of the 2005 WEMO Final EIS (BLM 2005) and is not discussed further in this supplemental EIS. For a general discussion of these species, please refer to Section 3.3.4, pp. 3-169 to 3-170 of the 2005 WEMO Final EIS.

Threats

The threats identified for the five bat species would not change from the previous analysis included in the affected environment of the 2005 WEMO Final EIS (BLM 2005) and is not discussed further in this supplemental EIS. For a general discussion of these species, please refer to Section 3.3.4, pp. 3-169 to 3-170 of the 2005 WEMO Final EIS.

Nelson's Bighorn Sheep

The information from the 2005 WEMO Final EIS (BLM 2005) is supplemented by the following updated information from the DRECP Baseline Biology Report (March 2012). All other background information for this species would not change from the previous analysis included in the affected environment of the 2005 WEMO Final EIS (BLM 2005) and is not discussed further in this supplemental EIS. For a general discussion of this species, please refer to Section 3.3.5, pp. 3-170 to 3-171 of the 2005 WEMO Final EIS.

Life History

The life history of the bighorn sheep would not change from the previous analysis provided by the 2005 WEMO Final EIS (BLM 2005) within the planning area. Please refer to Section 3.3.5.1, pg. 3-171.

Regulatory Status

The regulatory status of the bighorn sheep would not change from the previous analysis provided by the 2005 WEMO Final EIS (BLM 2005) within the planning area. Please refer to Section 3.3.5.1, pg. 3-171.

Threats

Threats to this species would not change from the previous analysis provided by the 2005 WEMO Final EIS (BLM 2005) within the planning area. For a discussion of these threats, please refer to Section 3.3.5.1, pg. 3-171.

Birds

Southwestern Willow Flycatcher

The information from the 2005 WEMO Final EIS (BLM 2005) is supplemented by the following updated information from the DRECP Baseline Biology Report (March 2012). All other background information for this species would not change from the previous analysis included in the affected environment of the 2005 WEMO Final EIS (BLM 2005) and is not discussed further in this supplemental EIS. For a general discussion of these species, please refer to Section 3.3.6.11, pp. 3-178 to 3-179 of the 2005 WEMO Final EIS.

Life History

In California, the southwestern willow flycatcher is restricted to riparian habitats occurring along streams or in meadows (Craig and Williams 1998; Sogge and others 2010). The structure of these habitats typically consists of a dense mid-story and understory and can also include a dense canopy (60 FR 10695–10715). However, suitable vegetation is not uniformly dense and typically includes interspersed patches of open habitat. Typical plant species associated with their habitat include willow (*Salix* spp.), mulefat (*Baccharis salicifolia*), box-elder (*Acer negundo*), stinging nettle (*Urtica* spp.), cottonwood (*Populus* spp.), tamarisk (*Tamarix* spp.), and Russian olive (*Elaeagnus angustifolia*). Within the habitat structure parameters discussed above, southwestern willow flycatcher does demonstrate adaptability in that it can occupy riparian habitats composed of native broadleaf species, a mix of native and exotic species, or monotypic stands of exotics (Sogge and others 2010). This subspecies is known to nest in monotypic stands of Russian olive and tamarisk (60 FR 10695–10715). Furthermore, along the San Luis Rey River in San Diego County, southwestern willow flycatcher has nested in riparian habitat dominated by coast live oak (*Quercus agrifolia*), and in Cliff-Gila Valley in New Mexico they are known to nest in tall box-elder. Plant species composition does not seem as important as a dense twig structure and an abundance of live, green foliage (Sogge and others 2010). Also, the location of the nest seems to depend more on suitable twig structure and live vegetative cover than height or plant species composition (Sogge and others 2010).

Southwestern willow flycatcher nesting sites are located near surface water or saturated soils. Due to the variability of hydrologic conditions in Southern California, water availability at a site may range from inundated to dry from year to year or within the breeding season. Nonetheless, moisture levels must remain high enough to support appropriate riparian vegetation (Sogge and others 2010). Dense willow thickets are the most important habitat component for breeding E. t. adastus and E. t. brewsteri in California (Stefani and others 2001).

Southwestern willow flycatchers are insectivorous and forage at the edges or internal openings of their territory, above the canopy or over open water. Their diet consists mainly of bees, wasps, flies, leaf hoppers, and beetles (Durst and others 2008b), which they catch in the air, glean from

vegetation, or occasionally pick, catch, or seize from the ground (Sedgwick 2000). Presumably, the diets of migrating *E. t. adastus* and *E. t. brewsteri* are similar.

Southwestern willow flycatcher is predominantly monogamous although reports of polygyny are not uncommon (Sedgwick 2000). Males arrive at the breeding sites between early May and early June (USFWS 2002). Females arrive 1 to 2 weeks after males and inhabit the territory of a male (Finch and Stoleson 2000). Nest building begins approximately 2 weeks after pair formation. The female incubates the eggs for an average of 12 to 13 days. The nestlings fledge between 12 and 15 days after hatching (Sogge and others 2010). Southwestern willow flycatcher will typically renest following an unsuccessful attempt and less frequently may renest following a successful attempt.

Regulatory Status

The regulatory status for the southwestern willow flycatcher has not changed from the 2005 WEMO Final EIS as described in Section 3.3.6.11, pg. 3-179 (BLM 2005).

Threats

The primary threat to the southwestern willow flycatcher is loss, modification, and fragmentation of suitable riparian habitat (Sogge et al. 2010). In general, increased human populations and development have resulted in a decline of riparian habitat, a habitat type that is naturally rare, patchy, and dynamic in the Southwest due to the varying hydrologic conditions of the region. The specific primary causes for loss and modification of riparian habitats have been dams and reservoirs, water diversion and groundwater pumping, channelization, flood control, agriculture, recreation, and urbanization (Sogge et al. 2010). Other threats include nest parasitism by cowbirds and grazing.

Western Yellow-billed Cuckoo

The information from the 2005 WEMO Final EIS (BLM 2005) is supplemented by the following updated information from the DRECP Baseline Biology Report (March 2012). All other background information for this species would not change from the previous analysis included in the affected environment of the 2005 WEMO Final EIS (BLM 2005) and is not discussed further in this supplemental EIS. For a general discussion of these species, please refer to Section 3.3.6.15, pg. 3-181 of the 2005 WEMO Final EIS.

Life History

In the western United States, nests are typically constructed in willows, Fremont cottonwood, mesquite, hackberry (*Celtis* spp.), soapberry (*Sapindus saponaria*), alder (*Alnus* spp.), or cultivated fruit trees on horizontal branches or vertical forks of the large tree or shrub (Hughes 1999). Nest sites in arid regions are restricted to relatively humid river bottoms, ponds, swampy areas, and damp thickets (Hughes 1999). Foraging occurs extensively in cottonwood riparian habitat (Hughes 1999).

The western yellow-billed cuckoo has a short breeding season, lasting only about 4 months from time of arrival on breeding grounds in the spring to fall migration. Western yellow-billed cuckoos typically lay a single clutch per season in mid-June to mid-July, and incubation occurs over 9 to 11 days (Hughes 1999; Johnson and others 2008). Development of the young is very rapid, with

fledgling occurring in 6 to 9 days; the entire breeding cycle may be only 17 days from egg laying to fledging of the young (Hughes 1999). Fledglings are dependent upon parents for up to 3 weeks following fledgling (Johnson and others 2008). Cuckoos are a monogamous species, and both sexes incubate and care for the young (Hughes 1999).

Regulatory Status

The regulatory status for the western yellow-billed cuckoo has been updated from the 2005 WEMO Final EIS (BLM 2005) to include a BLM Sensitive listing in addition to California endangered and proposed threatened under the ESA (as described in Section 3.3.6.15, pg. 3-181 of the 2005 WEMO Final EIS (BLM 2005). Additionally, a decision on the designation of Critical Habitat is pending.

Threats

The western yellow-billed cuckoo is sensitive to habitat fragmentation and degradation of riparian woodlands due to agricultural and residential development (Hughes 1999), and major declines among western populations reflect local extinctions and low colonization rates (Laymon and Halterman 1989). Groundwater pumping and the replacement of native riparian habitats by invasive non-native plants, especially tamarisk, have substantially reduced the area and quality of available breeding habitats for yellow-billed cuckoo (75 FR 69222–69294).

Bendire's Thrasher

The information from the 2005 WEMO Final EIS (BLM 2005) is supplemented by the following updated information from the DRECP Baseline Biology Report (March 2012). All other background information for this species would not change from the previous analysis included in the affected environment of the 2005 WEMO Final EIS (BLM 2005) and is not discussed further in this supplemental EIS. For a general discussion of these species, please refer to Section 3.3.6.1, pp. 3-173 to 3-174 of the 2005 WEMO Final EIS.

Life History

This species breeds in desert areas containing cactus, Mojave yuccas, and Joshua trees.

Regulatory Status

The regulatory status for the Bendire's thrasher has been updated from the 2005 WEMO Final EIS (BLM 2005) to include BLM Sensitive and a USFWS bird of conservation concern in addition to the California Species of Special Concern status (as described in Section 3.3.6.1, pg. 3-173 of the 2005 WEMO Final EIS).

Threats

Identified threats include habitat destruction through rural and urban development, off-road vehicle activity during the nesting season, and removal of yuccas and cholla cacti. Grazing has shown both positive and negative effects on this species. Fragmentation of the small remaining populations is a serious long-term threat.

Burrowing Owl

The information from the 2005 WEMO Final EIS (BLM 2005) is supplemented by the following updated information from the DRECP Baseline Biology Report (March 2012). All other background information for this species would not change from the previous analysis included in the affected environment of the 2005 WEMO Final EIS (BLM 2005) and is not discussed further in this supplemental EIS. For a general discussion of these species, please refer to Section 3.3.6.3, pg. 3-174 of the 2005 WEMO Final EIS.

Life History

Throughout their range, burrowing owls require habitats with three basic attributes: open, well-drained terrain; short, sparse vegetation generally lacking trees; and underground burrows or burrow-like structures (e.g., pipe openings) (Gervais and others 2008; Klute and others 2003).

Burrowing owls are opportunistic predators that will consume arthropods, small mammals, birds, amphibians, and reptiles (Haug and others 1993; Karalus and Eckert 1987; Gervais and others 2008). Owls typically forage in habitats characterized by low-growing, sparse vegetation (Haug and others 1993). In California, crickets and meadow voles were found to be the most common food items (Thomsen 1971).

Nesting in California generally runs from February through August, with peak activity from mid-April to mid-July (Zeiner and others 1990; Thomsen 1971; Gervais and others 2008). Burrowing owls are primarily monogamous and typically breed once per year.

California supports year-round resident burrowing owls and over-wintering migrants (Gervais and others 2008). Many owls remain resident throughout the year in their breeding locales (especially in central and Southern California) while some apparently migrate or disperse in the fall (Haug and others 1993; Coulombe 1971; Barclay 2007).

Burrowing owls exhibit high site-fidelity and reuse burrows year after year, although dispersal distances may be considerable and variable depending on location and the age of the owls. In California, western burrowing owls most commonly live in burrows created by ground squirrels (Gervais and others 2008). Therefore, the suitability and quality of burrowing owl habitat in the planning area is closely and positively related to the occurrence and population health of ground squirrels. In other regions where squirrel burrows do not occur, burrowing owls may depend on badgers for nest burrow excavation, although this species is a major predator of burrowing owls (Green and Anthony 1997). Where burrowing mammals have been eliminated, burrowing owls may prefer grazed areas where livestock have reduced vegetation height (Wedgwood 1976).

Regulatory Status

The regulatory status for the burrowing owl has been updated from the 2005 WEMO Final EIS (BLM 2005) to include BLM Sensitive and a USFWS bird of conservation concern in addition to the California Species of Special Concern status (as described in Section 3.3.6.3, pg. 3-174 of the 2005 WEMO Final EIS.

Threats

Threats to the burrowing owl would not change from the previous analysis provided by the 2005 WEMO Final EIS (BLM 2005) within the planning area. For a discussion of these threats, please refer to Section 3.3.6.3, pg. 3-174.

Golden Eagle

The information from the 2005 WEMO Final EIS (BLM 2005) is supplemented by the following updated information from the DRECP Baseline Biology Report (March 2012). All other background information for this species would not change from the previous analysis included in the affected environment of the 2005 WEMO Final EIS (BLM 2005) and is not discussed further in this supplemental EIS. For a general discussion of these species, please refer to Section 3.3.6.5, pg. 3-175 of the 2005 WEMO Final EIS.

Life History

Golden eagles use nearly all terrestrial habitats of the western states, occurring primarily in mountainous canyon land, rimrock terrain of open desert and grassland areas (Kochert and others 2002). In central California, they prefer open grasslands and oak savanna, with lesser numbers in oak woodland and open shrublands (Hunt and others 1998) but can also be found in desert grasslands and chaparral habitats (Millsap 1981). Secluded cliffs with overhanging ledges and large trees are used for nesting and cover. Preferred territory sites include those that have a favorable nest site, a dependable food supply, and broad expanses of open country for foraging. Golden eagles typically forage in open habitats including grasslands and shrublands.

Golden eagles in the planning area are mostly resident, but may move downslope for winter or upslope after the breeding season (Polite and Pratt 1990). Both residents and migratory individuals show fidelity to wintering areas (Kochert and others 2002).

Golden eagles use the same nest each year, alternate nests in successive years, or nest only every other year (Terres 1991). Pairs rarely re-nest when the first clutch is destroyed (Watson 1997) and there are no records of pairs producing more than one brood per year. Golden eagles prefer to locate their nests on cliffs or trees near forest edges or in small stands near open fields (Bruce and others 1982; Hunt and others 1998). Mating occurs from late January through August, with peak activity in March through July. Eggs are laid from early February to mid-May. Incubation lasts 43–45 days (Kochert and others 2002), and the fledging period is 72–84 days (Johnsgard 1990). The young usually remain dependent on their parents for as long as eleven weeks after fledging.

Golden eagles are a top avian predator in the scrubland, grassland, and woodland ecosystems that make up much of the planning area. They feed mainly on leporids (hares and rabbits) and sciurids (ground squirrels, prairie dogs, marmots), but they also take birds, fish, and reptiles, mostly on or near the ground, and they frequently feed on carrion (Kochert and others 2002). They may directly compete with ferruginous hawks and other smaller hawks for small mammals, and with California condors and common ravens for carrion. Territorial interactions with other golden eagles may result in some fatalities.

Regulatory Status

The regulatory status for the golden eagle has been updated from the 2005 WEMO Final EIS (BLM 2005) to include a BLM Sensitive listing in addition to the California: Fully Protected, Species of Special Concern (as described in Section 3.3.6.5, pg. 3-175 of the 2005 WEMO Final EIS (BLM 2005).

Threats

Threats to the golden eagle would not change from the previous analysis provided by the 2005 WEMO Final EIS (BLM 2005) within the planning area. For a discussion of these threats, please refer to Section 3.3.6.5, pg. 3-175.

Gray Vireo

The information from the 2005 WEMO Final EIS (BLM 2005) is supplemented by the following updated information. All other background information for this species would not change from the previous analysis included in the affected environment of the 2005 WEMO Final EIS (BLM 2005) and is not discussed further in this supplemental EIS. For a general discussion of these species, please refer to Section 3.3.6.6, pp. 3-175 to 3-176 of the 2005 WEMO Final EIS.

Life History

This species is found on arid slopes dominated by short, densely branched, stiff-twigged shrubs. It is migratory, occurring in the western Mojave Desert from early April until mid-August.

Regulatory Status

The regulatory status for the gray vireo has been updated from the 2005 WEMO Final EIS (BLM 2005) to include USFWS bird of conservation concern in addition to the BLM Sensitive and California Species of Special Concern status (as described in Section 3.3.6.6, pp. 3-175 to 3-176 of the 2005 WEMO Final EIS).

Threats

Identified threats include habitat destruction through rural and urban development, off-road vehicle activity during the nesting season, wildland fires, and removal of yuccas and cholla cacti. Grazing has shown both positive and negative effects on this species. Fragmentation of the small remaining populations is a serious long-term threat.

LeConte's Thrasher

The information from the 2005 WEMO Final EIS (BLM 2005) is supplemented by the following updated information. All other background information for this species would not change from the previous analysis included in the affected environment of the 2005 WEMO Final EIS (BLM 2005) and is not discussed further in this supplemental EIS. For a general discussion of these species, please refer to Section 3.3.6.8, pg. 3-177 of the 2005 WEMO Final EIS.

Life History

The habitat for the LeConte's thrasher is creosote bush scrub with stands of cholla cactus, Joshua trees, and thorny shrubs.

Regulatory Status

The regulatory status for the LeConte's thrasher has been updated from the 2005 WEMO Final EIS (BLM 2005) to include USFWS bird of conservation concern in addition to the California Species of Special Concern status (as described in Section 3.3.6.8, pg. 3-177 of the 2005 WEMO Final EIS).

Threats

The primary threat is loss of habitat and fragmentation of habitat into segments too small to support a viable population in the long term. LeConte's thrashers are sensitive to vehicle traffic during the nesting season, especially off road travel in washes.

Bell's Vireo (Least Subspecies)

The Bell's vireo was not included in the 2005 WEMO Final EIS (BLM 2005), but is considered to potentially occur within the planning area based on recent documentation (Dudek and ICF International 2012) and consultation with BLM biologists. The information presented below is based on the species accounts prepared for the March 2012 draft DRECP baseline biology report (Dudek and ICF International 2012).

Life History

Bell's vireo is a neotropical migrant that breeds in the summer in riparian scrub. This species is largely associated with early successional cottonwood-willow and are known to nest in riparian woodlands dominated by willow (Peterson and others 2004) and Fremont cottonwood (Kus 2002b). Suitable willow woodlands are typically dense with well-defined vegetative strata or layers. The most critical structural component of nesting habitat in California is a dense shrub layer 2 to 10 feet aboveground (Goldwasser 1981; Franzreb 1989; Brown 1993). The presence of water, including ponded surface water or moist soil conditions, may be an important component of nesting habitat (Rosenberg and others 1991). Bell's vireo may forage in scrub or chaparral habitat near nesting habitat (USFWS 1986b).

Breeding least Bell's vireos begin arriving on their breeding grounds in late March and begin nesting in early April (Kus 2002a). Individuals may remain on the breeding grounds into early October, but nesting is typically finished by the end of July (Kus 1999).

Little is known about the migratory routes of this species. Individuals leave the northernmost breeding grounds by August or September (Barlow 1962). Most have left the United States by early October, although some may remain in the LCR Valley until late November (Brown 1993). During spring migration, adults return to their breeding grounds in early to mid-March and reach the northern limits of the breeding range in May (Brown 1993; Kus 1999). Home range and movement during the breeding season is limited to areas within dense riparian corridors.

Regulatory Status

The least Bell's vireo is both federally listed and California state listed as endangered. Bell's Vireo is also listed as a Bird of Conservation Concern by the USFWS within the Mojave Desert Bird Conservation Regions (USFWS 2008a). Critical habitat is not found within the study area for this species.

Threats

Historical loss of riparian habitat due to agricultural practices, urbanization, off-road vehicular activity, and exotic plant invasion has contributed to decline of the species (USFWS 2006a, Wildlife Action Plan Team 2006). Loss of breeding habitat due to water source alteration (e.g., channelization, urbanization, and firewood cutting) also threatens the species. In addition, nest parasitism by the brown-headed cowbird has greatly reduced nest success throughout most of its breeding range and has been suggested as a primary cause for decline throughout California. In urbanized areas, where habitat is fragmented and breeding habitat lacks buffers, nest predation may also increase due to meso-predator release and the addition of non-native predators such as domestic or feral cats (USFWS 2006a). The Argentine ant (*Linepithema humile*) also has been noted as a potential nest predator (Peterson and others 2004).

Swainson's Hawk

The Swainson's hawk was not included in the 2005 WEMO Final EIS (BLM 2005), but is considered to potentially occur within the planning area based on recent documentation (Dudek and ICF International 2012) and consultation with BLM biologists. The information presented below is based on the species accounts prepared for the March 2012 draft DRECP baseline biology report (Dudek and ICF International 2012).

Life History

Swainson's hawks breed in the grasslands, shrub-steppe, desert, and agricultural areas of the Columbia Basin, Great Basin, Great Plains, American Southwest, and the Central Valley of California. In California, remnant (or recolonizing) populations in Southern California are found in the western Mojave Desert in the Antelope Valley and in the eastern Mojave Desert in the Mojave National Preserve. Historically, Swainson's hawks nested throughout the California lowlands, including coastal valleys and plains where they no longer occur today. Specific locations where Swainson's hawks have been reported breeding in southeastern California include near Cima Dome and Lanfair Valley in San Bernardino County, at Oasis Ranch in Mono County, and near Lancaster in Los Angeles County. They generally nest in isolated trees, narrow bands of vegetation, or along riparian corridors in grassland, shrubland, and agricultural landscapes. Within the Western Mojave area, Joshua trees (Yucca brevifolia) and non-native ornamental trees or trees planted as windbreaks also function as nest sites. In North America, breeding Swainson's hawks prey chiefly upon small rodents such as young ground squirrels (Spermophilis spp.), pocket gophers (Thomomys spp.), deer mice (Peromyscus spp.), and voles (Microtus spp.). Swainson's hawks arrive on the breeding grounds in March-April.

Regulatory Status

The Swainson's hawk is California state listed as threatened and is also listed as a Bird of Conservation Concern by the USFWS within the Mojave Desert Bird Conservation Regions (USFWS 2008a).

Threats

Threats to this species include historical loss of riparian habitat due to agricultural practices, urbanization, and contracting range of Joshua trees and riparian habitats in the Mojave Desert (Bloom 1980). Chronic and acute pesticide poisoning also affects the Swainson's hawk (Goldstein et al. 1996, Risebrough et al. 1989).

California Condor (*Gymnogyps californianus*)

Life History

Currently, the condor is found in three disjunct populations: a reintroduced population in both Southern and central–coastal California, a reintroduced population in the Grand Canyon area of Arizona, and a reintroduced population in Baja, California, Mexico.

California condors are primarily a cavity nesting species and typically nest in cavities located on steep rock formations or in the burned out hollows of old-growth conifers. Less typical nest sites include cliff ledges, cupped broken tops of old-growth conifers, and in several instances, nests of other species. California condors are obligate scavengers, feeding only on the carcasses of dead animals, primarily medium- to large-sized mammals, but also occasionally on reptiles and birds. Condor food items within interior California in prehistoric times probably included mule deer (*Odocoileus hemionus*), tule elk (*Cervus elaphus nannodes*), pronghorn antelope (*Antilocapra americana*), and smaller mammals.

Regulatory Status

The California condor is listed as federally and state Endangered and state Fully Protected.

Reptiles and Amphibians

Desert Tortoise

The information from the 2005 WEMO Final EIS (BLM 2005) is supplemented by the following updated information from the DRECP Baseline Biology Report (March 2012). All other background information for this species would not change from the previous analysis included in the affected environment of the 2005 WEMO Final EIS (BLM 2005) and is not discussed further in this supplemental EIS. For a general discussion of these species, please refer to Section 3.3.2, pp. 3-69 to 3-144 of the 2005 WEMO Final EIS.

Life History

The desert tortoise can be found in a wide variety of habitats, such as alluvial fans, washes, canyons, and saltbush plains (Coachella Valley Conservation Commission 2007; Woodbury and Hardy 1948; Lovich and Daniels 2000; USFWS 1994). Occupied habitat for populations in the

Western Mojave Desert includes valleys, bajadas, and hills with sandy loams to rocky substrates (Germano and others 1994). The vegetation mostly consists of low growing sclerophyll shrubs with mostly winter germinating annuals (Germano and others 1994). Whereas most tortoises in the Mojave Desert are usually associated with creosote bush (*Larrea tridentata*) scrub on alluvial fans and bajadas (USFWS 2008), they can also be found in Saltbush scrub (*Atriplex* spp.) (Stewart 1991) and even in some man-made structures, such as artillery mounds (Baxter 1988).

The presence of shrubs in tortoise habitat is extremely important. Shrubs not only supply shade for the tortoises during hot weather (Marlow 1979), but also the roots provide support and protection for tortoise burrows. For instance, near Twentynine Palms, California, 71% of desert tortoise burrows were associated with creosote bush, and desert tortoises avoided the only community without creosote bush (Baxter 1988). However, other investigators found that burrows were not significantly closer to creosote bush than random sites in areas with vegetation representing both Mojave and Sonoran affinities. Burrows were significantly farther from yucca (*Yucca* spp.) than random sites (Lovich and Daniels 2000). In still another case, burrows were associated with Mojave yucca (*Yucca schidigera*) and catclaw acacia (*Acacia greggii*) even though these species were not particularly abundant (Burge 1978). Wilson and others (1999) found that most juvenile burrows were associated with shrubs. These studies point out that utilization of shrubs varies with the location of the study site; nevertheless, shrubs provide important resources for the desert tortoise.

Several studies have also shown that edaphic (soil) conditions are important for desert tortoises. Tortoises spend up to 98% of their lives underground (Nagy and Medica 1986). Where soils are so sandy that they cannot support the roof of a burrow, tortoises are unlikely to utilize the area (Baxter 1988). In a multivariate analysis of tortoise abundance criteria, Weinstein and others (1986) indicated that "soil digability" is a significant regression variable (i.e., this variable accounted for a significant amount of the variance in habitat use). Conversely, if a caliche horizon (a hardened deposit of calcium carbonate) is present, it may be so hard that tortoises cannot successfully burrow under it. For instance, at the Twentynine Palms Marine base, Baxter (1988) found that every "tank pit" supported tortoise burrows, most often located just under the hardpan.

Desert tortoises are herbivores, and wildflowers, grasses, and in some cases, cacti make up the bulk of their diet (USFWS 2010e; Woodbury and Hardy 1948). Some of the more common herbaceous species utilized by the desert tortoise include desert dandelion (*Malacothrix glabrata*), primrose (*Oenothera* spp.), gilia (*Gilia* spp.), showy desert- marigold, and filaree. Additionally, tortoises may eat some grasses, such as Indian rice grass (*Oryzopsis hymenoides*) or galleta grass (*Hilaria rigida*), although the nutritional value may be less. Also, tortoises are known to eat some cacti such as prickly pear (*Opuntia mohavensis*), beavertail (*Opuntia basilaris*), and various cholla cacti (*Opuntia* spp.). Spring desert annuals and grasses are particularly important in that they supply tortoises with much needed water (USFWS 2010e), which can be stored by desert tortoises for long periods of time (Marlow 1979; Woodbury and Hardy 1948). In Twentynine Palms, California, desert tortoises were found in plant communities with high plant species diversity, such as washes and ecotones between communities (Baxter 1988). Although tortoises were captured more frequently in the diverse wash community—significantly more than expected based on a random distribution—this could be a result of higher visibility to the surveyors in these areas. Nevertheless, their burrows were also significantly closer to ecotones than a set of random points. The use of these high plant diversity areas may therefore be related to increased food availability or possibly the nature of the annual herbs found in these areas.

In addition to the description of tortoise activity presented in the 2005 WEMO Final EIS (BLM 2005) (3.3.2.3, pp. 3-73 to 3-74), tortoise activity is focused on its home range and is primarily determined by temperature (USFWS 1994). Nevertheless, some relocated tortoises have moved significant distances from their release point, including crossing major highways (Stewart 1991). Duda and others (1999) found that tortoise home ranges tend to shrink during periods of drought compared to years of high rains. Following winter hibernation, tortoises become active as low temperatures abate in the spring months. During the spring, tortoises are active throughout the day, foraging on the fresh shoots of annual plants. But as the heat continues to increase into the summer months, tortoises are active only in the cooler morning, late afternoon, and evening hours. During the hot daytime temperatures, tortoises retreat to burrows to wait it out or, in some cases, will aestivate through the summer.

In addition to the description of tortoise activity presented in the 2005 WEMO Final EIS (BLM 2005) (3.3.2.3, pp. 3-75 to 3-76), the desert tortoise breeds in the late summer and fall, before going into hibernation for the winter. Males will "joust" to establish loosely defined home ranges, but these can overlap and are not exclusive. Home range size can vary dramatically, from 10 to over 450 acres (USFWS 1994). Females begin breeding at about 15 to 20 years of age, and will store the male's sperm (Gist and Fisher 1993; Turner and Berry 1984). Egg laying occurs in the spring, but occasionally may also take place in the fall. Incubation is typically about 100 days, with the eggs hatching in the late summer and early fall. There is little or no parental care of the nest or the young. The sex of the offspring is determined by the incubation temperature; females being hatched at higher ground temperatures (above 89°F) while males are hatched below this temperature (Spotila and others 1994). Desert tortoises can produce from one to three clutches of eggs per year. On rare occasions, clutches can contain up to 15 eggs; most clutches contain 3 to 7 eggs, with an average clutch size of 4.5 eggs (Turner and others 1984, 1986).

The desert tortoise is a primary consumer; that is, they feed on plants. As such, they compete for vegetation resources with other primary consumers, such as the desert iguana, Gambel's quail, mourning dove (*Zenaida macroura*), pronghorn antelope, and domestic cattle (*Bos taurus*). Adult tortoises are preyed on by few other animals; however, some may be taken by coyote and kit fox. Young tortoises are routinely preyed upon by kit fox and common raven.

Desert tortoise burrows supply important shade and thermoregulatory resources for a variety of species, including many species of snakes, insects and spiders, and small mammals.

Regulatory Status

The information from the 2005 WEMO Final EIS (BLM 2005) (Section 3.3.2.1, pg. 3-69), is supplemented by the following updated information from the DRECP Baseline Biology Report (March 2012).

The Agassiz's desert tortoise (*Gopherus agassizii*) (hereafter simply referred to as desert tortoise) is both a California state- and federally listed threatened species. Critical habitat for desert tortoise was first designated for the Beaver Dam Slope (Utah) population in 1980 (45 FR 55654–55666). An initial recovery plan for the Mojave population of the desert tortoise was completed in 1994 (USFWS 1994). A revised draft recovery plan was completed in 2008 (USFWS 2008 and finalized in 2011 (USFWS 2011).

Under the 2011 Recovery Plan (USFWS 2011), a revision of the desert tortoise recovery units was made reducing the initial six units to five based on recent genetic work (Murphy and others 2007;

Hagerty and Tracy 2007). The principal changes are results of combining and expanding the previous northern Colorado and eastern Colorado units into one (i.e., Colorado Recovery Unit), a contraction of the Eastern Mojave Recovery Unit, an appurtenant expansion of the Northeastern Recovery Unit, and a contraction of the southern extreme of the Western Mojave Recovery Unit in the vicinity of the Coachella Valley.

Threats

Threats to desert tortoises within the WEMO Planning Area have not changed from the previous analysis provided by the 2005 WEMO Final EIS (BLM 2005) and associated 2006 Biological Opinion, except as discussed herein. For a discussion of these threats, please refer to the 2006 Biological Opinion in Appendix F.

Mojave Fringe-toed Lizard

The information from the 2005 WEMO Final EIS (BLM 2005)is supplemented by the following updated information from the DRECP Baseline Biology Report (March 2012), field data collected by the Barstow and Ridgecrest Field Offices, and other literature cited herein. All other background information for this species would not change from the previous analysis included in the affected environment of the 2005 WEMO Final EIS (BLM 2005) and is not discussed further in this supplemental EIS. For a general discussion of these species, please refer to Section 3.3.7.1, pp. 3-182 to 3-183 of the 2005 WEMO Final EIS.

Life History

The Mojave fringe-toed lizard is best described as an opportunistic omnivore. They feed primarily on sand-dwelling insects, but will also feed on the flowers, leaves, and seeds of annual plants (Jarvis 2009). Juvenile Mojave fringe-toed lizards feed primarily on arthropods including ants, beetles, and scorpions. As is seen in many reptiles that live in arid environments, these lizards obtain most of their water from the insects and plants that they ingest (76 FR 61321–61330).

Mating typically occurs between April and late June (76 FR 61321–61330). Reproductive activity is highly dependent on the availability of sand-dwelling plants that grow in response to winter (October–March) rainfall (76 FR 61321–61330). Clutch size ranges from two to five eggs, but average two or three eggs (Miller and Stebbins 1964). During years with low rainfall females produce smaller clutch sizes, or none at all. Conversely, they may have multiple clutches in years with abundant rainfall (76 FR 61321–61330).

Mojave fringe-toed lizards are most active from late spring through early fall, when they are active during the hotter periods of the day. They seek refuge in burrows or under the sand when daytime surface temperatures start to exceed 49°C (120°F).

Regulatory Status

The regulatory status for the Mojave fringe-toed lizard has been updated from the 2005 WEMO Final EIS (BLM 2005) to include BLM Sensitive in addition to the California Species of Special Concern status (as described in Section 3.3.7.1, pg. 3-182 of the 2005 WEMO Final EIS (BLM 2005).

Threats

Threats to the Mojave fringe-toed lizard would not change from the previous analysis provided by the 2005 WEMO Final EIS (BLM 2005) within the planning area. For a discussion of these threats, please refer to Section 3.3.7.1, pp. 3-182 to 3-183.

Northern Sagebrush Lizard

Life History

The sagebrush lizard occurs in a wide variety of open forest and shrub habitat types and utilizes mammal burrows and rock crevices as hibernation sites during cold periods (Zeiner et al 1990). Individuals are active from March or April to late September or early October (Zeiner et al 1990). The reproductive season usually extends from late May to July (Zeiner et al 1990). Egg-laying usually occurs in June or July (Stebbins 1954) with newly emergent hatchlings observed from mid-August to late September (Zeiner et al 1990).

Regulatory Status

The sagebrush lizard is a BLM Sensitive species.

Threats

Threats to this species have not been identified for the planning area, but would most likely be similar to those described for the Mojave fringe-toed lizard including loss of habitat, an increases in local predator (i.e., common ravens), and OHV activities.

Tehachapi Slender Salamander (*Batrachoseps stebbinsi*)

Life History

The Tehachapi slender salamander inhabits moist canyons and ravines in oak and mixed woodlands. Vegetation in occupied habitat includes foothill pine, canyon live oak (*Quercus chrysolepis*), interior live oak, blue oak, Fremont cottonwood (*Populus fremontii*), western sycamore (*Platanus racemosa*), and California buckeye. In more exposed areas of Caliente Creek, habitat includes California juniper (*Juniperus californica*), yucca (*Yucca* spp.), bush lupine (*Lupinus* spp.), and buckwheat (*Eriogonum* spp.). In the lower elevation Caliente Creek areas, the species is restricted to the lower margins of northfacing slopes and side canyons among granitic or limestone talus and scattered rocks. The species also occurs on north-facing slopes in the Tehachapi Mountains within talus piles and fallen wood.

Individuals are primarily active November through May. During the moist periods of fall, winter, and spring precipitation, individuals seek cover under surface objects, especially rock talus during the day. Other substrates that may be used for cover include rocks, logs, bark, and other debris in moist areas but they are primarily associated with talus.

Similar species lay their eggs underground or on moist substrates underneath or within surface objects, especially pieces of bark. It is unknown how or whether juvenile Tehachapi slender salamander habitat differs from that of adults. Juveniles are rarely found, which may indicate that hatching occurs in the spring, as surface activity declines, and that juveniles may remain

underground. As a semifossorial species, the Tehachapi slender salamander is able to enter termite tunnels, earthworm burrows, and other small openings not accessible to larger salamanders.

Regulatory Status

The Tehachapi slender salamander is California state listed as threatened and is a BLM Sensitive Species.

Southwestern Pond Turtle (*Clemmys marmorata pallida*)

The information from the 2005 WEMO Final EIS (BLM 2005) is supplemented by the following updated information. All other background information for this species would not change from the previous analysis included in the affected environment of the 2005 WEMO Final EIS (BLM 2005).

Life History

The southwestern pond turtle is found south of San Francisco Bay including the West Mojave Planning Area (WMPA) and is a subspecies of the western pond turtle. General life history information for this species can be found in the 2005 WEMO Final EIS (BLM 2005).

Regulatory Status

The Southwestern pond turtle is a federal USFWS Species of Concern, BLM Sensitive Species, and California Species of Special Concern.

Threats

Several threats to western pond turtle within the WEMO Planning Area have been identified. In Afton Canyon, the habitat is severely degraded as a result of ground water depletion from human activities and by infestations with the exotic shrub salt cedar (*Tamarix ramosissima*) (Lovich and Myer, 2001). "Betty Ford Crossing" is currently the single most viable habitat patch within Afton Canyon, but it is not the most protected habitat for this species since a currently designated open route crosses the river at this point and any remaining turtles are subject to crushing by vehicles (Lovich and Puffer, 2016).

Within Afton Canyon an additional risk is presented by a major rail line that parallels the Mojave River for most of its course crossing the river at two points. The proximity of trains to the riparian system provides the potential for toxic spills from wrecks (Lovich and Myer, 2001). Both spills and illegal dumping of toxic materials have occurred at Afton Canyon in the past.

E.5 Socioeconomics and Environmental Justice

E.5.1 Socioeconomics

E.5.1.1 Regulatory Framework

There are no federal, state, or local regulations associated with socioeconomics that are applicable to the WMRNP.

E.5.1.2 Regional and Background Information

The following information pertaining to existing economic and demographic conditions in the planning area is excerpted from the Socio-Economic Analysis developed for the 2005 WEMO Final EIS prepared by Alfred Gobar and Associates. Those data have been supplemented by being revised to reflect updated U.S. Census Bureau data, and additional discussion focusing on the role of access has been added. The complete socio-economic technical report is contained in Appendix N of the 2005 WEMO Final EIS. In addition, the presentation of the information in this section has been revised from that previously provided in the 2005 WEMO Final EIS by being focused on the role of access.

Encompassing nearly 9.4 million acres, the planning area is a substantial geographic region. This large study area includes over 974,000 residents per 2008-2012 ACS data, and encompasses portions of five separate counties. Motor vehicle access through such a large area is key to providing regional connectivity in such a dispersed area. The vast majority of travel is funneled to key arterial Interstates, highways and County roads, but access drives connectivity and commerce through all parts of the planning area, both for area residents and for all of Southern California.

In totality, the West Mojave's existing population base is significant, but also widely dispersed in scattered concentrations ranging from as few as less than 30,000 residents in the Barstow and Ridgecrest areas to more than 300,000 in the Palmdale-Lancaster area of Los Angeles County and the Victor Valley area of San Bernardino County. Given the large geographic area and widely dispersed population, OHV access is the key to maintaining regional connectivity across the area. The vast majority of OHV travel in the area is based on funneling traffic from dispersed areas into a few major arteries including interstate highways, State highways, and County roads. The planning area services this burgeoning, but widely dispersed, population that has, and uses the high desert as its recreational backyard.

Regional Environment

The WEMO planning area is also situated along the periphery of Southern California and its huge metropolitan population and employment base. Overall economic growth and trends throughout the WEMO Planning area are still greatly influenced and driven by growth and economic trends associated with the larger economic region of Southern California. The six-county Southern California region (Los Angeles, Orange, San Diego, San Bernardino, Riverside, and Ventura counties) had 21 million residents and 11 million nonagricultural wage and salary jobs in 2010.

A large number of workers residing in outlying areas, including the West Mojave planning area, commute to jobs in the more developed regions of Southern California because of the high volume of employment opportunities. Growth in employment throughout Southern California is one of the principal factors driving demand for living in outlying subregions, such as the West Mojave. Recent census data from 2010 strongly suggest that population and housing growth throughout the West Mojave was substantially concentrated within cities and unincorporated enclaves located closest to the major employment centers of Southern California. As a result, the WEMO Planning area population base has not been considered a self-generating economy even though certain industries such as aerospace, mining, military and government operations have long provided local employment to area residents.

This is rapidly changing. In 2000, about one in five workers residing in cities throughout the West Mojave commuted at least 60 minutes each way to work. In 2010, the average commute time in

cities throughout the West Mojave was 29.5 minutes. The rapid growth of high desert cities has created an economy that is sustaining itself, but still relies to a large extent on the influx of dollars from other Southern California areas.

The planning area provides the major connecting corridor between the Southern California area and two other key metro areas—the Las Vegas metro area and the Central Valley of California. Recreation-, service- and tourism-sector jobs in the planning area are largely influenced by the economic conditions in Southern California and these other metro areas. Other jobs in the high desert continue to service these metro populations, such as energy generation and transmission, and mining.

Between 1980 and 2010 nonagricultural employment in Southern California grew 88.0 percent from 5.85 million jobs in 1980 to 11.0 million in 2010, outpacing the national growth rate. U.S Growth nonagricultural employment growth over this same time period was 58.0 percent. Aggregate employment has grown at a slower rate in absolute and relative terms since 1990 as a result of significant job losses during the early 90's. The overall slower pace of employment growth is indicative of broader trends describing the outlook of future economic growth in the region.

Study Area Demographics

The demographic characteristics of the eleven incorporated cities which make up the WEMO Planning area are shown in Table E.5-1.

The West Mojave extends across large portions of four Southern California counties (Los Angeles, San Bernardino, Kern, and Inyo), which all combined have 12.7 million residents (2010 Census) or nearly 37.2 percent of the Statewide population (34.1 million residents). Demographic characteristics describing an area are most often compared to corresponding characteristics describing a larger geographic setting of which it is a part. Roughly 80 to 90 percent of all residents within Southern California, however, reside in areas that are substantially more developed and urbanized than is the case with the WEMO Planning area. As noted in Table E.5-2, counties within the planning area are anticipated to grow by double digits over the 2010 to 2030 timeframe. All of the counties, except Inyo and Los Angeles, are expected to grow at a rate that exceeds that of the state.

Typical population densities generally range from roughly 2,500 persons per square mile in growing suburban areas to more than 7,500 persons per square mile in urbanized areas. By comparison, the corresponding population density for the eleven WEMO Planning area cities combined (accounting for 71 percent of the planning area population base) only averages about 865 persons per square mile (726,482 residents in 2010 divided by 840 square miles). The Census Bureau utilizes a minimum threshold of 1,000 persons per square mile to denote an urbanized setting. The WEMO Planning area is more characteristic of a large rural environment. As such, demographic traits that describe the WEMO Planning area reflect distinctly different circumstances than is true for more urbanized portions of Southern California, thereby minimizing the usefulness of direct comparisons. Instead, the State of California, which includes a sizeable rural population, serves as a more appropriate reference for comparing overall distinctions describing WEMO Planning area residents.

Compared to the State as a whole, the WEMO Planning area consists of a relatively young population base. The planning area includes a heavy composition of families, and similarly has a

greater proportion of residents 20 years of age or younger than the State. As result, there are relatively fewer small households (two persons or less). The West Mojave is still attracting a large number of new households but at a whole. The affordability of housing in the WEMO Planning area remains a principal attraction to the new households, resulting in population growth rates in the planning area being higher than in the more fully developed areas of the Inland Empire, and the attraction of those households to lower-cost, local recreation and tourism options.

Table E.5-1. 2010 Census Demographic Comparison, Incorporated Cities Within West Mojave Plan Region

Census Variable	Combined Cities	City of Adelanto	Town of Apple Valley	City of Barstow	City of California City	City of Hesperia	City of Lancaster	City of Palmdale	City of Ridgecrest	City of Twentynine Palms	City of Victorville	City of Yucca Valley
Total Population	726,482	31,765	69,135	22,639	14,120	90,173	156,633	152,750	27,616	25,048	115,903	20,700
% Share of Total	100.0%	4.4%	9.5%	3.1%	1.9%	12.4%	21.6%	21.0%	3.8%	3.4%	16.0%	2.9%
Population Growth (1990-2010)	85.1%	273.0%	50.0%	5.4%	137.1%	78.9%	231.2%	121.9%	-0.4%	111.9%	185.0%	51.2%
Families as % of Households	76.6%	84.2%	75.0%	67.0%	70.6%	80.0%	74.4%	82.3%	66.5%	72.2%	79.6%	63.5%
Population in Group Quarters	3.5%	5.5%	0.7%	1.6%	18.5%	0.0%	5.3%	0.1%	0.3%	13.4%	4.4%	1.1%
Average Household Size	3.1	3.8	2.9	2.8	2.8	3.4	3.2	3.6	2.5	2.7	3.4	2.5
Housing by Tenure Owner-Occupied	62.4%	57.8%	69.1%	49.0%	60.3%	66.9%	60.4%	67.9%	60.5%	33.9%	61.8%	63.5%
Renter-Occupied	37.6%	42.2%	30.9%	51.0%	39.7%	33.1%	39.6%	32.1%	39.5%	66.1%	38.2%	36.5%
Unit Vacancy	10.3%	14.0%	9.6%	15.4%	21.3%	8.9%	9.3%	7.7%	9.5%	14.2%	11.2%	13.4%
Median Housing Value	$178,745	$118,500	$230,300	$123,300	$145,100	$193,700	$214,800	$227,300	$191,100	$166,300	$172,500	$183,300
Median Rent	$970	$1,034	$986	$782	$878	$1,067	$1,113	$1,130	$777	$927	$1,091	$888
Median Household Income	$49,935	$42,208	$50,664	$45,417	$53,768	$48,624	$52,290	$55,213	$59,830	$43,412	$52,357	$45,502

Table E.5-1. 2010 Census Demographic Comparison, Incorporated Cities Within West Mojave Plan Region

Census Variable	Combined Cities	City of Adelanto	Town of Apple Valley	City of Barstow	City of California City	City of Hesperia	City of Lancaster	City of Palmdale	City of Ridgecrest	City of Twentynine Palms	City of Victorville	City of Yucca Valley
Workforce Characteristics Workers per 1,000 Population*	418	304	418	441	413	412	412	430	498	566	394	416
Occupation (Age 16+) White Collar*	69.0%	63.1%	70.3%	68.3%	69.0%	65.4%	70.7%	69.4%	73.1%	70.1%	67.9%	68.9%
Blue Collar	31.0%	36.9%	29.7%	31.7%	31.0%	34.6%	29.3%	30.6%	26.9%	29.9%	32.1%	31.1%
Average Commute Time	29.5	38.6	29.8	24.3	32.6	39	30.7	40.1	14.3	14	34.5	26.3

*2000 Census

Source: Alfred Gobar Associates; U.S. Bureau of the Census.

Table E.5-2. Population Projections in the WEMO Planning Area

Geography	2010	2020	2030	2040	2050	2060	% Change 2010-2030	% Change 2010-2060
Inyo*	18,528	19,350	20,428	22,009	23,053	23,921	10.2	29.1
Kern	841,146	1,057,440	1,341,278	1,618,681	1,858,455	2,055,622	59.5	144.3
Los Angeles	9,824,906	10,441,441	10,950,335	11,243,022	11,434,565	11,562,720	11.5	17.7
Riverside*	2,191,886	2,593,211	3,046,064	3,462,256	3,828,798	4,216,816	39.0	92.3
San Bernardino	2,038,523	2,273,017	2,626,945	2,988,648	3,248,440	3,433,047	28.9	68.4
California	37,309,382	40,643,643	44,279,354	47,690,186	50,365,074	52,693,583	18.7	41.2

Source: California Department of Finance 2013.
*contains only one census tract within the planning area.

Workforce participation (workers, not jobs) among West Mojave households continues to lag the State and Southern California economy. Census data (2010) indicates there was an average of 1.35 workers (persons indicating a place of work) per household throughout the WEMO Planning area compared to a State-wide average of approximately 1.47 workers per household. Similarly, current estimates of local employment (local jobs, as distinct from resident workers) also indicate that there are fewer job opportunities in the WEMO Planning area (1.14 jobs per occupied household) than is true for the State economy or Southern California as a whole (1.34 jobs per household). The incidence of local job opportunities in the WEMO Planning area, is comparable to slightly less than other outlying regions of Southern California, including Kern County (1.33 jobs per household) and the Inland Empire (1.24 jobs per household).

Demographic traits and growth trends describing the WEMO Planning area overall vary considerably within the planning area. The San Bernardino sub-area of the planning area accounts for 64 percent of the planning area's land area, nearly 49 percent of the 2000 resident population, and nearly 48 percent of population growth between 1990 and 2000. By comparison, the Los Angeles sub-area only accounts for 7 percent of the planning area's land area, but 41 percent of the 2000 resident population, and over 50 percent of corresponding population growth. The Kern sub-area accounted for 11 percent of the 2000 population base, but less than 2 percent of total corresponding growth. The Inyo sub-area, with roughly 600 residents, accounts for less than 0.1 percent of the WEMO planning area population base and has experienced an overall decline in population since 1990. On a combined basis, the Los Angeles and San Bernardino sub-areas accounted for over 98 percent of total population growth between 1990 and 2000.

The population growth and changes in the planning area add stress to the transportation network in several ways:

- Regional and Planning Area population growth adds more vehicles to the existing network;

- Planning Area population growth requires retooling of the network and its uses as new communities are constructed, become more densely populated, and require additional access needs;
- The modest income characteristics of the Planning Area population also favor closer-to-home recreation options that add more vehicles to the existing network;
- Population growth in outlying portions of the Planning Area results in increases in average commute times and therefore a greater number of vehicle miles traveled per person; and
- The youthfulness of Planning Area population growth increases the number of persons engaged in vehicle-based recreation, and in particular in OHV use.

Regional Trends in Population and Employment

A wide variety of socioeconomic factors can be evaluated with regards to growth trends, but changes in population, employment, and housing tend to reflect principal drivers of urbanization and associated economic activity, and these in turn affect and are affected by the transportation network.

Total population within the six-county region of Southern California, plus Kern County, grew by 8.0 million residents over the 30-year period from 13.8 million residents in 1980 to 21.8 million residents in 2010. The resident population of Inyo County has remained relatively static since 1980 (about 18,000 residents) and is not explicitly evaluated in relation to regional trends since it hosts roughly 600 residents, or less than 0.1 percent of the WEMO population.

The total population throughout Southern California grew at an average annual rate of 1.93 percent. Los Angeles County continues to account for the largest share of the population in Southern California. The pattern of growth, however, is shifting and outlying subregions are capturing a greater share of total growth. Since 1980, outlying counties such as Riverside, San Bernardino, and Kern County have steadily increased their respective share of total population.

As shown in Table E.5-3, nonagricultural employment trends since 1970 has followed population growth in the planning area. Agriculture (including grazing activities) and mining have a long history in the WEMO Planning area, but account for less than 1 percent of current employment opportunities. Non-agricultural employment correlates better than total employment with household formation, associated housing demand, and population growth since a large segment of agricultural employment is transient and seasonal with limited capacity to occupy market rate housing. Non-agricultural employment growth will constitute a principal force driving future housing growth and urbanization in the WEMO Planning area. Employment directly associated with recreation accounts for about 2 percent of total service-based employment, but is growing. Accommodation and food services are a much larger proportion of total service-based employment, and are increasing at a faster rate than other sectors. While most of the services employment is expected to support the local population and through travelers, some proportion of it is also related to recreation and OHV access on public lands in the West Mojave, which accounts for about 1 percent of current employment opportunities or about 2,500 jobs in the area.

Factors that augment the current employment base of the WEMO Planning area include a higher proportion of service and trade sector jobs (consistent with rural and emerging growth areas).

The WEMO Planning area also has a moderately higher mix of government jobs, reflecting the historical role of federal and state agencies in the region. The manufacturing base within the WEMO Planning area is significantly underrepresented by comparison to the broader Southern California economy.

Table E.5-3. WEMO Planning Area Employment Since 1970

Sector	1970	1980	1990	2000	2011	Change 1970-2011 (%)	Change 1990-2011 (%)
Farm/Agriculture Services	31,611	46,428	42,019	68,182	52,503	66	25
Mining	8,324	14,017	17,009	11,427	15,667	37	-8
Construction	15,924	29,521	58,625	60,851	61,308	282	5
Manufacturing	41,808	49,945	65,849	86,538	65,740	57	-<1
Services	119,657	294,705	470,470	634,888	814,242	580	73
Government	103,363	122,057	160,440	178,983	199,450	93	24

Source: EPS-HDT 2013

Not only is total employment in Southern California slowly increasing, but the outlying areas which comprise the WEMO Planning area are capturing larger shares of the growth. In 1980, Los Angeles County accounted for 62.1 percent of nonagricultural employment throughout the Southern California region, including Kern County. In 2010, Los Angeles County's respective share was down to 47.3 percent. By comparison, San Bernardino County captured an increasing share of employment (from 4.2 percent in 1980 to 7.2 percent in 2010), while the corresponding share for Kern County has remained relatively constant (2.9 percent). Both Riverside and San Bernardino County are commonly recognized as a single metropolitan statistical area (Inland Empire) for purposes of tracking socio-economic trends. On the basis of this definition, the Inland Empire has led Southern California in net employment gains since 1990 (314,400 jobs). As these trends suggest, the proportionate share of nonagricultural employment growth has been shifting over the 30-year reference period, principally from Los Angeles County to the other six counties. As detailed in Table D.5-2, a large amount of the nonagricultural employment growth has taken place in the projected area, as is evidenced by the elevated gains in employment over the past decades.

Since the CDCA Plan was approved in 1980, the livestock industry in the California Desert has undergone major decline, especially in the last 10 years. Most of the grazing operations on public land within the planning areas are small family operations. As the permittee or lessee has aged and is less able to run their grazing operation stocking rates have typically declined. Unless a younger family member or partner is capable of maintaining the grazing operation, in addition to stocking rates declining, fewer range improvements are maintained and usually no new range improvements are developed. This trend has been especially hard on the sheep industry. Very few sons or daughters follow in their parent's footsteps and continue family sheep operations. Overall, the AUMs that BLM may annually authorize under good conditions have decreased from its peak of nearly 40,000 AUMs in 1992 to 13,039 AUMs in 2016 for all classes of livestock.

The cattle and sheep markets have also experienced substantial fluctuations over the past 30 years. These markets have a great deal of influence on family incomes and fluctuations in stocking rates. The overall costs of running a grazing operation has nearly doubled over the past 30 years while market returns have been fairly static along with BLM grazing fees.

E.5.2 Environmental Justice

E.5.2.1 Regulatory Framework

Federal

Executive Order 12898

In 1994 President Clinton issued Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, to direct federal attention on environmental and human health conditions in minority and low- income communities. EO 12898 promotes nondiscrimination in federal programs that substantially affect human health and the environment, and it guarantees information access and public participation relating to these matters. This order requires federal agencies to identify and address any disproportionately high or adverse human health or environmental effects on minority and/or low-income populations resulting from programs, policies, and activities of federal agencies. The Council on Environmental Quality (CEQ) oversees federal compliance with EO 12898.

Council on Environmental Quality's Environmental Justice Guidance under the National Environmental Policy Act

To ensure that federal agencies effectively identify and address environmental justice concerns according to EO 12898, the CEQ, in consultation with the Environmental Protection Agency (EPA), developed guidance to assist federal agencies to implement procedures. According to the CEQ's *Environmental Justice Guidance under NEPA*, agencies should consider the composition of affected areas to determine whether minority or low-income populations are affected by a proposed action, and, if so, whether those environmental effects may be disproportionately high or adverse (CEQ 1997).

According to the CEQ environmental justice guidelines, minority populations should be identified if:

- A minority population percentage either exceeds 50% of the population of the affected area, or:
- If the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis (e.g., a governing body's jurisdiction, neighborhood census tract, or other similar unit).

Environmental Protection Agency (EPA) Final Guidance for Incorporating Environmental Justice Concerns in EPA's Compliance Analyses

The EPA's *Final Guidance for Incorporating Environmental Justice Concerns in EPA's Compliance Analyses* defines how the EPA will ensure that disproportionately high and adverse human health or environmental effects on minority communities and low-income communities

are identified and addressed. It establishes agency-wide goals for engaging American Indian, Alaska Native, Native Hawaiian, and other indigenous peoples. It also establishes agency-wide goals for environmental protection and lists actions the EPA would take to incorporate environmental justice into its mission (EPA 1998).

Environmental Protection Agency Plan Environmental Justice 2014

The EPA's Plan Environmental Justice (EJ) 2014 is a strategy to help the agency integrate environmental justice into its programs, policies, and activities. Plan EJ 2014 identifies Cross-Agency Focus Areas, Tools Development, and Program Initiatives as the three essential elements that will advance environmental justice across the EPA and other agencies of the federal government.

Bureau of Land Management Land Use Planning Handbook, Appendix D

The Plan Area includes all or part of the following Department of Interior (DOI) Bureau of Land Management (BLM) field office jurisdictions:

- Ridgecrest
- Barstow
- Needles
- Palm Springs/South Coast

Appendix D (Social Science Considerations in Land Use Planning Decisions) of the BLM Land Use Planning Handbook provides guidance on integrating social science information into the planning process for projects within BLM lands. Any information gathered for planning purposes must be considered in the context of BLM's legal mandates. To be effective, social scientific data and methods identified in Appendix D must be integrated into the entire planning process (BLM 2005). Furthermore, Section IV (Environmental Justice Requirements) of Appendix D provides guidance for assessing potential impacts on population, housing, and employment as they relate to environmental justice. It also describes variables such as lifestyles, beliefs and attitudes, and social organizations with respect to environmental justice.

Defining Environmental Justice Populations

The CEQ Environmental Justice Guidance defines "minorities" as individuals who are members of the following population groups: American Indian or Alaskan Native, Asian or Pacific Islander, Black not of Hispanic origin, or Hispanic (CEQ 1997). The total minority population has been calculated by subtracting the white alone, not Hispanic or Latino, population from the total population. An environmental justice population is identified when the minority population of the potentially affected area is greater than 50% or the minority population percentage is meaningfully greater than the minority population in the general population or other appropriate unit of geographical analysis. For this analysis, any census tract with a minority population greater than 50% was identified as an environmental justice tract of concern.

The CEQ Environmental Justice Guidance defines "low-income populations" as populations with mean annual incomes below the annual statistical poverty level. For this analysis, low-

income population was determined by utilizing the U.S. Census tract data for the 5-year period 2008-2012. For this purpose, "low-income" is equated with "below poverty level." Other measures of "low-income" are also in use in California. For example, the State of California Department of Housing and Community Development, Division of Housing Policy Development establishes annually specific "low-income" thresholds for California counties. The Department distinguishes as well between "low-income," "very low income," and "extremely low" income thresholds for households of different sizes.

The CEQ and EPA guidance documents do not provide a discrete threshold for determining when a low-income population should be identified for environmental justice. For this analysis, a population of a U.S. Census tract that merits an environmental justice analysis has a percentage of its low-income population of the potentially affected census tract greater than the area-wide percentage of the low-income population across the entire West Mojave planning area.

E.5.2.2 Regional and Background Information

A discussion of the minority and low income populations in the WEMO planning area is presented in Section 3.6.

E.6 Recreation Activities

E.6.1 Regulatory Framework

Federal

Federal Land Policy and Management Act, 1976 as Amended

FLPMA establishes public land policy; guidelines for administration; and provides for the management, protection, development, and enhancement of public lands. In particular, the FLPMA's relevance is that it establishes BLM's authority to grant ROWs for multiple uses. Among those uses, FLPMA recognizes that the public lands should be managed in a manner that will provide for outdoor recreation.

California Desert Conservation Area Plan, 1980 as Amended

The CDCA Plan (BLM 1980) includes a Recreation Element to address use of, and access to, recreational destinations within the California Desert. The management goals of the CDCA Plan Recreation Element are as follows:

1) Provide for a wide range of quality recreation opportunities and experiences emphasizing dispersed undeveloped use.
2) Provide a minimum of recreation facilities. Those facilities should emphasize resource protection and visitor safety.
3) Manage recreation use to minimize user conflicts, provide a safe recreation environment, and protect desert resources.
4) Emphasize the use of public information and educational techniques to increase public awareness, enjoyment, and sensitivity to desert resources.

5) Adjust management approach to accommodate changing visitor use patterns and preferences.

6) Encourage the use and enjoyment of desert recreation opportunities by special populations, and provide facilities to meet the needs of those groups.

In order to accommodate the goals, access to the desert must be provided while protecting sensitive resources. The Recreation Element states the following with regard to access:

"To engage in most desert recreational activities outside of open areas, visitors must use motorized vehicles and usually travel on some previously used or marked motorized-vehicle route. Understandably, vehicle access is among the most important recreation issues in the Desert. A primary consideration of the recreation program, therefore, is to ensure that access routes necessary for recreation enjoyment are provided" (BLM 1980, p. 84).

E.6.2 Regional and Background Information

Located only 90 minutes from downtown Los Angeles, the WEMO Planning area is the recreational backyard of the metropolitan area's 21 million residents, of whom nearly 2 million participate in OHV activities and an even greater number camp, hike or drive for pleasure. The Mojave Desert provides an easily accessible, uncrowded recreation experience. The many recreation opportunities of the WEMO Planning area arise from the variety of its mountains, bajadas, dry lakes and badlands, the diversity and affluence of its visitors and the sheer volume of space that its landscape provides.

The types of recreation provided in the WEMO Planning area are highly varied. Due to its vastness, many visitors feel a greater freedom from regulations that encourages them to try new forms of recreation while not having to worry about bothering others. Given the scale of the desert and this sense of freedom, it is not surprising that many of the recreational activities center around vehicles, speed events or activities that require a great deal of acreage and separation from other visitors. These activities include motorcycle activities, four-wheel drive exploring, sightseeing, target shooting, hunting, using experimental vehicles/aircraft, model rocketry, and dry land windsailing. Many other recreational pursuits that do not revolve directly around the recreational aspect of vehicle use are, by necessity (due to the distances involved), dependent upon OHVs. Examples of this include endurance equestrian rides and support vehicles, hiking, mountain biking, bird watching, botany, rockhounding, camping, geocaching, and picnicking, for which vehicles are a means to access various destinations. In Chapter 4, the effect of the designated route network on recreational opportunities is quantified and evaluated through the mileage of routes designated for these various recreational uses.

Patterns of Use

Although most recreational activities are widely dispersed, certain activities have "hot spots" that have been established over time. How or why they were established varies from case to case, but may be due to the features (topography, geology) of the area, proximity to urban areas, the availability of access into the area, and publicity. Understanding recreation patterns and hot spots is critical to the design of an effective OHV access network. Particular features or land-characteristics may make a given area highly desirable for a certain type (or types) of recreational activity. For instance, flat, expansive terrain is often desirable for recreational

activities such as target shooting, driving for pleasure, and more quick-paced race events. On the other hand, mountainous terrain is often more conducive to such activities as rock climbing, hiking, rock hounding or technical four-wheel rock crawling. In addition, specific attractions of an area dictate the types of use, as well as the levels of use that predominate.

Some of the most popular hot spots in the desert portions of the WEMO planning area are dry lakebeds. Dry lakebeds pose unique access issues. This is due to the difficulty in following routes across lakebeds, and the adverse impacts and safety issues with marking them. Major lakebeds have been individually classified as to their availability for access and associated recreational use, and are generally identified as either open or closed, or available by permit. Smaller lakebeds are available for access consistent with the access parameters for surrounding areas, i.e., either open access or limited to designated routes. Two of the larger lakebeds in the West Mojave Desert that have not yet been specifically designated for access are Cuddeback and Koehn Lake Beds.

Cuddeback Lake is a sizeable lakebed that has been a popular destination for both casual recreational use, as well as commercial use, for several decades. Ease of access, the frequency that the lakebed is dry, and surrounding vistas contribute to its attraction. The casual recreational uses that occur on the lakebed include land sailing, model rocket launching, bicycling, photography, star-gazing, and camping. Additionally, motor vehicle use of all kinds is popular on the lakebed including motorcycles, ATV, recreational Off-Highway Vehicle, and four-wheel drive vehicles, as well as OHV and non-OHV use associated with commercial filming. Past and current levels of use are not currently consistent with the access designation for the surrounding area.

Koehn Lake is a sizeable lakebed located in the Fremont Valley northwest of the Rand Mountains and south of the Jawbone area that is not particularly popular for the public, but that has some unique safety issues. To the unfamiliar visitor, Koehn Lake's surface appearance is misleading. To the naked eye, the lakebed generally appears to be dry, but the lake actually only has a thin crust of a few inches on the surface. After one breaks through this crust, the subsurface is a clayish like material that acts similar to quicksand. Because of the potential hazard posed by the lakebed surface, recreational use and travel across the lakebed are a concern to BLM.

The southernmost, Coyote dry lakebed north of the Joshua Tree area is a popular destination for casual recreational users, due to its proximity to Copper Mountain Community College. Ease of access to college students and surrounding vistas contribute to their attraction. The casual recreational uses that occur on the lakebed are generally limited to day use riding, including motorcycles and all-terrain vehicles, with occasional OHV use associated with occasional overnight camping. The routes across the lakebed are difficult to ascertain for a user entering from a route adjacent to the lakebed, and they serve as a substantial source of route proliferation onto adjacent lands. This lakebed is currently designated as limited to designated routes, but the difficulty of the public identifying designated routes and BLM managing the limited use is a concern to BLM.

The relative proximity of the Mojave Desert to urban centers makes it easy and convenient for recreationists to visit those "hot spots" and other areas having the features that they desire. About 85% of all visitors to the Mojave Desert are from the urban areas of Southern California. The BLM public lands are closer to the Los Angeles basin than other similar desert-environment

recreation areas, such as the Mojave National Preserve and the national parks, and offer more expansive areas and a wider variety of recreational experiences.

OHV access is itself a feature or characteristic that may or may not be sought. For example, a recreationist hoping to photograph or film particular wildlife undisturbed in its natural habitat would not want access so convenient that it attracts a large number of other visitors. Recreationists seeking to hike and camp in remote, difficult to reach areas to experience solitude would not find a location that has ready access from a major highway to be desirable. Conversely, a recreationist seeking to ride his dune buggy over sand dunes with groups of other people may appreciate easy access. Many other OHV users are seeking ready OHV access to the desert landscape to experience the space and solitude that heavily used areas cannot offer.

Publicity about an area's recreational opportunity often attracts users. Although some of this publicity can come through the mainstream news media (newspapers, television news reports), much of it comes by "word of mouth." A recreation club (motorcycle riding club, four-wheel drive club, dune buggy club, hiking and camping club, equestrian endurance riding club, rock hounding club, rock climbing club, photography club, or wildlife viewing club) may send out newsletters to its members identifying areas that have those features that are considered ideal for the type of recreational activity that the club engages in. The popularity of the web (organizational websites, Facebook) and similar mechanisms to share information have further increased sharing of information about locations and destinations in the desert. Computer and cell phone applications can provide pictures and specific directions to sites, and have further expanded the reach of information beyond club members and small groups of individuals. This promotes discussion about specific areas and facilitates increased recreation at those sites. Recreation clubs are often drawn to specific hot spots where people participating in that particular type of recreation can gather and socialize.

Guidebooks and maps publicize favorite recreation sites. Guidebooks are available that describe areas in the Mojave Desert that offer significant opportunities for specific activities. These guidebooks typically describe the areas of interest in sufficient detail to lead recreationists to the most promising regions for the activity. Maps published by the American Automobile Association and regional user interest groups are particularly popular, for they indicate areas where different types of recreational activities occur.

Recreationists engage in activities that make use of more than one type of feature or terrain, and often desire to travel to locations where multiple types of terrain are readily available or that are relatively close to other areas having different terrain. For instance, in dual sport motorcycle touring, recreationists use motorcycles that are licensed for use on regular streets and highways but are capable of off-road travel. Recreationists engaged in such touring can ride to the desert on major highways, and then go off-road once a desired trail or special recreation opportunity has been reached. Their motorcycles can fit through tight spaces that larger vehicles, are unable to access.

Four-wheel drive vehicles have their attractions as well. A single four-wheel drive SUV can accommodate more people and items than can a dual sport motorcycle, and can also readily switch from regular highway travel to off-road touring.

E.7 Grazing

E.7.1 Regulatory Framework

Under the Taylor Grazing Act, allotments are classified under Section 3 as a grazing permit or under Section 15 as a grazing lease. Allotments with perennial forage have an established limit of forage based on the quality and quantity of perennial plants, stated in animal unit months (AUMs) for a defined period of grazing use. An AUM is a measure of perennial or ephemeral feed that will support a cow and its calf, a ewe and its lambs, or a bull for one month. Perennial forage consumption is typically authorized at the same level from year to year unless forage production does not meet seasonal norms. When the CDCA Plan (1980) originally allocated AUMs for forage consumption for livestock use it occasionally suspended AUMs for forage allocations to wildlife and for poor rangeland conditions to improve watershed stability.

In contrast, grazing use in allotments with ephemeral forage does not have an established level or specified period of use. Instead, the amount and length of grazing use in any particular season or year is based on ephemeral production and determined just prior to authorizing the grazing use. In the WEMO Planning area, minimum forage production is 230 lbs/acre to authorize ephemeral grazing for a season for most of the planning area. The 2006 WEMO Plan authorized ephemeral sheep grazing on two allotments within portions of the Fremont-Kramer DWMA (now designated as DT ACEC under the DRECP LUPA). In these areas the minimum forage production is 350 lbs/acre to authorize ephemeral grazing. This level of forage is anticipated to provide sufficient forage for both domestic livestock and wildlife, and still provide ample seed source to sustain production in subsequent years within the planning area.

E.7.2 Regional and Background Information

In most cases, BLM authorizes grazing by permit or lease for a period of 10 years. A shorter period of time is sometimes issued for special circumstances, such as to accommodate a shorter-term lease of the base property or when the Authorized Officer determines that a shorter- term authorization is in the best interest of range management. Additionally, temporary, non-renewable grazing authorization may be issued for special short-term needs such as trailing, or when there is short-term surplus forage available for grazing. All permits and leases are subject to modification and to annual adjustments. Such modifications are implemented through consultation between the permittee or lessee and the BLM, and consistent with terms of applicable biological opinions and Section 106 of NHPA review.

The permit or lease identifies mandatory terms and conditions that specify the number, kind and/or type of livestock that may graze the allotment, and the grazing period (usually with specific beginning and ending dates). In addition, many permits and leases also require adherence to prescribed grazing prescriptions in the form of grazing systems, such as deferred, deferred-rotation, or rest-rotation. Other authorizations may have conditions pertaining to turnout dates based on vegetation conditions. Based on range type, season of use and range condition all permittees and lessees have specific grazing utilization thresholds and other specified terms and conditions to protect site-specific areas such as riparian areas, wildlife habitat, and special status plant populations. These terms and conditions have been developed in consultation and cooperation between BLM and the livestock operator, were developed based on decisions made in the 2006 WEMO Plan, are the result of the 2006 WEMO Plan, and/or may be the result of biological opinions, other resource management strategies, or another planning effort.

Frequently, the permittee or lessee elects to graze fewer livestock than the full amount of grazing authorized under the active preference (permitted use) for the grazing season. Sometimes this is due to environmentally related factors such as droughts or fires, and in other cases it may be to accommodate the livestock operator's need to adjust livestock numbers for marketing or livestock husbandry purposes. Normally, the BLM will authorize the requested amount of non-use on a short-term basis. In rare situations, the BLM may temporarily authorize another qualified applicant to graze the amount of authorized non-use in an allotment, depending upon the reason for non-use.

E.8 Energy Production, Utility Corridors, and Other Land Uses

E.8.1 Regulatory Framework

Federal

Federal Land Policy and Management Act, 1976 as Amended

The United States Congress passed the FLPMA in 1976. Title V, "Rights-of-Way," of the FLPMA establishes public land policy and guidelines for administration, provides for management, protection, development, and enhancement of public lands, and provides the BLM authorization to grant ROW. Authorization of systems for generation, transmission, and distribution of electric energy is addressed in Section 501(4) of Title V. In addition, Section 503 specifically addresses "Right of Way Corridors" and requires common ROWs "to the extent practical." FLPMA, Title V, Section 501(a)(6) states, "[t]he Secretary, with respect to the public lands (including public lands, as defined in section 103(e) of this Act, which are reserved from entry pursuant to section 24 of the Federal Power Act (16 U.S.C. § 818)) [P.L. 102-486, 1992] and, the Secretary of Agriculture, with respect to lands within the National Forest System (except in each case land designated as wilderness), are authorized to grant, issue, or renew rights-of-way over, upon, under, or through such lands for roads, trails, highways, railroads, canals, tunnels, tramways, airways, livestock driveways, or other means of transportation except where such facilities are constructed and maintained in connection with commercial recreation facilities on lands in the National Forest System."

California Desert Conservation Area Plan, 1980 as Amended

Section 601 of the FLPMA required preparation of a long range plan for the CDCA. The CDCA Plan was adopted in 1980 to provide for the use of public lands and resources of the CDCA in a manner that enhances, wherever possible, and does not diminish, on balance, the environmental, cultural, and aesthetic values of the Desert and its productivity. The CDCA Plan is a comprehensive, long range plan covering 25 million acres. Approximately 10 million acres (about half) of this total are public lands administered by the BLM. These public lands are dispersed throughout the California Desert, which includes the Mojave Desert, the Sonoran Desert, and a small portion of the Great Basin Desert.

The CDCA Plan includes 12 elements: Cultural Resources; Native American; Wildlife; Vegetation; Wilderness; Wild Horse and Burro; Livestock Grazing; Recreation; Motorized Vehicle Access; Geology, Energy and Mineral Resources; Energy Production and Utility Corridors; and Land Tenure Adjustment. Each of the elements contains goals and specific actions for the management, use, development, and protection of the resources and public lands

within the CDCA, and is based on the concepts of multiple use, sustained yield, and maintenance of environmental quality. In addition, each element provides both a desert wide perspective of the planning decisions for one major resource or issue of public concern as well as more specific interpretation of multiple-use class guidelines for a given resource and its associated activities.

E.8.2 Regional and Background Information

A discussion of the land uses affected by the transportation network, and the specific land uses within the WEMO planning area, is presented in Section 3.8.

E.9 Cultural Resources

E.9.1 Regulatory Framework

Federal

National Historic Preservation Act

The National Historic Preservation Act (NHPA) of 1966 (Public Law [PL] 89-665, 16 United States Code [U.S.C.] 470-1), as amended, generally sets forth as the national policy of the federal government, in cooperation and partnership with the states, local governments, Native American tribes, and private organizations and individuals to (1) use measures, including financial and technical assistance, to foster conditions under which our modern society and our prehistoric and historic resources can exist in productive harmony and fulfill the social, economic, and other requirements of present and future generations; (2) administer federally owned, administered, or controlled prehistoric and historic resources in a spirit of stewardship for the inspiration and benefit of present and future generations; (3) contribute to the preservation of non-federal prehistoric and historic resources and give maximum encouragement to organizations and individuals undertaking preservation by private means; and (4) encourage the public and private preservation and utilization of all usable elements of the nation's historic built environment (16 U.S.C 470-1).

Sections 106 and 110 of the NHPA have specific bearing on federal agency historic preservation activities and the management of historic properties. Section 106 of the NHPA requires federal agencies to take into account the effects of their undertakings on such historic properties and to afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on those undertakings. These regulations require federal agencies to conduct the necessary studies or consultations to identify cultural resources that may be affected by an undertaking, evaluate cultural resources that may affected to determine if they are eligible for the NRHP, and to assess whether such historic properties would be adversely affected. Where historic properties would be adversely affected, the federal agency is required to consult with the State Historic Preservation Officer, Native American tribes that attach religious or cultural significance to historic properties, the Advisory Council on Historic Preservation, and other consulting parties to resolve the effects of the undertaking.

Section 110 of the NHPA (16 U.S.C. 470h-2) generally provides that all federal agencies assume responsibility for the preservation of historic properties that are owned or controlled by such agency. Under this section, federal agencies must establish a preservation program for the

identification, evaluation, and nomination to the NRHP, and for protection of historic properties. The agency's preservation program shall ensure:

A. That historic properties under the jurisdiction or control of the agency are identified, evaluated, and nominated to the National Register.

B. That such properties under the jurisdiction or control of the agency as are listed in or may be eligible for the National Register are managed and maintained in a way that considers the preservation of their historic, archaeological, architectural, and cultural values in compliance with Section 106 and gives special consideration to the preservation of such values in the case of properties designated as having national significance.

C. That the preservation of properties not under the jurisdiction or control of the agency, but subject to be potentially affected by agency actions, are given full consideration in planning.

D. That the agency's preservation-related activities are carried out in consultation with other federal, state, and local agencies, Indian tribes, Native Hawaiian organizations carrying out historic preservation planning activities, and with the private sector.

E. That the agency's procedures for compliance with Section 106 of this Act

   i. are consistent with regulations issued by the Council pursuant to this Act.

   ii. Provide a process for the identification and evaluation of historic properties for listing in the National Register and the development and implementation of agreements, in consultation with State Historic Preservation Officers, local governments, Indian tribes, Native Hawaiian organizations, and the interested public, as appropriate, regarding the means by which adverse effects on such properties will be considered

   iii. Provide for the disposition of Native American cultural items from federal or tribal land in a manner consistent with section 3(c) of the Native American Grave Protection and Repatriation Act" (25 U.S.C. 3002[c]) (16 U.S.C 470h-2(a)).

National Register of Historic Places

The NRHP is the official list of the nation's historic places worthy of preservation. Authorized by the NHPA, the NRHP is part of the national program to identify, evaluate, and protect America's historic and archaeological resources. Cultural resources listed or eligible for listing on the NRHP are called historic properties.

Eligibility for inclusion in the NRHP is specified in regulations at 36 CFR 60.4 and is based on the following:

The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association; and:

A. That are associated with events that have made a significant contribution to the road patterns of our history; or

B. That are associated with the lives of persons significant in our past; or

C. That embody the distinctive characteristics of a type, period, or method of construction, or representation of the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

D. That have yielded, or may be likely to yield, information important in prehistory or history.

An NRHP-eligible site must meet one or more of the above criteria and have integrity appropriate to the criteria. In most cases, archaeological sites typically qualify under Criterion D; non-archaeological properties often qualify for listing under Criterion A, B, or C. Integrity varies in terms of the criterion under which the site is evaluated. For example, an archaeological site evaluated under Criterion D would need to have the potential to provide meaningful scientific research data that is important to prehistory or history. If the site has been disturbed or damaged to the extent it cannot do this, it would lack integrity. Historic buildings, on the other hand, typically need to be in their original location and be relatively unmodified or restorable to have integrity under Criterion A, B, or C. Historic buildings and structures must also evoke the historic period of significance to a layperson. None of the four criteria are mutually exclusive. It is not uncommon for a historic structure to have a related archaeological component.

Under special consideration, some cultural resources not otherwise eligible may be considered eligible. These include religious properties, moved properties, birthplaces and graves, cemeteries, reconstructed properties, commemorative properties, and properties less than 50 years old.

National Environmental Policy Act, as amended

NEPA (42 U.S.C. §§ 4321–4370c.) provides the statutory basis for considering impacts on the cultural environment as a whole, as well as cultural resources that are not historic properties. NEPA places the responsibility on the federal government to "preserve important historic, cultural, and natural aspects of our national heritage, and maintain, whenever possible, an environment [that] supports diversity and a variety of individual choice" (42 U.S.C. § 4331[b][4]). NEPA requires federal agencies to conduct an interdisciplinary analysis of the environmental consequences of their actions early in the decision-making process. For cultural resources, this analysis considers the effects of agency actions on physical features such as archaeological sites, buildings, and structures, as well as the practice of religious and other traditional lifeways that reflect community heritage. Implementing regulations are found in 40 CFR §§ 1500–1508, 36 CFR § 800.8, and 32 CFR § Part 775.

Federal Land Policy and Management Act of 1976

The FLPMA (P.L. 94-579; 43 U.S.C. §§ 1701 et seq.) mandates that public lands be managed in a manner that will protect the quality of scientific, scenic, historic, ecological, environmental, air and atmospheric, water resource, and archeological values. Title VI of the FLPMA establishes the California Desert Conservation Area. BLM, under the Secretary of the Interior, is the implementing agency for FLPMA. However, under 43 U.S.C. § 1781.h, the Secretary of Agriculture and Secretary of the Defense manage public lands that fall within their respective jurisdictions if the lands are located within or adjacent to a California Desert Conservation Area. Permits authorizing the collection of fossils for scientific purposes are issued under FLPMA.

Archaeological Resources Protection Act

The Archaeological Resources Protection Act (as implemented by 43 CFR 7) was enacted to protect archaeological resources on public lands and Indian lands and to acknowledge that archaeological resources are an irreplaceable part of America's heritage. The Archaeological Resources Protection Act applies when a project may involve archaeological resources located on federal or tribal land. The Archaeological Resources Protection Act requires that a permit be obtained before excavation of an archaeological resource on such land can take place and that artifacts recovered during excavation are curated at an appropriate facility. Section 7.8 of 43 CFR 7 includes professional qualification standards for archaeologists conducting work under the permit covered by this act. The act also provides for the notification of Indian tribes when sites of cultural or religious importance could be harmed. In addition, it details descriptions of prohibited activities and financial and incarceration penalties for convicted violators. It provides authority to federal officials to better manage archaeological sites on public land (16 U.S.C. 470aa-470mm).

Antiquities Act; Title 16, U.S.C. Section 431-433

This act authorizes the president to designate as national monuments objects or areas of historic or scientific interest on lands owned or controlled by the United States. The act required that a permit be obtained for examination of ruins, excavation of archaeological sites, and the gathering of objects of antiquity on lands under the jurisdiction of the Secretaries of Interior, Agriculture, and Army, and provided penalties for violations.

Preserve America, Executive Order 13287

Agencies shall provide leadership in preserving America's heritage by actively advancing the protection, enhancement, and contemporary use of the historic properties owned by the federal government. Each agency is to provide and maintain an assessment of the status of its inventory of historic properties and their ability to contribute to community economic development initiatives.

Where consistent with its mission and governing authorities, and where appropriate, agencies shall seek partnerships with state and local governments, Native American tribes, and the private sector to (1) promote the unique cultural heritage of communities and of the nation and to realize the economic benefit that these properties can provide, and (2) cooperate with communities to increase opportunities for public benefit from, and access to, federally owned historic properties.

Indian Sacred Sites, Executive Order 13007

In managing federal lands, agencies shall, to the extent practicable, permitted by law, and not inconsistent with agency functions, accommodate Indian religious practitioners' access to and ceremonial use of Indian sacred sites. Agencies are to avoid adversely affecting the physical integrity of these sites, maintaining the confidentiality of such sites, and informing tribes of any proposed actions that could restrict access to, ceremonial use of, or adversely affect the physical integrity of, sacred sites.

Consultation and Coordination with Indian Tribal Governments, Executive Order 13175

In formulating or implementing policies that have tribal implications, agencies shall respect Indian tribal self-government and sovereignty, honor tribal treaty and other rights, and strive to meet the responsibilities that arise from the unique legal relationship between the federal government and Indian tribal governments. The Executive Memorandum of April 29, 1994, outlines the principles that agencies are to follow in their interactions with Native American tribal governments.

The Timbisha Shoshone Tribal Homeland Act of 2000 designated a 640-acre parcel within the northern portion of the planning area (Darwin Subregion) as trust land for the Timbisha-Shoshone Tribe (Whitley 2000, Caton 2009).

American Indian Religious Freedom Act, 42 U.S.C. 1996

This act recognizes that freedom of religion for all people is an inherent right and that traditional American Indian religions are an indispensable and irreplaceable part of Indian life. Establishing federal policy to protect and preserve the inherent right of religious freedom for Native Americans, this act requires federal agencies to evaluate their actions and policies to determine if changes should be made to protect and preserve the religious cultural rights and practices of Native Americans. Such evaluations are made in consultation with native traditional religious leaders.

Native American Graves Protection and Repatriation Act, 25 USC 3001-13

This act establishes requirements for the treatment of Native American human remains, and associated funerary objects, and objects of cultural patrimony on federal land. The implementing regulations for this act are found at 43 CFR 10. In the event of an inadvertent discovery of human remains and/or associated funerary objects, work shall stop in the immediate area and be protected. The federal agency is required to notify and consult with tribes that are, or likely to be, culturally affiliated with the remains and/or associated funerary objects. Upon request, each agency is required to return any such item to any lineal descendant or specific tribe with whom such item is associated.

CDCA Plan Cultural Resources Element

The general goals of the California Desert Conservation Area (CDCA) Plan Cultural Resources Element are to:

1. Broaden the archaeological and historical knowledge of the CDCA through inventory efforts and the use of the existing data. Continue the effort to identify the full array of the CDCA's cultural resources.
2. Preserve and protect representative sample of the full array of the CDCA's cultural resources.
3. Ensure that cultural resources are given full consideration in land use planning and management decisions, and ensure that BLM authorized actions do not result in inadvertent impacts.

4. Ensure proper data recovery of significant (NRHP quality) cultural resources where adverse impacts cannot be avoided.

These goals have not been modified in the West Mojave Plan.

E.9.2 Regional and Background Information

The evaluation of potential cultural resources in accordance with the criteria established by the federal and state legislation and regulations described earlier is made with reference to a historic context. The context is defined as "the patterns or trends by which a specific occurrence, property, or site is understood and its meaning (and ultimately its significance) within history or prehistory is made clear" (National Park Service 1995). A general context for the consideration of cultural resources within the West Mojave Area is presented below.

Prehistory

The prehistory of the West Mojave Area spans four general temporal periods: Late Pleistocene and Early, Middle, and Late Holocene. In light of the many cultural sequences, the temporal periods are described below.

Late Pleistocene (20,000-10,000 BP)

Despite some claims for very early human occupation within the Planning Area (Davis et al. 1980), the earliest well-documented evidence is found in the form of the distinctive fluted Clovis-style projectile points that have been found at scattered locations throughout the region (Rondeau et al. 2007). Because these points are typically found on the surface and are not associated with radiocarbon assays, the dating of these early occupations remains problematic. However, Olivella beads from several sites within the Planning Area, including the Stahl Site in Inyo County, one site in Riverside County, and four sites in San Bernardino County (Goldstone, Awl Site, Rodgers Ridge, and Flood Pond), have yielded radiocarbon dates within the Late Pleistocene range. These sites were located adjacent to lakes or marshes and often contain a variety of artifact forms such as scraping tools, leaf-shaped bifaces, and associated debitage (i.e., prehistoric debris) (Erlandson et al. 2007; Fitzgerald et al. 2005). Based on the relatively high frequency of points and scrapers, these early groups have traditionally been seen as mobile big-game hunters; however, recent studies suggest that their economies were more diverse and focused on smaller animals and plant foods, and that large game played a minor role (Erlandson et al. 2007). They are believed to have lived in small populations in temporary camps located near permanent water sources (Sutton et al. 2007).

Early Holocene (10,000-7,500 BP)

In general, the transition from the terminal Wisconsin to the Early Holocene within the Mojave Desert was characterized by somewhat warmer and increasingly drier conditions. Pluvial lakes, while still present in the region, were generally retreating and had dried completely by around 8,000 years ago. Human use of the desert is manifested by the Lake Mojave Complex, which occurred between approximately 10,000 and 8,000 years ago, and is characterized by projectile points of the Great Basin stemmed series and abundant bifaces, steep-edged unifaces, crescents, and occasional cobble-core tools and ground stone implements. Sites attributed to the Lake

Mojave Complex have usually been found only as surface deposits and lack materials suitable for dating. However, some radiocarbon dates have been obtained for sites at Lake Mojave, Fort Irwin, Twentynine Palms, Rosamond Lake, and China Lake (Sutton et al. 2007). These sites are frequently found on the shorelines of pluvial lakes. Site types include residential bases, lithic workshops, and small camps. Settlement patterns are seen as highly mobile, with small social units visiting resource patches on seasonal rounds. Faunal remains have been found in limited quantities at Lake Mojave sites, but evidence from excavations at Fort Irwin suggest hunting focused on small game, reptiles, and rodents (Sutton et al. 2007).

Middle Holocene (7,500 to 4,000 BP)

During the first part of the Middle Holocene, a drier climate resulted in sporadic and relatively short-duration appearance of shallow desert lakes. Researchers have posited that during this period settlement within the Mojave Desert focused on upland contexts, along remnant pluvial lake basins and channels, and at spring/seep locations. During the early part of the Middle Holocene, the Pinto Complex (7,000 to 4,000 BP) appeared in the area encompassed by the Planning Area. Radiocarbon data from some sites in the Mojave Desert suggest that there was an overlap between the Lake Mojave and Pinto complexes and that the Pinto Complex may have begun in the Early Holocene (Sutton et al. 2007). The artifact assemblage includes Pinto points, leaf-shaped points and knives, drills, heavy-keeled scrapers, retouched flakes, choppers, hammerstones, and shell beads. Manos and flat milling stones appear in abundance for the first time in the Mojave Desert. Based on this high abundance of milling tools, intensive plant exploitation was one of the inhabitants' subsistence strategies and access to plant resources must have been an important factor in determining site placement (Sutton et al. 2007). Groups most likely consisted of multiple families living in centralized sites logistically close to locations used to gather resources (Sutton et al. 2007).

Sutton et al. (2007) propose that the Deadman Lake Complex may be somewhat distinct from the Pinto Complex. To date, the Deadman Lake Complex has been identified in the Twentynine Palms area only. The assemblage has small- to medium-size contracting stemmed points, an abundance of battered cobbles and core tools, bifaces, simple flake tools, milling tools, and shell beads from the Pacific Ocean and the Sea of Cortez. The artifacts are similar to Pinto Complex artifacts, but use the local igneous materials. Sutton et al. (2007) note also that it is possible the Deadman Lake Complex reflects a localized version of the Pinto Complex in which the sites are located at higher elevations and thus have access to different resources than those of the Pinto Complex in remnant pluvial lake basins.

Late Holocene (after 4,000 BP)

Following an approximate 1,000-year period of reduced occupation in the Mojave Desert (Sutton et al. 2007), the Gypsum Complex (approximately 4,000 BP and 2000 BP) emerged amid the somewhat wetter and cooler climatic conditions of the Late Holocene. The artifact assemblage characteristic of Gypsum sites consists of Elko, Humboldt, and Gypsum Cave points; triangular knives; large points with straight bases and shoulders; hammerstones; choppers; flake-based scrapers; scraper-planes; large drills with expanding bases; stone pendants; limited shell beads; millingstones; manos; mortars; and pestles (Warren 1984). Faunal remains from Gypsum sites indicate hunting focused on artiodactyls, lagomorphs, and rodents (Sutton et al. 2007).

Prehistoric sites and features with diagnostic elements indicate use of the Darwin area from at least the Newberry Period (ca. 4,000 -1,350 BP) through contact, though the potential for evidence of earlier occupation exists in several sites where subsurface deposits have been identified and remain undisturbed.

In Owens Valley and the eastern Sierra, the period between 2000 BP and 1500 BP (the Newberry Period in regional chronologies) is characterized by highly mobile groups, caches of Elko and Humboldt Basal notched points, bifaces, and milling equipment (Eerkens and Spurling 2008; Faull 2007). Sites dating to the latter part of this period are typically base camps with structures and lithic reduction sites. Obsidian quarrying reached its peak during this period (Eerkens and Spurling 2008). Sites occur more in the Volcanic Tablelands and northern Owens Valley than in the southern Owens Valley area (Poulson 2009).

The Late Holocene from about 1500 BP to the time of the historic era is viewed by most archaeologists as the extension of the ethnographic present. A series of dry and wet episodes characterize the climate during this period (Larsen and Michaelsen 1989; Sutton 1996, Weide et al. 1974). Lakes in the Mojave Desert started to dry up and site locations are centered near ephemeral water sources during the latter part of this period.

The Rose Springs Complex during the latter part of the Late Holocene (1500 to 1000 BP) marked the beginning of the bow-and-arrow technology in the Mojave Desert. These sites have well-developed middens and a variety of material culture including Eastgate and Rose Spring projectile points, stone knives, drills, pipes, bone awls, milling tools, marine shell artifacts, and large quantities of obsidian (Sutton et al. 2007). The sites are found near springs (Saratoga, Rose) along washes and sometimes along lakeshores (Rogers/Rosamond and Koehn lakes). Evidence of wickiups and pit houses has been found in two sites in the western Mojave Desert (Sutton et al. 2007).

In the Owens Valley, sites dating to 1500-600 BP (identified in regional chronologies as the Haiwee Period) show evidence of more sedentary groups with semi-subterranean houses. The bow and arrow (Rose Spring and Eastgate points), and storage pits are introduced, and artifact caching mostly disappears (Faull 2007). Production at obsidian quarries drops off (Eerkens and Spurling 2008). The band-like structure is replaced by the household as the primary socioeconomic unit (Poulson 2009). Subsequently, (600 BP to contact, Marana Period Cottonwood and Desert Side-notched points and Owens Valley Brown ware (a coil and scrape type of construction) are introduced and there is an increase in ground stone tools as the harvesting of green pinyon nuts becomes a subsistence focus (Bettinger 1989; Eerkens and Spurling 2008).

Protohistory and Ethnographic Context

To evaluate cultural development, archaeological explanations need to be expanded. The similarities between the Late Holocene period and the ethnographically recorded occupation of the area have resulted in an extrapolation from the ethnographic present to Late Holocene patterns. While this has its difficulties, certain types of ethnographic information can be employed in the evaluation of the archaeological record. Perhaps the most valuable is the linguistic structure of the area.

The use of linguistic evidence for prehistory is more tenuous than the more substantial cultural material record but it can provide important insight. If the archaeological record and linguistic

evidence both reflect actual activities, the reconstruction proposed by one field should be substantiated by the other. When an area undergoes an intensive linguistic change (as from one stock to another), it may also undergo a corresponding change in the material remains left by the people involved. If two groups are in extended contact, their nonlinguistic elements can be assimilated while their language may remain relatively distinct (Bright and Bright 1965).

One of the most important questions that needs to be addressed and that requires consideration of ethnographic and linguistic information is the development of the location of the native populations at the time of contact. Where did they come from, and when did they arrive?

The major linguistic division within the Planning Area is the Uto-Aztecan stock, which includes the Numic and Takic subfamilies. Speakers of languages derived from the Numic branch of the Uto-Aztecan language group include the Kawaiisu, Southern Paiute, Western Shoshone, and Owens Valley Paiute; the speakers of the languages derived from the Takic branch include the Cupeño, Kitanemuk, Serrano, and Cahuilla (Warren 1984).

Evidence for population movements and the location of these groups at contact have been evaluated based on diagnostic artifacts, projectile points, milling technology and ceramics, burial patterns, and specialty items such as crescentics and beads.

Numic/Takic Language Subfamilies (Mojave Desert/Western Great Basin)

Golla (2007) proposes the development of the Numic and Takic languages in California as dating from about 2000 years ago, and that the Numic languages developed somewhat more recent between 1500 and 2000 years ago. Bettinger and Baumhof (1982) estimate a time depth for the split between the Numic dialects beginning around 800 years ago.

In most explanations, the expansion of the Uto-Aztecan languages within the Mojave Desert and Western Great Basin show similar time depths to the Yuman languages in the Colorado Desert. As with the Yuman languages, expansion toward the coast either filled a void or replaced an existing population. Early explanations described the "Uto-Aztecan wedge" based principally on the assumption of a broad Hokan dispersed language group and the position of the Uto-Aztecan languages relative to the Salinan and Yuman languages. This explanation is challenged by both the proposed timeline for their development and the archaeological record.

As noted earlier, the four tribes that speak languages from the Numic branch are the Kawaiisu, Southern Paiute (Chemehuevi), Western Shoshone, and Owens Valley Paiute, and the four tribes that speak languages from the Takic branch include the Cupeño, Kitanemuk, Serrano, and Cahuilla. As stated above, to understand what remnants may have been left behind by these tribes, it is important to know where their traditional territories are located. The following is a description of lands traditionally occupied by each tribe.

The Kawaiisu occupied the southern end of the Sierra Nevada watershed by the Piute and Tehachapi mountains at the line between the Great Basin and California cultures. The habitat was in the mountainous ridge between the Mojave Desert and the San Joaquin Valley. One source suggests that there were Mountain Kawaiisu who lived in the Piute and Tehachapi mountains and Desert Kawaiisu who lived east of Tehachapi into southern Death and Panamint valleys where they sometimes lived with Shoshone (Garfinkel and Williams 2009).

The Chemehuevi are considered a subgroup of the larger Southern Paiute group. The Chemehuevi occupied territory west of and along the Colorado River, south of Needles into

eastern Mojave Desert as far east as Providence Mountains (Kroeber 1925; Kelly and Fowler 1986). In 1776, there were no Chemehuevi along the Colorado River; however, they moved into the Chemehuevi Valley after the Halchidoma were forced to move east with the Maricopa. After 1876, they moved back to the remote desert when war broke out with the Mojave (Kroeber 1925).

The Western Shoshone occupied a region that included Death Valley through the highlands of central Nevada into northwestern Utah, Skull, Deep Creek, Panamint, and Saline valleys (Thomas et al. 1986, Norwood et al. 1980).

The Owens Valley Paiute occupied a narrow valley along the Owens River on the eastern side of the southeastern Sierra Nevada and extends north to Benton, California, and east to Fish Lake Valley, Nevada (Liljeblad and Fowler 1986; Norwood et al. 1980; Steward 1934).

The Cupeño were a small group of about 500 to 750 who occupied an area approximately 10 miles in diameter south of the San Luis Rey River and centered on the area now known as Warner Springs within the valley of San Jose de Valle (Bean and Smith 1978b; Kroeber 1925).

The Kitanemuk lived in the Tehachapi Mountains at the southern end of the San Joaquin Valley with Antelope Valley being their southern boundary (Kroeber 1925; Blackburn and Bean 1978).

The Serrano territory generally encompassed the San Bernardino Mountains east of Cajon Pass, east to Twentynine Palms and south to Yucaipa Valley (Bean and Smith 1978a).

The Cahuilla occupied mountains, passes, canyons, valleys, and desert from the Colorado Desert north of the Chocolate Mountains and across to Borrego Springs, westerly along Palomar Mountain, northerly to the Santa Ana River near Riverside, then easterly along the San Bernardino Mountains to Orocopia Mountain, and encompassing the San Jacinto and Santa Rosa mountain ranges (Bean 1978).

Cultural Characteristics for Numic and Takic Language Speakers

Cultural characteristics similar for Numic and Takic language speakers in the Mojave Desert include diagnostic point types and coil and scrape pottery or paddle and anvil pottery (Bean 1978; Bean and Smith 1978a; Thomas et al, 1986). There are four point types that may be associated with contact populations in the Numic/Takic language area: Rose Spring, Eastgate, Cottonwood and Desert Side Notched. These tribes also traditionally cremated their dead with the exception of the Kitanemuk and Kawaiisu (Strong 1929, Blackburn and Bean 1978; Zigmond 1986; Kelly and Fowler 1986, Garfinkel and Williams 2009). The Western Shoshone and Owens Valley Paiute practiced both cremations and burials (Busby et al. 1979; Thomas et al. 1986). The Cahuilla and Southern Paiute (Chemehuevi) also were agriculturalists and the Owens Valley Paiute practiced a specialized irrigation system to grow crops (Bean 1978, Busby et al. 1979, Kelly and Fowler 1986; Steward 1933). Sutton et al. (2007) suggest a geographic difference for artifact types. They note that the northern Mojave Desert or the Numic language areas have a combination of Desert Side Notched and Cottonwood triangular points, brown ware pottery, some buff ware pottery near the Mojave River, and primarily Coso obsidian artifacts. The eastern portion of the Mojave Desert also representing Takic language areas have only Cottonwood triangular points, brown and buff ware pottery, and local obsidian artifacts. The Mojave River appears to have been a boundary between the Takic and Numic speakers (Sutton et al. 2007).

Historic Period

Initial Exploration by Europeans

The term historic period generally is defined as the period after initial contact between Native American groups and European explorers/settlers, when written sources about the area become available. An arbitrary date for the beginning of the historic period for California would be 1540, with the expedition of Spanish explorer Hernando de Alarcon. Alarcon's expedition brought the first Europeans to the Planning Area. The expedition sailed up the Colorado River as far as the confluence of the Colorado and Gila Rivers (Woznicki 1968). In the same year Melclor Diaz led an expedition by foot up to the confluence of the Colorado and Gila rivers. In 1700, Father Eustebio Francisco Kino traveled from Sonora, Mexico, to the Yuma area, and for the next few years Spanish priests and missionaries moved up and down the Colorado and Gila rivers visiting the tribes.

Exploration into central and northern portions of the Planning Area was slower and more intermittent. In 1772 Pedro Fages, a Spanish army officer and commander of California's Spanish force, crossed into the Planning Area while following a band of runaways from the presidio at San Diego (Greene 1983). His chase appears to have led him through the San Bernardino Valley, over to the high desert near Cajon Pass, and into the Mojave Desert before proceeding on to the south end of San Joaquin Valley and then on to Monterey (Greene 1983). Juan Maria de Rivera explored the southern portions of Colorado and Utah in 1765 during an expedition to find routes west from Santa Fe, New Mexico. In 1776, an expedition by Franciscan missionaries Francisco Atanasio Dominguez and Silvestre Velez de Escalante left Santa Fe, New Mexico, looking for a route to the California coast. They did not reach the coast, but did explore portions of the Great Basin before turning back (Malouf and Findlay 1986).

Trails, Trading Routes, and Transportation

The first Spanish period trails in the Planning Area were pioneered by the de Anza Expeditions in 1774-1775 and 1775-1776. Mexico gained its independence from Spain in 1821, but travel in the Planning Area was still limited. Travel on the existing trails in the area increased after restrictions against private traders were lifted (Malouf and Findlay 1986). American trappers and traders began working the northern portion of the Planning Area in increasing numbers in the early 1800s, including groups led by Jedediah Smith in 1826-1827 and Peter Ogden in 1829-1830 (Malouf and Findlay 1986). Both these groups came into California in the region of Needles and moved west through the Mojave Desert, using the Mojave Indian Trail, and then north into the San Joaquin Valley (Malouf and Findlay 1986).

A primary route for the growing trade was the Old Spanish Trail, pioneered by Antonio Armigo in 1829. The Old Spanish Trail began in Santa Fe, New Mexico, and ended at the Pacific Ocean at the Pueblo of Los Angeles. Armigo's route included portions of the routes blazed by de Rivera, Dominguez and de Escalante, and Jedediah Smith. The portion of the trail route within the Planning Area followed the Mojave River west past what is now Barstow, then southwest through the Cajon Pass to Mission San Gabriel and on to Los Angeles.

The Old Spanish Trail became increasingly important to trade in the 1830s, being used by many American trappers and traders. The Mojave River Valley was also a popular route for horse and cattle thieves and Native American slave traders bound for the established settlements in New Mexico. The trail was designated in 2002 as a National Historic Trail.

The Southern Pacific Railroad constructed a railroad line from Mojave to Needles, on the Colorado River, between 1882 and 1883, which increased the exploitation of the regions' mineral resources (Hector 1987). The town of Barstow, originally named Waterman, was founded in 1886 as a town for railroad workers. The establishment of a main transfer station at Yermo, 10 miles from Barstow, resulted in significant growth in Barstow itself (Hector 1987).

The completion of the San Pedro, Los Angeles, and Salt Lake Railway line from Salt Lake City, Utah, to Barstow in May of 1905 further increased the town's importance. Much of the route ran through only sparsely inhabited areas in the Planning Area, Barstow being the only town of any size. Although not a large town, Kelso, on the line east of Barstow, was a major staging stop for the railroad.

Numerous small railroads were constructed in the Planning Area for the express purpose of servicing mining operations. The Borate and Daggett Railroad, constructed in 1898, was used to haul borate the dozen miles from the mines at Borate to the Southern Pacific line at Daggett (Ross 2002). Many Navajo Native Americans worked on the construction of the line. The Borate and Daggett ran for nine years, carrying mail and passengers in addition to its main cargo of borate (Ross 2002).

When the railroad route from Barstow to Needles was constructed, a dirt road was also established adjacent to the tracks (Hatheway 2001). This road was most likely built as part of the construction of the railroad, but was soon used for wagon transportation. Through the rest of the 1800s and into the first decade of the 1900s, the road was only lightly used, since the train provided a much more cost-effective way of transporting people and goods through the area. After the turn of the century, however, the rise of the automobile made the road a potential route from Nevada to the west coast. The County of San Bernardino improved the existing dirt road in 1911 (Hatheway 2001), possibly to entice the State of California to adopt the route as a highway. Plans were being formed for a highway connecting the east coast and west coast, and the Needles to Barstow to Los Angeles route was one of the main considered alignments.

Mining

Mining has been a recurring and significant factor in the development of the Planning Area. By the early 1850s, gold deposits had been discovered in San Bernardino County around Leach Lake and Lytle Creek (Greene 1983.) In the early 1860s, gold was discovered in the Picacho Peak area north of Blythe and in the Bear and Holcomb Valleys in the San Bernardino Mountains. In the 1870s, gold mining began in earnest in both the northern and southern portions of the planning area. Silver and gold deposits were identified in Darwin in 1874, prompting a mining boom that, at its peak in 1876, included a population of 1000 miners, families, and immigrant workers, 20 mines, 200 buildings, 2 smelters and an extension route for the Cerro Gordo Freighting Company with regular service to the ports of Los Angeles. Further south in the same timeframe, mining began in the Little San Bernardino and Eagle Mountains near Twentynine Palms and Joshua Tree National Park. The oasis at Twentynine Palms had originally been explored by a military survey party led by Colonel Henry Washington in 1885 (Greene 1983). At its height of operations the area supported numerous mining districts (Greene 1983). At its full extent the area in and around the park supported numerous mining districts, including Twentynine Palms, Washington, Gold Park, Piñon, Cottonwood, Eagle Mountain, Monte Negras, Rattler, and Dale (Greene 1983:89-90).

One of the major mining areas opened up as a result of the Southern Pacific line from Mojave to Needles was the Buckeye Mining district, located in the mountains south of the rail line and approximately 50 miles east-southeast of Barstow. Two of the principal mines begun in the area in the late 1880s were the Bagdad and Roosevelt mines, established by John Suter (Ross 2001). A rich gold ore deposit was found in the late 1890s, after the claims had been sold by Suter. The first shipment of ore was delivered to the Randsberg-Santa Fe reduction company's stamp mill in Barstow in 1901 (Ross 2001). A second mining company, the Benjamin E. Chase Gold Mining Company, had been set up in the Buckeye district. Chase was also the president of the Ludlow & Southern Railway, which was built in 1903 to transport ore form the Chase mines to the railhead at Ludlow (Ross 2001). The two operations merged in 1904, and between then and 1910 it was the largest gold producing operation in San Bernardino County. It was also the largest copper producing operation in the county. Gold production fell after 1910, and the mines were worked intermittently from 1910 to the 1970s.

A mining boom started in the Mojave Valley in 1860 after silver was discovered by Robert W. Waterman and John L. Porter (Hector 1987). By the early 1880s the Calico silver mining district was established, and the town of Calico was founded in 1881 along the Mojave River. Silver deposits were also discovered around Ivanpah, which became a major mining district in the 1870s, and in the Providence Mountains in the 1870s-1880s (Greene 1983). In addition to silver and gold, borate deposits were found in 1883 north of Daggett by Hugh Stevens and Bill Neel. Mining commenced soon after, and in 1888 the most promising claims were purchased by Francis M. Smith, who also owned the borax mines in the Death Valley area.

Numerous silver mines were also established during the early 1860s in the Coso Range, resulting in the establishment of the Coso Mining Company and the Coso Gold and Silver Mining Company, among others (Norwood et al. 1980). Mining success fluctuated greatly in these areas and was never as successful as some other areas. A third mining area was established in 1865 in the Inyo Range on the southeast side of the Owens Valley, centered at Cerro Gordo. This area was very productive, and by 1868 the Union Mine at Cerro Gordo was the most productive silver mine in the United States (Norwood et al. 1980). Labor disputes, lack of a railroad, and economic recession caused problems sustaining mining activities in some areas. Other areas with gold and silver finds relatively quickly became played out, and miners move on to more productive areas.

In addition to gold and silver, salt was mined in the Saline Valley east of Independence. Salt mining began in 1864 and continued until 1918, but transportation costs kept the enterprise from growing to a major operation (Norwood et al. 1980). The Saline Valley Salt Tram, located just east of the planning area, was completed in 1913 to transport salt over the Inyo Mountains to Owens Valley where it was then shipped via railroad. It was the steepest tram in the United States rising from 1,100 feet in the Saline Valley to 8,500 feet at the crest of the Inyo Mountains, and then dropping to 3,600 feet in Owens Valley. The tram is on the National Register of Historic Places (#74000514) (Conrad 1973).

From 1945 to 1957, the Anaconda Copper Company made the Darwin area the largest lead producing area in California. The mines were reopened again in 1967 and have remained active, albeit in a much less productive state. In a 1968, a report on the town of Darwin, it was estimated that there are 30 miles of workings and tunnels in the surrounding hills and canyons (Norwood et al 1980).

Agriculture and Ranching

As a result of the mining operations in the area around the Owens and Panamint valleys, farmers and cattlemen also moved into the area, especially the Owens Valley, to supply food to the miners. The influx of Americans into the area resulted in conflicts with the indigenous Native American groups (Norwood et al. 1980). Camp Independence was established by the Army in 1862 in the Owens Valley to quell Native American-White miner violence that had broken out in the area. Temporarily abandoned in 1864, it was re-occupied in 1865 after violence again broke out and remained active until abandoned in March 1877 (California State Military Museum 2011c).

Agriculture began in the Owens Valley as a response to the miners' need for food in the area. Although the area received little rain, the Owens River supplied enough dependable water for irrigation. By the beginning of the twentieth century, the city of Los Angeles was experiencing a severe water shortage and it was proposed to William Mulholland, president of the Los Angeles Water Department, that the Owens River be tapped to supply Los Angeles with water (Norwood et al. 1980). A $23 million bond was approved by Los Angeles voters, water rights were purchased, and an aqueduct was completed by 1913. The diversion of water to Los Angeles did not immediately impact agriculture in the Owens Valley, but a drought in 1921-1922 began a decline that ended farming in the area by the mid-1930s (Norwood et al. 1980).

During the 1880s, the area around Twentynine Palms began to be used as a cattle range, with a number of large cattle companies based in the Banning and Big Bear areas running their herds from Morongo Valley to Twentynine Palms (California State Military Museum 2011g). Ranches in the area included the Barker and Shay Ranch, Jim Mart's "I-S" outfit, the Chase and Law Ranch, and the Talmadge brand, all of which used the area during the winter months. Warren's Well was also the gathering point for the spring and fall cattle roundups until World War II (California State Military Museum 2011g).

Military Installations in the Planning Area

A chain of military posts was established in San Bernardino County between 1859 and 1860 by Captain James H. Carleton. These posts were created to protect the travel route, called the Old Government Road, from San Bernardino across the Mojave Desert to Fort Mojave, near Needles (Hector 1987). The posts were garrisoned by elements of the California Volunteers during the Civil War, and most were evacuated at the war's end. Due to local concerns for protection of travel route and increasing mining activity, the posts were reoccupied in the late 1860s (California State Military Museum 2011b). Two of the more substantial posts were Fort Piute and Camp Cady. Fort Piute was established about 20 miles east of Fort Mojave, and Camp Cady was located about 20 miles east of Barstow (California State Military Museum 2011b). Both had permanent buildings constructed of either adobe or rock. Both also had histories of abandonment and reoccupation, with Fort Piute finally being abandoned in 1868 and Camp Cady in 1871 (California State Military Museum 2011b).

In Inyo County, Camp Independence was established by the Army in 1862 as a result of disputes between the Owens Valley Paiute and local ranchers. As cattleman and ranchers moved into Owens Valley and cattle grazed on the Paiute food supply, the Paiute stole and killed some cattle for food. The ranchers armed themselves and violence between the Native Americans and whites escalated; this became known as the Owens Valley Indian War (1861-1865). The ranchers asked

the help of the military in Los Angeles and Fort Tejon. Camp Independence was built to quell the conflicts between the Native Americans and ranchers and protect the road to the mines in Nevada. The Paiute were escorted to San Sebastian Indian Reservation in 1863. The camp operated until 1877 when disputes subsided (California State Military Museum 2011c).

The presence of the military in the Planning Area increased dramatically in the years immediately before and after America entered World War II. One of the first to open was Fort Irwin. Originally established as the Mojave Anti-Aircraft Range, it was opened in 1940. In 1942 the range was renamed Camp Irwin, in honor of MG George LeRoy Irwin (California State Military Museum 2011e). It was deactivated in 1944 and reactivated in 1951 as Camp Irwin Armored Combat Training Area for troops destined for the Korean conflict (California State Military Museum 2011e). The first antenna to support the National Aeronautics and Space Administration's unnamed exploration of deep space, called Pioneer Deep Space Station, was constructed at Fort Irwin in 1958 (NPS 2013). Renamed Fort Irwin in 1961, it was declared a permanent installation. Deactivated again in 1971, it was reactivated in 1980 as the National Training Center and serves as a major training facility for the Army, Marine Corps, and National Guard (California State Military Museum 2011e). The Pioneer Deep Space Station National Historic Landmark is located within Fort Irwin and is on the National Register (#85002813).

Edwards Air Force Base (AFB), located north and east of Lancaster, was established in 1942 on land first purchased in 1933 for use as a bombing range of units stationed at March AFB (Miksell 2000). The facility was from inception used for testing of highly secret developmental aircraft (Miksell 2000). Rogers Dry Lake is located within the base and its natural attributes of clean air, isolated location, weather, variable terrain, and large expanse was ideal for the military to flight test aircraft. The base emerged during the Cold War as a premier Air Force high-technology complex, especially important in the areas of experimental flight testing, captive flight testing (test tracks), rocket propulsion research, and in the 1960s, a center for astronaut training (California State Military Museum 2011d). Edwards AFB continues to be a major testing facility of new and experimental aircraft. In 1985 Rogers Dry Lake was added as a National Historic Landmark and is now listed on the NRHP (# 85002816). It is also a National Historic Site and as such part of the National Park system.

The Marine Corps Air Ground Combat Center, Twentynine Palms (MCAGCC) was first opened in 1940 as an Army glider training area (California State Military Museum 2011g). Converted to an Army fighter pilot training and bombing range in 1943, it was decommissioned and the land transferred to the County of San Bernardino in 1945. In 1952 the Marine Corps took control of the property and named it Headquarters Marine Corps Training Center, Twentynine Palms, California (State Military Museum 2011g). It became the MCAGCC, Twentynine Palms in 1979. At approximately 495 square miles, it is the largest Marine Corps Base in existence.

The Marine Corps Logistics Base, Barstow, opened in the summer of 1942 as Navy Supply Depot, Barstow, but was transferred to the Marine Corps as it was being completed in December of the same year (Hector 1987). The logistics base supplied material needed for the Fleet Marine Forces in the Pacific theater during World War II. The base also saw significant expansion during the Korean War years, and has continued to expand its services to the Marine Corps in the subsequent decades (Hector 1987). Because it employs a large number of civilian workers, the growth of the base has also resulted in the growth of the nearby town of Barstow.

Naval Air Weapons Station China Lake (NAWS CL), originally called Naval Ordinance Test Station Inyokern, was established in 1943 for the California Institute of Technology to conduct research into rockets and rocket propellants (Miksell 2000). NAWS CL continued after World War II with development and testing of guided missiles, jet aircraft ejection systems, and later space program capsules and the intercontinental ballistic missile development program (Miksell 2000). NAWS CL is the Navy's largest single land holding at 19,600 square miles and continues as their center for research, testing and evaluation of weapons systems. The Coso Rock Art District National Historic Landmark is within the boundaries of NAWS CL and is on the National Register (#66000209).

E.10 Visual Resources

E.10.1 Regulatory Framework

Federal

Federal Land Policy and Management Act

The Federal Land Policy and Management Act of 1976 (FLPMA; 43 United States Code 1701) and the U.S. Department of the Interior's Bureau of Land Management (BLM) Land Use Planning Handbook (2005), and BLM Manual H-8410-1 all emphasize the importance of protecting the quality of scenic resources on public lands. The BLM, through FLPMA, is charged with protecting the scenic value of the public lands they administer. FLPMA sections relevant to the Desert Renewable Energy Conservation Plan (DRECP) Proposed Land Use Plan Amendment (LUPA) are:

> Section 102(a): "The public lands [shall] be managed in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archaeological values."
>
> Section 103(c): Identifies "scenic values" as resources for public management. Section 201(a): "The Secretary shall prepare and maintain on a continuing basis and inventory of all public lands and their resources and other values (including…scenic values)."
>
> Section 505(a): "Each right-of-way shall contain terms and conditions which will…minimize damage to the scenic and esthetic values."
>
> FLPMA's legal mandate to protect the quality of scenic resources on public lands is carried out by the BLM and detailed in BLM's Visual Resource Management (VRM) system, as described in the FSEIS.

The BLM-established visual values for each VRI Class as outlined in BLM Manual H-8410-1 are as follows:

Scenic quality is a measure of the visual appeal of a tract of land. In the visual resource inventory process, public lands are given an A, B, or C rating based on the apparent scenic quality which is determined using seven key factors: landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications (see Illustrations 1, 2, 3, and 4). During the rating process,

each of these factors are ranked on a comparative basis with similar features within the physiographic province. Use the physiographic provinces as delineated by Fenneman (see Illustrations 5 and 6) to the extent possible. The boundaries of these provinces may be refined to fit local situations. The "Ecoregions of the United States" by R. C. Bailey may be helpful in making these refinements. An important premise of the evaluation is that all public lands have scenic value, but areas with the most variety and most harmonious composition have the greatest scenic value. Another important concept is that the evaluation of scenic quality is done in relationship to the natural landscape. This does not mean that man-made features within a landscape necessarily detract from the scenic value. Man-made features that complement the natural landscape may enhance the scenic value. Evaluations should avoid any bias against man-made modification to natural landscape.

A. Delineating Scenic Quality Rating Units (SQRU's). The planning area is subdivided into scenic quality rating units for rating purposes. Rating areas are delineated on a basis of: like physiographic characteristics; similar visual patterns, texture, color, variety, etc.; and areas which have similar impacts from man-made modifications. The size of SQRU's may vary from several thousand acres to 100 or less acres, depending on the homogeneity of the landscape features and the detail desired in the inventory. Normally, more detailed attention will be given to highly scenic areas or areas of known high sensitivity. Map and number each SQRU on an overlay as shown in Illustration 7.

B. Evaluating Scenic Quality. It is recommended that an interdisciplinary team do the evaluations. Ideally, one team member should have an environmental design arts background. All participants should have an understanding of the visual resource inventory system and be familiar with the areas to be evaluated. Evaluate each SQRU by observing the area from several important viewpoints. Scores should reflect the evaluator’s overall impression of the area. After evaluating all the SQRU's, show the scenic ratings on the scenic quality overlay (see Illustration 7). Record the rating on the Scenic Quality Rating Summary - Bureau Form 8400-5 (see Illustration 4). Bureau Form 8400-1 (see Illustration 3) may be used as a worksheet for completing each scenic quality evaluation. A photographic record should be maintained for the area. Photographs and completed evaluation forms should be filed for future reference.

Sensitivity levels are a measure of public concern for scenic quality. Public lands are assigned high, medium, or low sensitivity levels by analyzing the various indicators of public concern.

A. Factors to Consider.

1. Type of Users. Visual sensitivity will vary with the type of users. Recreational sightseers may be highly sensitive to any changes in visual quality, whereas workers who pass through the area on a regular basis may not be as sensitive to change.
2. Amount of Use. Areas seen and used by large numbers of people are potentially more sensitive. Protection of visual values usually becomes more important as the number of viewers increase.
3. Public Interest. The visual quality of an area may be of concern to local, State, or National groups. Indicators of this concern are usually expressed in public meetings, letters, newspaper or magazine articles, newsletters, land-use plans, etc. Public

controversy created in response to proposed activities that would change the landscape character should also be considered.

5. Adjacent Land Uses. The interrelationship with land uses in adjacent lands can affect the visual sensitivity of an area. For example, an area within the view shed of a residential area may be very sensitive, whereas an area surrounded by commercially developed lands may not be visually sensitive.
6. Special Areas. Management objectives for special areas such as Natural Areas, Wilderness Areas or Wilderness Study Areas, Wild and Scenic Rivers, Scenic Areas, Scenic Roads or Trails, and Areas of Critical Environmental Concern (ACEC), frequently require special consideration for the protection of the visual values. This does not necessarily mean that these areas are scenic, but rather that one of the management objectives may be to preserve the natural landscape setting. The management objectives for these areas may be used as a basis for assigning sensitivity levels.
7. Other Factors. Consider any other information such as research or studies that includes indicators of visual sensitivity.

B. Delineation of Sensitivity Level Rating Units (SLRU's). There is no standard procedure for delineating SLRU's. The boundaries will depend on the factor that is driving the sensitivity consideration. Consequently, a thorough review of the factors referred to in IIIA should be completed before any attempt is made to delineate SLRU's. Distance zone may also play an important role in identifying the SLRU boundaries.

C. Documentation Requirements.

1. Narrative. Prepare a summary statement with the essential facts and rationale to support the conclusions reached on sensitivity levels. The format for presenting this information is optional. As a minimum, the summary data must be entered on Form 8400-6 (see Illustration 8). Backup information used to evaluate each of the factors should be maintained with the inventory record.
2. Map Overlay. Prepare an overlay (see Illustration 9) showing the sensitivity rating units and ratings.

D. Completion of Sensitivity Rating. The instructions for completing the sensitivity ratings are shown in Illustration 8. Ideally, the rating should be done as a team effort involving the Area or District VRM Coordinator, Area Manager, and at least one other staff person. If timing or funding will to allow this approach, the rating may be done by the VRM coordinator and reviewed by the Area Manager. Management should be in agreement on the summary rating for each SLRU.

Distance Zones. Landscapes are subdivided into 3 distanced zones based on relative visibility from travel routes or observation points. The 3 zones are: foreground-middleground, background, and seldom seen. The foreground-middleground (fm) zone includes areas seen from highways, rivers, or other viewing locations which are less than 3 to 5 miles away. Seen areas beyond the foreground-middleground zone but usually less than 15 miles away are in the

background (bg) zone. Areas not seen as foreground-middleground or background (i.e., hidden from view) are in the seldom-seen (ss) zone.

A. Mapping Distance Zones. Prepare a distance zone overlay (see Illustration 10) using a base map common to the scenic quality base map. Distance zones are determined in the field by actually traveling along each route and observing the area that can be viewed. If the route is a highway or trail, it should be traveled in both directions, unless it is a one-way route. River use usually is one way; however, if there is up-river travel, it too should be evaluated from both directions. If a vehicle or boat is used for this field survey, it is best to have both a driver and an observer. Distance zones should be mapped for all areas. While they are not necessary to determine classes in Class A scenic areas or for areas with low sensitivity levels, distance zones can provide valuable data during the RMP process when adjustments to VRM classes are made to resolve resource allocation conflicts.

1. Foreground-Middleground Zone. This is the area that can be seen from each travel route for a distance of 3 to 5 miles where management activities might be viewed in detail. The outer boundary of this distance zone is defined as the point where the texture and form of individual plants are no longer apparent in the landscape. In some areas, atmospheric conditions can reduce visibility and shorten the distance normally covered by each zone. Also, where the foreground-middleground zone from one travel route overlaps the background from another route, use only the foreground-middleground designation.
2. Background Zone. This is the remaining area which can be seen from each travel route to approximately 15 miles. Do not include areas in the background which are so far distant that the only thing discernible is the form or outline. In order to be included within this distance zone, vegetation should be visible at least as patterns of light and dark.
3. Seldom-Seen Zone. These are areas that are not visible within the foreground-middleground and background zones and areas beyond the background zones.

B. Coordinating Distance Zones Delineation and Sensitivity Level Analyses. It is recommended that distance zones be delineated before the sensitivity analysis is done. The distance zone delineations provide valuable information that can be very useful in the sensitivity analysis. For example, the foreground-middleground zones are more visible to the public and changes are more noticeable and are more likely to trigger public concern. Also, the boundaries of the distance zones are very useful in helping to establish sensitivity rating units.

Visual Resource Inventory Classification Matrix

Scenic Quality	VSL High	VSL High	VSL High	VSL Medium	VSL Medium	VSL Medium	VSL Low
Special Areas	I	I	I	I	I	I	I
A	II	II	II	II	II	II	II
B	II	III	III/IV	III	IV	IV	IV
C	III	IV	IV	IV	IV	IV	IV

Visual Resource Inventory Classification Matrix

Scenic Quality	VSL High	VSL High	VSL High	VSL Medium	VSL Medium	VSL Medium	VSL Low
Distance Zones	f/m	b	s/s	f/m	b	s/s	s/s

Source: BLM Manual H-8410-1 (BLM 1984b)
VSL – Visual Sensitivity Level
Key to Distance Zones:
f/m = foreground/middleground
b = background
s/s = seldom seen

The BLM-established management objectives for each VRM Class as outlined in BLM Manual H-8410-1 are as follows:

VRM Classes and Objectives

- VRM Class I: To preserve the existing character of the landscape. Allowed Level of Change: This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.
- VRM Class II: To retain the existing character of the landscape. Allowed Level of Change: The level of change to the characteristic landscape should be low. Management activities may 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 found in the predominant natural features of the characteristic landscape.
- VRM Class III: To partially retain the existing character of the landscape. Allowed Level of Change: The level of change to the characteristic landscape should be moderate. Management activities may attract attention, but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.
- VRM Class IV: To provide for management activities which require major modification of the existing character of the landscape. Allowed Level of Change: The level of change to the characteristic landscape can be high. Management activities may dominate the view and may be the major focus of viewer attention. However, the impact of these activities should be minimized through careful siting, minimal disturbance, and repeating the basic elements of form, line, color, and texture within the existing setting.

CDCA Plan

Under FLPMA §601, the BLM has developed the CDCA Plan to "provide for the immediate and future protection and administration of the public lands in the California desert within the framework of a program of multiple use and sustained yield, and the maintenance of environmental quality." There is no stand-alone visual resource plan element within the CDCA; however, visual resources values are addressed within the recreation element of the CDCA Plan. According to the recreation element, the BLM will take the following actions to effectively

manage for activities involving the alteration of the natural character of the landscape (BLM 1980):

1. The appropriate levels of management, protection, and rehabilitation on all public lands in the CDCA will be identified, commensurate with visual resource management objectives in the multiple use class guidelines.
2. Proposed activities will be evaluated to determine the extent of change created in any given landscape and to specify appropriate design or mitigation measures using the BLM's contrast rating process.

The contrast rating process is a tool used to determine the extent of visual impact that proposed resource management activities would create in a landscape. It serves as a guide for reducing visual impacts to acceptable levels as defined by the visual management objectives and multiple use class guidelines.

E.10.2 Regional and Background Information

A discussion of the visual resources within the WEMO planning area is presented in Section 3.10.

E.11 Special Designations

E.11.1 Regulatory Framework

Federal

Federal Land Policy and Management Act, 1976 as Amended

FLPMA (Public Law 94-579, October 21, 1976), is called the BLM Organic Act because it consolidates and articulates BLM's management responsibilities. Many land and resource management authorities were established, amended, or repealed by FLPMA, and it proclaimed multiple use, sustained yield, and environmental protection as the guiding principles for public land management (BLM 2015).

Several sections of FLPMA provide guidance regarding the establishment, management, and inventory of resource values that are considered for special designations.

Lands in the vicinity of the Project were recently reviewed for wilderness characteristics based on FLPMA §201(a) requiring the BLM to:

> *prepare and maintain on a continuing basis an inventory of all public lands and their resource and other values (including, but not limited to, outdoor recreation and scenic values), giving priority to areas of critical environmental concern. This inventory shall be kept current so as to reflect changes in conditions and to identify new and emerging resource and other values. The preparation and maintenance of such inventory or the identification of such areas shall not, of itself, change or prevent change of the management or use of public lands.*

Section 202(c)(3) requires the BLM, through the land use planning system, to "give priority to the designation and protection of areas of critical environmental concern." In §103(a), an ACEC is defined as the following:

> *An area within the public lands where special management attention is required (when such areas are developed or used or where no development is required) to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life and safety from natural hazards.*

Section 603(a) of FLPMA required BLM to conduct the original inventory of wilderness characteristics, which was completed in 1979, while §603(c) stated that "once an area has been designated for preservation as wilderness, the provisions of the Wilderness Act (16 USC 1131 et seq.) which apply to national forest wilderness areas shall apply with respect to the administration and use of such designated area".

Wilderness Act of 1964

The "Wilderness Act" (Public Law 88-577; September 3, 1964) is the legislation authorizing the establishment and management of wilderness areas. Section 4(a) states:

> *…….each agency administering any area designated as wilderness shall be responsible for preserving the wilderness character of the area and shall so administer such area for such other purposes for which it may have been established as also to preserve its wilderness character. Except as otherwise provided in this Act, wilderness areas shall be devoted to the public purposes of recreational, scenic, scientific, educational, conservation, and historical use.*

California Desert Protection Act of 1994

The CDPA (Public Law 103-433, October 31, 1994) designated 69 areas as components of the National Wilderness Preservation System on BLM-managed public lands in the California Desert. Section 103(d) states that "wilderness is a distinguishing characteristic of the public lands in the California desert" and "the wilderness values of desert lands are increasing threatened by …development." The CDPA further states that there are no buffer zones designated along with the wilderness areas: "The fact that non-wilderness activities or uses can be seen or heard from areas within a wilderness area shall not, in itself, preclude such activities or uses up to the boundary of a wilderness area."

Omnibus Public Lands Management Act of 2009

The Bureau of Land Management's National Landscape Conservation System (NLCS) was created in June 2000 to conserve, protect, and restore special areas and unique resources. The lands are prized for their cultural, ecological, scientific, educational, wildlife, and aesthetic values for the benefit of current and future generations. The NLCS system gained legal permanence in 2009 with the passage of the Omnibus Public Land Management Act (Public Law 111-11, March 30, 2009) §2002(a). Section 2002(c) directed the BLM "to manage the system in accordance with any applicable law (including regulations) relating to any of component of the system in a manner that protects the values for which the components of the system were designated." The Public Lands within the CDCA and components of the National Wilderness Preservation System are areas included under this authorization.

California Desert Conservation Area Plan, 1980 as Amended

The CDCA is a 25-million acre expanse of land designated by Congress in 1976 through §601 of FLPMA. The BLM administers about 10 million of those acres. When Congress created the CDCA, it recognized its special values, and the need for a comprehensive plan for managing the area.

The CDCA Plan recognized the need to maintain and perpetuate wilderness resources, including plants and animals indigenous to the area, and to the extent consistent provide the above for opportunities for public use, enjoyment, and understanding, and the unique experiences dependent upon a wilderness setting, including maintaining access to these areas. The plan also directed managers to consider valid nonconforming uses and activities in the management of the wilderness so as to have the least possible adverse effect and/or wherever possible a positive effect (BLM 1980).

In addition, the plan established ACECs as a management tool for the protection of special values, including cultural resources, prehistoric archaeological features, wildlife habitat, and sensitive plant species. Prior to its designation, management prescriptions are developed for each proposed ACEC. These prescriptions are site specific and include actions that the BLM has the authority to carry out, as well as recommendations for actions that the BLM does not have direct authority to implement, such as cooperative agreements with other agencies and mineral withdrawals (BLM 1980).

BLM Manual 6340, Management of Designated Wilderness Areas

This manual section identifies BLM's role in administering wilderness areas on public lands, provides policy guidance for BLM personnel, and sets the framework for wilderness management program development. It states the goals of wilderness management, as well as administrative functions and specific activities related to wilderness management.

BLM Handbook 1601-1 Land Use Planning Handbook

This handbook provides general guidance for the establishment of BLM administrative designations: ACECs and Back Country Byways. It specifically states that designated ACECs must be managed to protect the area and prevent irreparable damage or natural systems.

BLM Handbook 8357-1, 1993 BLM Byways Handbook

This handbook provides specific direction for BLM's Back Country Byways program, including information of Byways nomination and designation, planning criteria, visitor safety, and specifications for entrance kiosks (BLM 1993).

BLM Instruction Memorandum No. 2011-154

This Instruction Memorandum directs offices to continue to conduct and maintain inventories regarding the presence or absence of wilderness characteristics, and to consider lands with wilderness characteristics in land use plans and when analyzing projects under NEPA (BLM 2011).

E.11.2 Regional and Background Information

Wilderness

The purpose of wilderness, as defined in section 2(a) of the Wilderness Act, is "...to assure that an increasing population, accompanied by expanding settlement and growing mechanization, does not occupy and modify all areas in the United States...leaving no lands designated for preservation and protection in their natural condition...". Further, wilderness is defined in Section 2(c) of the Wilderness Act to be areas "...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 Act 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…"

Section 4(c) of the Wilderness Act prohibits certain uses of wilderness. These prohibitions include commercial enterprise, permanent roads, temporary roads, use of motor vehicles, motorized equipment or motorboats, landing of aircraft, use of other forms of mechanical transport, and structures or installations. There are three classes of exceptions to some or all of the prohibitions. These include private existing rights (e.g., rights associated with a lease for a microwave tower that existed at the time of wilderness designation), actions necessary to meet the minimum requirements for the administration of the area, (e.g., use of motorized equipment to remove hazardous materials), and "Special Provisions" (e.g., livestock grazing that was established prior to designation).

The California Desert Protection Act of 1994 (CDPA), at Title I for BLM Wilderness, provides for motorized vehicle access for (1) fish and wildlife management activities by appropriate State agencies and (2) law enforcement. At Title VII, the CDPA establishes explicit federal water rights, allows access for Indian religious purposes, and provides mandates and procedures for acquiring State and private inholdings.

Wilderness areas are managed according to several internal policies, including BLM Manual MS-6340, Management of Designated Wilderness Areas (BLM 2012), in addition to 43 CFR 6300, Wilderness Management, and Principles for Wilderness Management in the California Desert (Desert Managers Group 1995).

Wilderness Study Areas (WSA)

To fulfill direction from Congress, under Section 603 of FLPMA, the BLM conducted its wilderness review process. This process was carried out by first inventorying public lands to determine which lands had wilderness characteristics, which was done with extensive public involvement. Lands found to have wilderness characteristics were administratively designated as WSA. For the CDCA this was documented in the Wilderness Inventory Final Descriptive Narratives, completed in March 1979 (BLM 1979). That inventory identified 138 Wilderness Study Areas comprising more than 5.5 million acres. Section 603 of FLPMA requires that, until the Congress determines otherwise, the Secretary of Interior shall manage these lands so as not to impair the suitability of these lands for preservation as wilderness.

The CDPA and the Omnibus Public Land Management Act of 2009 designated wilderness based in part on these WSA. The CDPA also released some public lands from WSA status, and identified some existing WSA that would continue to be managed to the non-impairment

standard until Congress makes a future decision on these lands. The WEMO Planning area contains approximately 315,230 acres within seven WSA identified by Congress in the CDPA.

All WSA are managed so not to impair the suitability of the area for preservation as wilderness and prevent unnecessary or undue degradation, in accordance with the BLM Wilderness Study Area Manual MS-6330 (BLM 2012), and will continue to be managed in that manner until Congress either designates them as wilderness or releases them for other uses.

As with wilderness, allowable pre-existing use as described in FLPMA, only apply to grazing, mining, and mineral uses, or as specifically identified in the legislation, and do not include other uses such as recreational activities. Although most recreational activities (including hiking, horseback riding, fishing, hunting and trapping, camping, and other primitive forms of recreation) are allowed in WSA, some activities may be prohibited or restricted if they do not meet the non-impairment standard or one of the exceptions.

While access on primitive routes or ways in WSA is allowed, BLM policy does not provide for OHV use of these routes unless continuous use and designation of that use has been established from 1976 onward. The result of the policy is that routes, once eliminated from the travel network, cannot be established in the network again until Congress releases the land for other uses.

WSA Guidance directs BLM to comply with the wilderness non-impairment mandate (FLPMA Section 603(c)). BLM must monitor and regulate the activities of off-highway vehicles (OHVs) in WSA to assure that their use does not compromise these areas by impairing their suitability for designation as wilderness. The BLM's Off Road Vehicle Regulations (43 CFR 8342.1) require that BLM establish off-road vehicle designations of areas and routes that meet the non-impairment mandate. BLM's policy is that cross-country vehicle use in WSA does cause the impairment of wilderness suitability. As described in BLM Manual 1626—Travel and Transportation Manual, "Any motorized/mechanized linear transportation feature located within [WSA] will be identified in a transportation inventory as a motorized/mechanized 'primitive route'...Primitive routes will not be made a part of the transportation system, classified as a transportation asset, or entered into the Facility Asset Management System (FAMS) unless one of the following conditions is met:

A. The routes are designated as non-motorized and non-mechanized trails, or

B. Congress releases the WSA from Wilderness consideration."

Motorized/mechanized primitive routes may be signed only to the extent necessary to prevent resource damage or users getting lost; they may not be assigned names or numbers that would appear to create a de facto route system.

Though motorized and mechanical transport may be permitted to continue along existing primitive routes, "closed" designations may be appropriate for WSA, or portions of WSA, where LUP planning goals are to provide primitive recreational opportunities, or where needed for the protection of an identified natural resource.

Lands Managed for Wilderness Characteristics

In accordance with Section 201 of FLPMA, the BLM is required to prepare and maintain on a continuing basis an inventory of public lands and their resources and other values. Per Section

603 of FLPMA, this includes lands with wilderness characteristics as defined in Section 2 of the Wilderness Act of 1964. Such lands do not, in and of themselves, imply particular land uses. All lands that are not currently designated as wilderness or WSAs are assessed during the LUP process to determine if they possess one or more wilderness characteristics. These characteristics generally include naturalness, outstanding opportunities for solitude, and outstanding opportunities for primitive and unconfined recreation.

Considering wilderness characteristics in the land use planning process may result in several outcomes related to land use, including, but not limited to: (1) emphasizing other multiple uses as a priority over protecting wilderness characteristics; (2) emphasizing other multiple uses while applying management restrictions (conditions of use, mitigation measures) to reduce impacts to wilderness characteristics; (3) the protection of wilderness characteristics as a priority over other multiple uses. This process is described by BLM policy in Manual MS-6320, Considering Lands with Wilderness Characteristics in the Land Use Planning Process, and BLM Land Use Planning Handbook, H-1601-1, Appendix C, (K) Wilderness Characteristics.

Management of lands with wilderness characteristics is part of BLM's multiple-use mandate, and is recognized within the spectrum of resource values and uses within the WEMO Planning Area. Lands with wilderness characteristics are defined for this planning effort as areas:

- Having been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable.
- Having outstanding opportunities for solitude or a primitive and unconfined type of recreation.
- Potentially containing ecological, geological, or other features of scientific, educational, scenic, or historical value.

These lands may be managed for the use and enjoyment of area visitors and may be devoted to the public purposes of recreation, scenic, scientific, educational, conservation, and historical use. In addition, they could augment multiple-use management of adjacent and nearby lands through the protection of watersheds and water yield, wildlife habitat, natural plant communities, and similar natural values.

The process for these inventories is described in BLM Manual MS-6310, Conducting Wilderness Characteristics Inventory on BLM Lands. In addition to review and maintenance of existing lands with wilderness characteristics data, the inventory incorporates new data concerning resource conditions for lands previously determined not to possess wilderness characteristics; newly acquired lands; and citizen information (public nominations of the lands with wilderness characteristics) meeting the minimum standard for further review, to establish an updated, current inventory of lands with wilderness characteristics.

Areas of Critical Environmental Concern

ACECs Designated Prior to 2006 WEMO Plan

Information on these ACECs is summarized below. A CD of the complete ACEC Management Plans for each of these ACECs is available from the California Desert District Office. Where the ACEC Management Plans include management prescriptions related to transportation, including

stopping, parking, and camping distances, that information is included within the following descriptions.

Afton Canyon

This ACEC protects a sensitive Mojave River riparian community and the scenic canyon in which it is located. Originally 4,726 acres, in 2006 the WEMO Plan expanded the ACEC southward. An Afton Canyon Natural Area management plan (1989) was prepared in cooperation with the CDFW under the Sikes Act and covers a larger area than the ACEC. The plan protects the ACEC and the adjacent desert habitat in the Cady Mountains, which is occupied habitat for bighorn sheep and contains nest sites for prairie falcon and golden eagle. Visitor facilities include two campgrounds, an equestrian campground, the Mojave Road, and interpretive signs and kiosks.

The 2006 WEMO Plan adopted the 1989 management plan recommendations, amending the MUC Class from M to L on 1,225 acres. The plan also adopted the provisions of the WEMO Plan for protection of bighorn sheep, prairie falcon, golden eagle, vermilion flycatcher, yellow-breasted chat, yellow warbler, summer tanager, least Bell's vireo, western pond turtle, desert tortoise, Mojave fringe-toed lizard, and all species of bats.

Amboy Crater

BLM designated the Amboy Crater as an ACEC within the Amboy Crater National Natural Landmark in 1987. The transportation-related management prescriptions for the unit allow stopping and parking within 25 feet, and camping within 100 feet, of centerline of designated routes.

Barstow Woolly Sunflower

BLM established a botanical ACEC northeast of Kramer Junction to protect the Barstow woolly sunflower. Although the area protects a relatively large population of this species, the ACEC represents only a small proportion of the overall range, which is limited to the western Mojave Desert. The desert tortoise and Mohave ground squirrel are also found within the ACEC. The State of California owns nine sections of land to the east and west, which CDFW manages for protection of desert plants and animals.

The 2006 WEMO Plan adjusted the boundary to encompass additional public lands northwest of Kramer Junction.

Stopping and parking of motor vehicles can take place within 50 feet of either side of the centerline of designated routes, while camping is restricted to existing disturbed areas along open routes.

Bedrock Springs

Bedrock Springs ACEC, located at the edge of the Golden Valley Wilderness, was established by the CDCA Plan to protect prehistoric values.

The 2006 WEMO Plan included this ACEC within the Mohave Ground Squirrel Conservation Area, and applied all conservation measures to the ACEC.

Big Morongo Canyon

BLM established the Big Morongo Canyon ACEC to protect habitat qualities for least Bell's vireo and triple-ribbed milkvetch. The Big Morongo Canyon ACEC is managed as a wildlife reserve, with emphasis on strict protection of the flora and fauna. This desert oasis is known internationally for its bird diversity, and opportunities are provided for wildlife viewing and photography, including boardwalk trails, interpretive displays and brochures. The ACEC was established in the 1980 CDCA Plan. Expansion of the ACEC in 1996 created a habitat linkage between the Little San Bernardino Mountains and the San Bernardino Mountains, though several private parcels remain to be acquired.

Black Mountain

The Black Mountain ACEC is one of the largest areas in the western Mojave Desert to protect the prehistoric and Native American values of this area northwest of Barstow. A management plan was approved in 1988. The ACEC lies entirely within the Superior-Cronese and Fremont-Kramer DT ACECs. The southeastern half is within the Black Mountain Wilderness. The ACEC includes critical habitat for the desert tortoise, and known occupied habitat for the Mojave ground squirrel, LeConte's thrasher, desert cymopterus, and Barstow woolly sunflower. Nest sites are present for golden eagle and prairie falcon.

The 2006 WEMO Plan included amending this ACEC plan to include species protection as a goal.

Calico Early Man Site

This National Register Property was established as an ACEC in 1980, and a management plan was prepared in 1984. The plan designated a vehicle route network and specified ways to protect the evidence of ancient human occupation.

The 2006 WEMO Plan modified the ACEC Management Plan to require that all provisions for surveys, minimization, mitigation, and compensation for adverse impacts to biological resources that apply to the Superior-Cronese DT ACEC would also apply to this ACEC.

Christmas Canyon

The Christmas Canyon ACEC protects prehistoric values. Most of the ACEC lies within the Spangler Hills Open Area in San Bernardino County. The 1988 ACEC management plan prescribed ways that the archaeological resources could be protected within an area open to recreational vehicle use.

In the 2006 WEMO Plan, a small portion of the southern edge of this ACEC was included within the Mohave Ground Squirrel Conservation Area. All conservation measures associated with the Conservation Area apply to the ACEC.

Camping is prohibited, and other recreational activities are limited, in sensitive areas near rock art, rock shelters, and middens.

Cronese Basin

The BLM designated the Cronese Lakes, north of Interstate 15 between Barstow and Baker, as an ACEC to protect valuable cultural and natural resources. Ephemeral wetlands are present on the lakes, which serve as stopover points for migratory waterbirds and nesting sites for many species during very wet years. Mesquite hummocks and desert willow washes add to the biological importance, and the dunes and sand sheets are occupied habitat for the Mojave fringe-toed lizard. The desert tortoise is found in low densities. A management plan was published in 1985.

In the 2006 WEMO Plan, the southeastern portion of this ACEC was included within the Superior-Cronese DT ACEC. The 2006 WEMO Plan amended the ACEC Management Plan to incorporate protection of blowsand areas for the Mojave fringe-toed lizard.

Desert Tortoise Research Natural Area

The CDCA Plan of 1980 designated lands north of California City in Kern County as an ACEC and a Research Natural Area. A management plan for the ACEC, prepared under authority of the Sikes Act, was approved in 1988. The ACEC is jointly managed by the BLM, CDFW and the Desert Tortoise Preserve Committee, a non–profit group established to acquire and manage lands for protection of the desert tortoise.

The 2006 WEMO Plan expanded the boundaries of this area to include lands acquired by the Desert Tortoise Preserve Committee. The ACEC was also included within the Mohave Ground Squirrel Conservation Area and the Fremont-Kramer DT ACEC. Stopping and parking of motor vehicles can take place within 50 feet of either side of the centerline of designated routes, while camping is restricted to existing disturbed areas along open routes.

Fossil Falls

The Fossil Falls ACEC was established in 1980 to protect prehistoric values. A management plan was approved in 1986.

The 2006 WEMO Plan amended the management plan for this ACEC by recognizing provisions applicable to the Mohave Ground Squirrel Conservation Area.

Great Falls Basin

The Great Falls Basin ACEC management plan was prepared in 1987 in cooperation with the CDFW under the Sikes Act. The ACEC adjoins the Indian Joe Canyon Ecological Reserve and the northern portion is within the Argus Range Wilderness. The southern portion is within a BLM wilderness study area. The western boundary is contiguous with the China Lake Naval Air Weapons Station. The ACEC protects unique and valuable wildlife and scenic resources, particularly the dozens of seeps and springs that serve as habitat for the threatened Inyo California towhee. Designated critical habitat for the towhee is present within the ACEC. In addition, large populations of quail and chuckar are present, as is a remnant population of bighorn sheep. Raptors nesting within the ACEC include golden eagle, prairie falcon, and long-eared owl. Potential habitat exists for the Panamint alligator lizard.

The 2006 WEMO Plan amended the management plan to prohibit travel on certain routes that were previously designated as open. The area was included within the Mohave Ground Squirrel Conservation Area and the Argus Range Key Raptor Area.

No camping is permitted within 200 yards of springs and riparian areas.

Harper Dry Lake

The ACEC was established to protect the remnant marshes at the southwestern edge of Harper Dry Lake. The marsh and alkali wetland communities bordering Harper Dry Lake hold potential for discovery of several rare and restricted-range plant species. The playa bordering the marshes supported nesting Western snowy plovers in the past, and surveys conducted in 2001 found these birds to be present and probably nesting. Harper Dry Lake is an important area for the conservation of Western snowy plover nesting habitat. Harper Dry Lake is recognized as a Key Raptor Area by the BLM, which has designated 223 such areas nationwide. Key Raptor Areas are places known to be significant habitats for selected species of birds of prey, and Harper Dry Lake is one of seven Key Raptor Areas in the Mojave Desert. The species known to utilize the habitat at Harper Dry Lake are northern harrier, short-eared owl, ferruginous hawk, and long-eared owl. Harper Dry Lake has been improved as a Watchable Wildlife site, a program to provide access and facilities to visitors for birdwatching, photography and passive recreation. Arrangements are now being made to supply surface water to the remnant marsh, and interpretive kiosks, restrooms, and trails have been installed.

The 2006 WEMO Plan adjusted the boundary of this ACEC by adding 110 acres of the Watchable Wildlife Site on the southern boundary and deleting 110 acres of barren lakebed on the northern boundary. The plan also included revised management objectives for conservation of plant and animal species, including the Western snowy plover and several restricted-range alkali wetland species. The area was also recognized as a Key Raptor Area.

Lands within 100 yards of marsh are closed to camping.

Jawbone/Butterbredt

The 1982 Sikes Act Plan for Jawbone/Butterbredt ACEC addressed the Sierra/Mojave/Tehachapi Ecotone Wildlife Habitat Management Area, a designated “special area” in the CDCA Plan. The ACEC plan incorporated all of the Rudnick Common Grazing Allotment and the vehicle management boundary agreement between the BLM and the Rudnick Estate Trust. OHV routes of travel were designated within the ACEC, which includes both designated wilderness and the Jawbone Canyon and Dove Springs Open Areas. The Pacific Crest Trail crosses the ACEC as well. The ACEC was established to manage and protect significant cultural and wildlife values of this transition zone between the mountains and the northwestern Mojave Desert. Among the wildlife habitats present are Butterbredt Springs, an important migratory bird stopover site, habitat for the yellow-eared pocket mouse in Kelso Valley, and the raptor and vulture migratory corridor between the Kern River Valley and the Mojave River. Nearly the entire range of a West Mojave endemic, the Kelso Creek monkeyflower, is located within the ACEC.

In 1995 Jawbone Station Visitor Center opened its doors to the public to serve as a public information and outreach center to those coming to the Jawbone/Butterbredt ACEC and the

surroundings public lands. The facility's goal is to educate the public about the agency, its mission, the sensitive resources in the area, and responsible use of the public lands.

The 2006 WEMO Plan added protection of the Bendire's thrasher, Mohave ground squirrel, yellow-eared pocket mouse, and Kelso Creek monkeyflower as specific objectives of the ACEC management plan. Three new conservation areas, including the Mohave Ground Squirrel, Kelso Creek Monkeyflower, and Bendire's Thrasher Conservation Areas, were also established within the ACEC.

Since the approval of the 2006 WEMO Plan, an intensive effort has been underway to implement the designated route system and manage OHV use within the Jawbone/Butterbredt ACEC and surrounding areas. The efforts have included signing and resigning all designated open routes as needed, regular patrols and monitoring in the Jawbone area, installation of additional information kiosks at main entry portals to the management area, building boundary fences around the Dove Springs Open Area and along the northern boundary of the Jawbone Canyon Open Area, and continued focused restoration efforts.

For the last eight years BLM has partnered with a local non-profit, the Friends of Jawbone (FOJ), to assist with management plan implementation efforts in the Jawbone area. The FOJ is able to maintain a staff of between eight and twenty individuals for field work crews, without funding from BLM. These crew members take on many different tasks including regular monitoring patrols, replacement of route signs, trash pickup, and implementation of approved habitat restoration activities, route and trail maintenance, and recreation facility maintenance.

No camping is permitted within 600 feet of water sources.

Juniper Flats

An ACEC was established for the Juniper Flats Cultural Area in 1980, and a management plan was prepared in 1988. The foothill area south of Apple Valley containing springs and riparian habitat in a dense stand of junipers was an important Native American habitation and special use site. Juniper Flats also provides important habitat for the San Diego horned lizard and the gray vireo. The Willow fire in 2000 burned the entire ACEC, leading to a temporary closure of the area until vegetative recovery had begun. Juniper Flats is an important equestrian riding area and provides access to the Deep Creek hot springs in the San Bernardino National Forest.

The 2006 WEMO Plan included construction of a multi-use trailhead to allow parking and staging for equestrian users.

Last Chance Canyon

The CDCA Plan designated Last Chance Canyon in the El Paso Mountains as an ACEC in 1980. A Plan Amendment in 1984 adjusted the boundaries to include additional prehistoric sites. This amendment implemented a recommendation of the ACEC management plan, which was completed in 1982. The archaeological sites are part of a larger archaeological district placed on the National Register of Historic Places in 1971.

The 2006 WEMO Plan adopted an interim route network until a revised OHV access network could be established for the El Paso Mountains. The ACEC was also included within the Mohave Ground Squirrel Conservation Area.

Manix

The Manix ACEC, located 20 miles northeast of Barstow along the Mojave River, was established in 1990 to protect paleontological and cultural resources. This site contains blowsand habitat for the Mojave fringe-toed lizard.

The 2006 WEMO Plan designated public lands along the Mojave River as a conservation area for the Mojave fringe-toed lizard.

Mojave Fishhook Cactus

A CDCA Plan Amendment established the Mojave Fishhook Cactus ACEC in 1984. The ACEC is composed of two separate parcels in the Brisbane Valley. The purpose of the ACEC is to protect the yellow-spined form of the Mojave fishhook cactus. Subsequent studies have shown that this area may be important to the Mojave monkeyflower as well. A management plan was completed in 1990, which designated OHV routes within the ACEC.

The 2006 WEMO Plan amended the MUC Class from U to L for 628 acres. The plan also designated Brisbane Valley as a tortoise Special Review Area.

Rainbow Basin

The Rainbow Basin ACEC, established in 1980, lies ten miles north of Barstow and includes two campgrounds, a scenic loop drive, hiking trails, and an interpretive trail. The area is popular with visitors that come to see the colored geological formations. The ACEC protects two nest sites for the prairie falcon. The ACEC management plan, completed in 1991, addressed both the ACEC and a larger surrounding area where route designation was accomplished and recommendations were made for campground and trail improvements and closure to target shooting. Hunting is allowed in the ACEC.

This area is part of the Coolgardie Mesa conservation area and ACEC, the Mohave Ground Squirrel Conservation Area, and the Superior-Cronese DT ACEC. The 2006 WEMO Plan closed routes that served as links to regional routes in order to reduce disturbance to the Lane Mountain milkvetch. Objectives of the management plan were also revised to include protections for the Lane Mountain milkvetch and prairie falcon.

Red Mountain Spring

This area was designated as an ACEC by the CDCA Plan to protect prehistoric values. A 1982 CDCA Plan Amendment listed this area as closed to vehicle travel. A management plan was completed in 1987. This ACEC was included in the route designation inventory and designation process for the Red Mountain subregion.

The 2006 WEMO Plan formally changed the name of this ACEC from Squaw Spring to Red Mountain Spring. The ACEC was included in the Mohave Ground Squirrel Conservation Area and the Fremont-Kramer DT ACEC.

Camping, OHV and non-OHV travel is prohibited.

Rodman Mountains Cultural Area

A 1988 CDCA Plan Amendment established this ACEC to protect cultural resources. Most of the ACEC is within the Rodman Mountains Wilderness. Portions outside the wilderness are part of the Ord-Rodman route designation subregion. The site contains raptor nests and limited desert tortoise habitat.

The 2006 WEMO Plan incorporated most of the ACEC into the Ord-Rodman DT ACEC.

Vehicle camping is restricted to within 100 feet of centerline of designated routes, and competitive speed events prohibited.

Rose Springs

An area surrounding Rose Springs in Inyo County was designated as an ACEC by the CDCA Plan to protect prehistoric values. Access is limited by a gate, which has been vandalized in the past. A management plan was prepared in 1985 that recommended closure of the ACEC to OHVs. Access to the ACEC is available via a transmission line road and the Los Angeles Aqueduct road.

The 2006 WEMO Plan incorporated this area into the Mohave Ground Squirrel Conservation Area.

Sand Canyon

The Sand Canyon ACEC was established to protect riparian habitat and wildlife in a canyon on the eastern slope of the Sierra Nevada Mountains. The ACEC is one of the most diverse areas in the West Mojave for species of small mammals and supports a wide variety of reptiles and birds. Two species nearly endemic to the West Mojave are found within the ACEC: the Ninemile Canyon phacelia and the yellow-eared pocket mouse. Riparian habitat in the ACEC is important to migratory birds, including the willow flycatcher. An ACEC management plan was prepared in 1989.

The 2006 WEMO Plan modified the ACEC management plan to incorporate protections for the yellow-eared pocket mouse.

Short Canyon

The Short Canyon ACEC was established by an amendment to the CDCA Plan in 1988. Most of the ACEC lies within the Owens Peak Wilderness. The purpose of the ACEC is to protect the unusual vegetation and diverse flora. Short Canyon is known to support occurrences of Charlotte's phacelia (*Phacelia nashiana*), a limited-range plant whose distribution falls almost entirely within the western Mojave Desert. In addition, a significant population of the state-listed Mojave tarplant (*Deinandra [Hemizonia] mohavensis*) was detected in the canyon in 1998. A management plan was prepared in 1990. The primary management action was to exclude grazing from the ACEC, which has been implemented through fencing and placement of cattle guards.

The 2006 WEMO Plan modified the ACEC management plan to incorporate protections for the Charlotte's phacelia and Mojave tarplant.

Soggy Dry Lake

BLM established the Soggy Dry Lake ACEC in the 1980 CDCA Plan. The Soggy Dry Lake Creosote Rings Preserve was established to protect ancient vegetation in the Fry Valley, where creosote bushes have developed as clonal rings, attaining an age of up to 11,700 years. A management plan for this ACEC was approved in 1982. The CDFW owns 488 acres adjacent to the ACEC, managed as the King Clone Ecological Reserve.

Steam Well

This ACEC protects historic and prehistoric values within the Golden Valley Wilderness in San Bernardino County.

The 2006 WEMO Plan incorporated this area into the Mohave Ground Squirrel Conservation Area.

Trona Pinnacles

The 1989 management plan for the Trona Pinnacles ACEC focused on protection of the outstanding scenery and geological features of this area, which is located ten miles south of Trona. The site is used for commercial filming and sightseeing. At least one prairie falcon nest site was reported within the ACEC, but falcons have not been recorded there for the past ten years.

Upper Johnson Valley Yucca Rings

The CDCA Plan of 1980 established this ACEC for the unique clonal yucca rings found near the Fry Mountains within the Johnson Valley Open Area. The yucca plants are believed to have grown in a manner similar to the ancient creosote rings near Soggy Dry Lake and represent a stable, old plant community. A management plan was completed in 1982, and a Plan Amendment in 1984 adjusted the boundary along parcel lines. The ACEC Management Plan was developed to provide for continued use to meet the recreational needs of the Johnson Valley Open Area while protecting the sensitive resources. This area is within an OHV Open Area, and is completely fenced, so it would not be affected by designation of the route network.

Western Rand Mountains

The Western Rand Mountains ACEC (RMMA) formerly supported high densities of desert tortoises, though tortoise numbers have declined substantially from historical levels. The ACEC is believed to support the Mohave ground squirrel, and is known to harbor burrowing owls and LeConte's thrasher. A Rand Mountains Fremont Valley Management Plan was completed in 1993, and adopted in 1994. This plan, which also addressed surrounding lands such as Koehn Lake and lands to the northeast, was prepared in cooperation with the CDFW under authority of the Sikes Act. The plan received a "no jeopardy" Biological Opinion from the USFWS. The plan recommended several amendments to the BLM's CDCA Plan:

- Expand the Western Rand Mountains ACEC by 13,120 acres
- Change Class M lands in the ACEC expansion and adjacent alluvial fan areas to Class L.

- Withdraw 32,590 acres within the RMMA from mineral location and entry. The 6,090-acre Koehn Lake and an additional 8,320 acres within the management area will remain as class M and open to mineral entry.
- Change the RMMA OHV network from an "existing routes" system to a designated trail system that was mapped and marked in the field. The network of available routes of travel adopted in the plan reduced the network from the existing network of 764 miles down to 129 miles of designated Open routes..
- Categorize portions of the RMMA as Desert Tortoise Category I habitat. These lands lie on both sides of the Randsburg-Mojave Road southwest of Red Mountain and are shown on Illustration #9 in the 1993 management plan.

Implementation of the Rand Mountains Fremont Valley Management Plan related to the management of off-highway vehicle use within the area has included:

- Mapping, marking, and maintaining of the designated trail network with brown numbered post to identify the trail system.
- Installing a 17-mile long fence on the southern boundary of the RMMA with portals allowing entry only on the designated trail system.
- Installing fences along both side of designated routes R5 and R50 within the ACEC to prevent off route travel by motorized vehicle.
- Installing fencing along the northern boundary of ACEC to control access into the area. Through the connection of the boundary fence lines and the R5 and R50 fence lines about 5,700 acres of desert tortoise habitat have been encircled and protected from uncontrolled vehicle trespass.
- Installing 12 information kiosks around the management area with maps, rules, and information brochures for the public.
- Performing active desert restoration on 50 miles of closed trails at roughly 700 sites, covering 32 acres of desert tortoise habitat restoration. Active restoration efforts have included ripping, barricading, vertical mulching, and replanting areas with desert vegetation.
- Performing outreach efforts on major holiday weekends during the use season to inform visitors of the vehicle-use regulations within the management area.
- Conducting patrols of the area by both Law Enforcement staff and Resource staff to make public contacts about the management area. The Rand Mountains Fremont Valley Management Plan proposed a goal of ranger patrols eight hours per week plus eight hours each weekend from March 1 to June 30, September 1 to November 1, and holiday weekends. Ranger staffing levels were not adequate to consistently to so until 2002. In 2002, a ranger was specifically assigned primary patrol responsibilities for the Rand Mountains, Fremont Valley, and the Desert Tortoise Natural Area in order to facilitate implementation of other plan goals.

The 2006 WEMO Plan adopted the recommendations of the management plan, including adjustment of the boundary; amending the MUC Class from M to L for 34,835 acres; adopting the route network; designating Category 1 tortoise habitat as DWMA; implementing mineral

withdrawal; and implementing an OHV-use permit program. The adoption of the route network was vacated by the Court in its Remedy Order of 2011, but the other actions were kept in place.

Since the adoption of the 2006 WEMO Plan, the first phase of a permit system has begun. The permit is required for all persons desiring to operate a motor vehicle within RMMA, as specified in the 2006 WEMO Plan.

Stopping and parking of motor vehicles can take place within 50 feet of either side of the centerline of designated routes, while camping is restricted to existing disturbed areas along open routes.

Whitewater Canyon

BLM established the Whitewater Canyon ACEC in the 1980 CDCA Plan. The Whitewater Canyon ACEC straddles the WEMO Planning area boundary, with the upper elevations lying within the planning area. All of the ACEC within the WEMO Planning area lies within the San Gorgonio Wilderness. Wildlife protection is a goal of the ACEC Plan, and the ACEC protects a substantial herd of bighorn sheep and harbors golden eagle and prairie falcon nests. Significant riparian areas are found in lower Whitewater Canyon, and these are known to support several species of riparian birds as well as the arroyo toad. Potential habitat exists for the triple-ribbed milkvetch within upper Whitewater Canyon. The Pacific Crest Trail and the California Riding and Hiking Trail cross the ACEC.

New ACECs Designated in the 2006 WEMO Plan

The 2006 WEMO Plan established 10 new ACECs within the planning area, as discussed below.

Bendire's Thrasher Conservation Area

The conservation strategy for Bendire's thrasher is based on conservation of habitat on public lands where thrashers were seen in 2001 or were abundant in the mid-1980s and conditions appear unchanged. Four public land conservation areas were established. These are within Joshua Tree National Park (106,710 acres), the Jawbone/Butterbredt ACEC (7,678 acres), northern Lucerne Valley (9,805 acres), and Coolgardie Mesa (7,646 acres).

Carbonate Endemic Plants Research Natural Area

BLM designated public lands within an area east of Highway 18 in the foothills of the San Bernardino Mountains as a Research Natural Area and manages the land as an ACEC to protect four federally listed and one unlisted species of plants, as well as the San Diego horned lizard, gray vireo, and bighorn sheep.

No camping is permitted in critical habitat.

Coolgardie Mesa

The Coolgardie Mesa ACEC lies within the Superior-Cronese DT ACEC and contains conservation areas for the desert tortoise, Mohave ground squirrel, Bendire's thrasher, and Lane

Mountain milkvetch. The ACEC serves as a multispecies reserve for these four species as well as the Barstow Woolly sunflower.

Kelso Creek Monkeyflower Conservation Area

The Kelso Creek Monkeyflower Conservation Area was established by the 2006 WEMO Plan. The plan included conservation prescriptions such as maintaining regional rangeland health standards, requiring botanical surveys for proposed projects, and monitoring of habitat. In the 2016 DRECP LUPA, the Kelso Creek Monkeyflower ACEC was eliminated as a separate ACEC, and was incorporated into the Jawbone/Butterbredt ACEC.

Middle Knob

The BLM designated the Middle Knob area as a new ACEC in the 2006 WEMO Plan. Management of this area includes requirements for avoidance of all listed species of plants and animals, designation of vehicle routes of travel to ensure compatibility with the purposes of the ACEC and with the Pacific Crest Trail, and prohibition of new wind energy development on public lands. Surveys for flax-like monardella in suitable habitat would be required for any ground-disturbing projects in the Middle Knob ACEC.

Mojave Monkeyflower

Conservation of Mojave monkeyflower is based on establishment of two reserve areas that include the majority of the known populations. These reserves, including southern Brisbane Valley and an area near Daggett Ridge, were designated as an ACEC in the 2006 WEMO Plan. The plan amended the MUC Class from U to L for 10,448 acres, and amended the MUC Class from M to L for 25,351 acres. Part of the ACEC lies within the Ord-Rodman DT ACEC. In the 2016 DRECP LUPA, this ACEC was split into two stand-alone ACECs, the Daggett Ridge ACEC and the Brisbane Valley ACEC.

Mojave Fringe-Toed Lizard Conservation Area

Two separate areas were designated as conservation areas for the Mojave fringe-toed lizard and are managed as an ACEC. The ACEC is found along the Mojave River east of Barstow and in and adjacent to the Sheephole Wilderness east of Twentynine Palms. Three other ACECs (Pisgah, Manix, and Cronese Lakes) serve to protect the Mojave fringe-toed lizard as well.

Parish's Phacelia Conservation Area

BLM established a new ACEC for conservation of Parish's phacelia northeast of Barstow along the Manix Trail. The plan designated 898 acres as a conservation area for this species of which 386 acres (43%) are located on private land and 512 acres (57%) are located on BLM land.

Camping is not an allowable use in this area.

Pisgah Crater

BLM designated a portion of the Pisgah Crater and surrounding area as an ACEC in the 2006 WEMO Plan. This crater and lava flow, an uncommon landform in the western Mojave Desert,

was previously designated as a Research Natural Area. The Pisgah Crater contains lava tubes of several types, some of which are used as bat roosts. The mix of dark lava and white sand has resulted in interesting color adaptations in the reptiles and small mammal fauna, called cryptic coloration or background color matching. These white and dark forms occurring together represent a location of high genetic biodiversity within species. The ACEC includes areas where populations of crucifixion thorn, white-margined beardtongue, sand linanthus, and Mojave fringe-toed lizard occur. Desert tortoise also occurs in the area.

West Paradise

The West Paradise ACEC lies within the Superior-Cronese DT ACEC and contains conservation areas for the desert tortoise, Mohave ground squirrel, and Lane Mountain milkvetch. The ACEC serves as a multispecies reserve for these three species.

DWMAs Designated in the 2006 WEMO Plan

The 2006 WEMO Plan established four Desert Wildlife Management Areas (DWMAs, now designated as DT ACECs under the DRECP LUPA), totaling 1,523,936 acres for the protection of the desert tortoise. The boundaries of these DT ACECs correspond to the general boundaries identified by the Desert Tortoise (Mojave Population) Recovery Plan (Recovery Plan): the Fremont-Kramer (803 square miles) and Superior-Cronese (1,003 square miles) DT ACECs, which are adjacent; the Ord-Rodman DT ACECs (392 square miles); and the Pinto DT ACECs (183 square miles). Tortoise DT ACECs are managed for tortoise conservation and recovery until which time the tortoise may be delisted as per criteria given in the Recovery Plan.

Public lands administered by the BLM within DT ACECs are designated as ACECs. The 2006 WEMO Plan serves as the ACEC management plan for the four Tortoise DT ACECs. Existing ACECs that lie within the boundary of the Tortoise DT ACECs ("included ACECs") are still maintained for the purpose of their original designation, unless specifically deleted by the 2006 WEMO Plan. Management provisions for resource protection in the Tortoise DT ACECs augment, rather than replace, the pre-existing ACEC provisions.

The 2006 WEMO Plan also established the Mohave Ground Squirrel (MGS) Conservation Area comprising 1,726,712 acres for the long-term survival and protection of the MGS. The MGS Conservation Area includes portions of the Fremont-Kramer and Superior-Cronese Tortoise DT ACECs, and additional, essential habitats located west and north of the two tortoise DT ACECs.

New ACECs Designated in the 2016 DRECP LUPA

The 2016 DRECP LUPA made changes to some existing ACECs, and also established 17 new ACECs within the planning area, as discussed below.

Under the DRECP LUPA, the Kelso Creek Monkeyflower ACEC was eliminated as a separate ACEC, and was incorporated into the Jawbone/Butterbredt ACEC. In addition, the Mojave Monkeyflower ACEC was split into two stand-alone ACECs, the Daggett Ridge ACEC and the Brisbane Valley ACEC. The new ACECs are described below.

Ayre's Rock

The Ayre's Rock ACEC encompasses 1,530 acres near Coso Junction. Ayer's Rock was formally listed on the National Register of Historic Places in 2003. The Ayer's Rock ACEC encompasses a complex of prehistoric archaeological resources, the most prominent of which is a monolithic boulder renowned for panels of Native American rock art, specifically painted polychrome pictographs. The area also includes Mohave ground squirrel (MGS) core habitat within the MGS Conservation Area.

Camping and recreational off highway vehicle use are prohibited within the National Register District.

Big Rock Creek Wash

The Big Rock Creek Wash ACEC encompasses 310 acres near the town of Pear Blossom in Los Angeles County. The BLM parcel of the ACEC is part of a proposed Significant Ecological Area (Big Rock Creek SEA) designated by Los Angeles County. Short-joint beavertail cactus is a USFWS Species of Concern that occurs here. In addition, remote sensing shows that the Big Rock Wash ecosystem is unique in the region. The red color exhibited in Landsat aerial photos indicates unique soil and vegetation characteristics. The vegetation consists of a diversity of plant species that are unusually dense and robust. This type of habitat supports a variety of wildlife species including the special status San Diego horned lizard.

Bristol

The Bristol ACEC encompasses 214,910 acres south of Interstate 40 and between the Mojave National Preserve and the Twentynine Palms Marine Base. The unit links the Cady Mountain Wilderness Study Area and the Bristol Mountains, Kelso Dunes, Trilobite, and Clipper Mountains wilderness areas with Mojave National Preserve. The ACEC also connects with the Pisgah ACEC on the west and the Chemehuevi ACEC on the east. This creates a contiguous conservation area which encompasses a transition zone between both Mojave and Sonoran/Colorado Desert ecosystems. The unit includes prehistoric trails and evidence of trading, habitation, and migration of various Native American groups. There are numerous remnants of early 20th century mining and transportation efforts including the ghost towns of Stedman, Ragtown, Ludlow, and the Tonopah and Tidewater Railroad grade.

The transportation-related management prescriptions for the unit allow stopping and parking within 25 feet, and camping within 100 feet, of centerline of designated routes.

Cady Mountains WSA

The Cady Mountain WSA ACEC encompasses 101,380 acres between Interstate 15 and Interstate 40, approximately 20 miles southwest of Baker. The unit provides regional habitat connection for bighorn sheep, and overlaps a portion of the Old Spanish Trail.

Eagles Flyway

The Eagles Flyway ACEC encompasses 10,980 acres south of CA State Highway 178, east of CA State Highway 14, and west of the El Paso Mountain Wilderness. This area connects

Robber's Roost Birds of Prey Nesting Area to the El Paso Wilderness. It is an important area for maintaining connectivity for raptors and other wildlife between the Sierras and the El Paso Mountains. Golden eagles, which are protected under the Bald and Golden Eagle Protection Act, have frequently been seen flying from the Sierras across this area to the El Pasos. This area provides prime upland foraging for these birds of prey. The area also includes Mohave ground squirrel (MGS) core habitat within the MGS Conservation Area.

El Paso to Golden Valley Wildlife Corridor

The El Paso to Golden Valley Wildlife Corridor ACEC encompasses 57,920 acres south and east of the El Paso Mountains Wilderness. This area is of local importance to the residents of the town of Ridgecrest as is evident from the request by them to separate it in the El Paso Collaborative Access Plan (CAPA). The area is avidly used for rock hounding and other various recreation types. A variety of songbirds use the area, both during migration and as nesting habitat. Resident songbird species include loggerhead shrikes and Le Conte's thrashers. There are at least four special status bat species, including the sensitive Townsend's big-eared bat, that call this area home.

Granite Mountain Corridor

The Granite Mountain Corridor ACEC encompasses 39,290 acres between Lucerne Valley and Apple Valley. The area is critical for bighorn sheep, golden eagles, desert tortoise, prairie falcons and several other species. Additionally, numerous rare and sensitive plants have major populations here, and Joshua tree woodland is present, making the area regionally significant. The area provides critical links for wildlife populations to the north and south of this linkage area.

Mesquite Hills/Crucero

The Mesquite Hills/Crucero ACEC encompasses 5,040 acres southwest of Baker. The area includes extensive mesquite groves that among the few mesquite bosques remaining in the California deserts. The area is critical for fringed toed lizard, desert tortoise, burrowing owl, and several bat species. Nomadic tribes of the past to recent Native Americans have occurred within the Mesquite Hills/Crucero Hills for over 4,000 years. Evidence of Native American visitation within the Mesquite Hills/Crucero Hills spans over 4,000 years and are scattered throughout the area.

The transportation-related management prescriptions for the unit allow stopping and parking within 25 feet, and camping within 100 feet, of the centerline of designated routes.

Mojave Ground Squirrel

The Mojave Ground Squirrel ACEC encompasses 198,500 acres south of CA State Highway 190, and east of the Tehachapi, Scodie, and Sierra Nevada Mountain Ranges. This area contains the habitat for the state threatened Mohave ground squirrel (*Spermophilus mohavensis*), and was established to protect the long-term survival of this species. This area includes greater connectivity between the large, mostly undeveloped and protected Mohave Ground Squirrel

(MGS) habitat found within the three Military Ranges to the north, east (China Lake NAWS) and south (Edwards).

Northern Lucerne Valley Linkage

The Northern Lucerne Valley Linkage ACEC encompasses 21,900 acres approximately 16 miles south-southwest of Barstow. The area is critical for bighorn sheep, golden eagles, desert tortoise, prairie falcons and several other species. Additionally, numerous rare and sensitive plants have major populations here, and Joshua tree woodland is present, making the area regionally significant. The area provides critical links for wildlife populations to the north and south of this linkage area.

Olancha Greasewood

The Olancha Greasewood ACEC encompasses 26,620 acres south of CA State Highway 190 and east of CA State Highway 395. This area of sand dunes has a UPA described in the CDCA Plan as a Great Basin Enclave with greasewood (*Sarcobatus vermiculatus*) as the dominant plant.

Old Woman Springs Wildlife Linkage

The Old Woman Springs Wildlife Linkage ACEC encompasses 55,980 acres south and west of Highway 247, between Lucerne Valley, Yucca Valley, and Pioneertown. The area is critical for bighorn sheep, Mojave fringed toed lizards, desert tortoise, burrowing owl, and several other species. Additionally, numerous rare and sensitive plants have major populations here; Joshua tree woodland is also present, making the area regionally significant.

Panamints and Argus

The Panamints and Argus ACEC encompasses 34,005 acres between the Argus Wilderness and Death Valley National Park. This area encompasses an essential movement corridor which links wildlife habitats in the China Lake Naval Air Weapons Station and Argus Wilderness to those protected by the Death Valley National Park. Desert Bighorn sheep and Mojave ground squirrels are two of those focal species that occur here. In addition, the area provides excellent habitat for foraging and nesting of numerous raptor species, including golden eagles and prairie falcons. There are numerous prehistoric and historic sites in the area. Panamint Lake was an important location in prehistory when water and riparian resources were abundant, allowing prehistoric Native Americans a refuge from the harsh environment around them. The Lake has many National Register eligible properties and has ethnographic significance to several Paiute and Shoshone Tribal groups today.

No camping is permitted within 200 meters of desert wildlife watering holes.

Pipes Canyon

The Pipes Canyon ACEC encompasses 8,720 acres north of Yucca Valley. The ACEC area has numerous prehistoric resources that meet criteria for inclusion in the National Register of Historic Places (NRHP) as contributing elements of an Eligible District. This area has the greatest concentration of known NRHP eligible sites within the Barstow Field Office. Sites

include petroglyphs, pictographs, rock shelters, village sites, and milling sites. This area is of particular cultural interest to local Native American Tribes.

Santos Manuel

The Santos Manuel ACEC encompasses 27,550 acres approximately 10 miles east of Twentynine Palms. The area provides high density Desert tortoise habitat and serves as a critical tortoise habitat linkage. The area is the location of the recent discovery of an important archaeological site. The site is similar to the Topok Maze site near Needles, California, and is an example of an extremely rare site type. This site meets criteria for eligibility for the National Register of Historic Places. Native Americans have determined this area of high significance to maintain the cultural landscape.

Soda Mountains Expansion

The Soda Mountains Expansion ACEC encompasses 16,720 acres between Interstate 15 and the southern border of the Soda Mountain Wilderness Study Area. This area provides important plant and wildlife connectivity between surrounding Wilderness and Wilderness Study Areas which encompass large blocks of intact habitat. There is one known site within the Soda Mountain Expansion that meets criteria for inclusion to the National Register of Historic Places. The site is a geoglyph which is of sacred value to Tribes.

Soda Mountains WSA

The Soda Mountains WSA ACEC encompasses 88,780 acres approximately three miles west of Baker. The unit includes prehistoric and historic cultural resources associated with various indigenous and early European occupation periods. The Soda Mountains also provide important connectivity between large habitat blocks.

E.12 Noise

E.12.1 Regulatory Framework

Ambient noise standards are maintained at the federal, state, and local levels. In 1974, the EPA published "Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety" (EPA 550/9-74-004). This document provides information for state and local agencies to use in developing their ambient noise standards to assist state and local government entities in development of state and local ordinances, regulations, and standards for noise (Department of State 2007).

Federal

Noise and land use guidelines have been produced by a number of federal agencies including the Federal Highway Administration, the EPA, the Department of Housing and Urban Development, and the American National Standards Institute. These guidelines are all based upon statistical noise criteria such as Leq, Ldn or CNEL.

The EPA "Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety" identified outdoor and indoor noise levels to protect public health and assets (Table E.12-1). A Leq (24) of 70 dB was identified as the level of environmental noise that would prevent any measurable hearing loss over a lifetime. An Ldn of 55 dBA outdoors and 45 dBA indoors were identified as noise thresholds that would prevent activity interference or annoyance (Department of State 2007).

Table E.12-1. EPA Noise Control Guidelines

Use	Measure	Indoor activity interference (dBA)	Hearing loss consideration (dBA)[b]	To protect against both effects (dBA)[c]	Outdoor activity interference (dBA)	Hearing Loss consideration (dBA)[b]	To protect against both effects (dBA)[c]
Residential with Outside Space	Ldn Leq(24)	45	70	45	55	70	55
Residential with No Outside Space	Ldn Leq(24)	45	70	45			
Commercial	Leq(24)	[a]	70	70[d]	[a]	70	70[d]
Inside Transportation	Leq(24)	[a]	70	[a]			
Industrial	Leq(24)	[a]	70	70[d]	[a]	70	70[d]
Hospitals	Ldn Leq(24)	45	70	45	55	70	55
Educational	Ldn Leq(24)	45	70	45	55	70	55
Recreational Area	Leq(24)	[a]	70	70[d]	[a]	70	70[d]
Farm Land and General Unpopulated Land	Leq(24)				[a]	70	70[d]

Source: City of Rialto 1992

Notes:

[a] Since different types of activities appear to be associated with different levels, identification of a maximum level for activity interference may be difficult except in those circumstances where speech communication is a critical activity.

[b] Level of hearing loss is defined as the exposure period which results in hearing loss at the identified level is a period of 40 years.

[c] Based on lowest level

[d] Based on hearing loss

A Leq of 75 dBA during 8 hours may be identified in these situations so long as the exposure over the remaining 16 hours per day is low enough to result in a negligible contribution to the 24-hour average.

EPA has regulations that are specific to motor vehicle and motorcycle noise emissions. These regulations apply to motorcycles manufactured after 1982, except for motorcycles designed for closed-course competition only. Under 40 CFR Part 205, both street and off-road motorcycles manufactured after 1986 meet a noise standard of 80 dB, and must be labeled to indicate compliance with the standard.

State

California Government Code section 65302(f) encourages each local governmental entity to perform noise studies and implement a noise element as part of its General Plan. In addition, the California Office of Planning and Research has published guidelines for preparing noise elements, which include recommendations for evaluating the compatibility of various land uses as a function of community noise exposure.

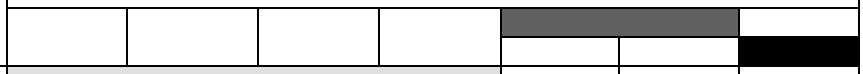
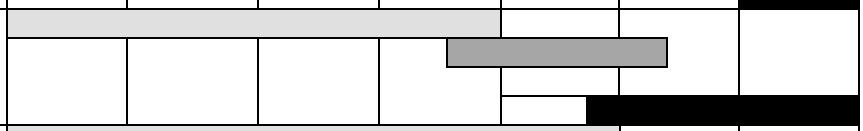
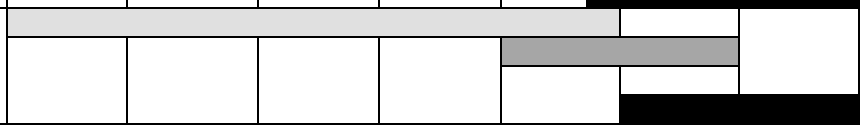
The California Department of Health Services has established the Office of Noise Control, which has prepared studies associated with noise levels and their effects on various land uses. Based upon these studies, the State has established interior and exterior noise standards by land use category and standards for the compatibility of various land uses and noise levels (Table E.12.-2). In addition, noise limits for highway vehicles are regulated under the California Vehicle Code, §§23130 and 23130.5. The limits are enforceable on the highways by the California Highway Patrol and the County Sheriff's Office.

Motorcycles registered in the state that are manufactured on or after 2013 or have an aftermarket exhaust system manufactured on or after 2013 must have the federal EPA noise emission label affixed to it in order to be operated, used, or parked in the state.

Table E.12-2. Noise/Land Use Compatibility Matrix for Community Noise Environments

Land Use Category	Community Noise Exposure Level (CNEL, dBA)						
	50	55	60	65	70	75	80
Residential – Low density single-family, duplex, and mobile homes							
Residential – Multi-family							
Transient Lodging – Hotels, motels							
Schools, Libraries, Churches, Hospitals, Nursing homes							
Auditoriums, Concert halls, Amphitheaters							
Sport arenas, Outdoor spectator sports, amusement parks							
Playgrounds, neighborhood parks							
Golf courses, riding stables,							

Table E.12-2. Noise/Land Use Compatibility Matrix for Community Noise Environments

Land Use Category	Community Noise Exposure Level (CNEL, dBA)
Cemeteries	
Office and Professional Buildings, Retail Commercial, Banks, Restaurants	
Industrial, Manufacturing, Utilities, Service Stations, Warehousing, Agriculture	

Source: State of California Office of Noise Control, Department of Health Services 1976

Normally acceptable: Specified land use is satisfactory based upon the assumption that any buildings involved are of normal conventional construction without any special noise insulation requirements.

Conditionally acceptable: New construction or development should be undertaken only after a detailed analysis of the noise requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air systems or air conditioning, normally suffices.

Normally unacceptable: New construction or development should generally be discouraged. If it does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

Clearly unacceptable: New construction or development should generally not be undertaken.

E.12.2 Regional and Background Information

Noise is defined as unwanted sound. The Environmental Protection Agency (EPA, 40CFR205.166) has set noise emissions standards for many types of sources, under the Noise Control Act (1972). Noise can be described in terms of three variables: amplitude (loud or soft), frequency (pitch), and time pattern (variability), and its potential effects can be described in terms of a noise generating source, a propagation path, and a receiver (FTA 2006). The ambient sound level of a region is defined by the total noise generated within the specific environment and is usually composed of sound emanating from natural sources such as birds and wind blowing through leaves, and from human activities, including traffic on roads and highways. Ambient sound levels vary with time of day, wind speed and direction, and level of human activity. In this context, the ambient noise level constitutes the normal or existing level of environmental noise at a given location. Ambient noise levels will generally vary across a region. Because traffic on roads constitutes a substantial part of ambient noise levels, the ambient noise levels will generally be higher in close proximity to major transportation arteries such as urban centers and Interstate highways, and lower in undeveloped and remote areas.

Noise is defined as unwanted sound that exceeds the ambient level. Noise can be described in terms of three variables: amplitude (loud or soft), frequency (pitch), and time pattern (variability), and its potential effects can be described in terms of a noise generating source, a propagation path, and a receptor (FTA 2006). Excessive noise exposure has been shown to cause interference with human activities at home, work, or recreation; community annoyance, hearing loss, and affect people's health and well-being. Even though hearing loss is the most

clearly measurable health hazard, noise is also linked to other psychological, sociological, physiological, and economical effects, either temporary or permanent (EPA 1974).

Potential human annoyance and health effects associated with noise may vary depending on factors such as: (1) the difference between the new noise and the existing ambient noise levels; (2) the presence of tonal noise, noticeable or discrete continuous sounds, such as hums, hisses, screeches, or drones; (3) low frequency noise (frequency range of 8 to 1,000 Hertz [Hz]); (4) intermittent or periodic sounds, such as a single vehicle passing by, backup alarms, or machinery that operates in cycles; and (5) impulsive sounds from impacts or explosions (Brüel and Kjaer 2000). In some cases, noise can also disrupt the normal behavior of wildlife. Although the severity of the effects varies depending on the species being studied and other conditions, research has found that wildlife can suffer adverse physiological and behavioral changes from intrusive sounds and other human disturbances (NPS 2012).

With respect to the transportation network in the WEMO Planning area, the types of noises from use of routes on public lands are generally intermittent noises created by the passage of single vehicles or vehicles in small groups on an irregular and infrequent basis. In developed areas or areas near major highways that have higher ambient noise levels, the additional noise created by these vehicles is expected to have little or no adverse impact. However, in remote areas with low ambient noise levels, the additional noise may have an adverse impact on wildlife or sensitive receptors. This can especially be the case where routes used for organized activities create greater use levels, and therefore greater noise impacts, even if these impacts are only intermittent.

Noise Measurement

To describe environmental noise and to assess impacts on areas sensitive to community noise, a frequency weighting measure that simulates human perception is customarily used. The frequency weighting scale known as A-weighting best reflects the human ear's reduced sensitivity to low frequencies and correlates well with human perceptions of the annoying aspects of noise. The A-weighted decibel scale (dBA) is cited in most noise criteria. In general, a difference of more than 3 dBA is a perceptible change in environmental noise, while a 5 dBA difference typically causes a change in community reaction. An increase of 10 dBA is perceived by people as a doubling of loudness, and almost certainly causes an adverse community response. Noise containing discrete tones (tonal noise) is much more noticeable and more annoying at the same relative loudness level than other types of noise, because it stands out against background noise (BLM 2005).

Decibels are logarithmic units that conveniently compare the wide range of sound intensities to which the human ear is sensitive. Therefore, the cumulative noise level from two or more sources will combine logarithmically, rather than linearly (i.e., simple addition). For example, if two identical noise sources produce a noise level of 50 dBA each, the combined noise level would be 53 dBA, not 100 dBA.

The predominant rating scales for noise impacts to human communities in the State of California are the equivalent continuous sound level (Leq) and Community Noise Equivalent (CNEL) based on A-weighted decibels (dBA). Leq is the total sound energy of time-varying noise over a sample period. CNEL is the time-varying noise over a 24-hour period, with a weighting factor of 5 dBA applied to the hourly Leq for noises occurring from 7:00 p.m. to 10:00 p.m. (defined as

relaxation hours) and with a weighting factor of 10 dBA from 10:00 p.m. to 7:00 a.m. (defined as sleeping hours). The noise adjustments are added to the ambient noise levels occurring during the more sensitive hours. Day-night average noise (Ldn) is similar to the CNEL but without the adjustment for nighttime noise events. CNEL and Ldn are normally exchangeable and within 1 dB of each other. Other noise-rating scales used to assess an annoyance factor include the maximum instantaneous noise level, or Lmax, and percentile noise exceedance levels, or LN. Lmax is the highest exponential time-averaged sound level that occurs during a stated time period. It reflects peak operating conditions and addresses the annoying aspects of intermittent noise. LN is the noise level that is exceeded "N" percent of the time during a specified time period. For example, the L10 noise level represents the noise level exceeded 10 percent of the time during a stated period. The L90 noise level represents the noise level exceeded 90 percent of the time and is considered the lowest noise level experienced during a monitoring period. It is normally referred to as the background noise level.

Community noise levels are closely related to the intensity of human activity and land use. Noise levels are generally considered low when ambient levels are below 45 dBA, moderate in the 45 to 60 dBA range, and high above 60 dBA. In wilderness areas, the Ldn noise levels can be below 35 dBA. In small towns or wooded and lightly used residential areas, the Ldn is more likely to be around 50 or 60 dBA. Levels around 75 dBA are more common in busy urban areas (e.g., downtown Los Angeles), and levels up to 85 dBA occur near major freeways and airports. Although people often accept the higher levels associated with very noisy urban residential and residential-commercial zones, they nevertheless are considered to be adverse to public health.

The surrounding land uses dictate what noise levels would be considered acceptable or unacceptable. Most of the surrounding land use within close proximity to transportation routes in the WEMO Planning area is rural.

Typical Sound Levels

People experience a wide range of sounds in the environment. Table E.12-3 shows the relative A-weighted noise levels of common sounds measured in the environment and industry for various sound levels, including transportation sources. Excessive noise cannot only be undesirable but may also cause physical and/or psychological damage. The amount of annoyance or damage caused by noise is dependent primarily upon the amount and nature of the noise, the amount of ambient noise present before the intruding noise, and the activity of the person working or living in the area. Environmental and community noise levels rarely are of sufficient intensity to cause irreversible hearing damage, but disruptive environmental noise can interfere with speech and other communication and be a major source of annoyance by disturbing sleep, rest, and relaxation.

Table E.12-3. Typical Sound Levels Measured in the Environment and Industry

Noise source at a given distance[1]	A-Weighted Sound Level (dBA)	Noise Environments	Qualitative Description
Carrier deck jet operation	140	Carrier flight deck	Painfully loud
Civil defense siren (100 feet)	130		
Jet takeoff (200 feet)	120		Threshold of pain

Table E.12-3. Typical Sound Levels Measured in the Environment and Industry

Noise source at a given distance[1]	A-Weighted Sound Level (dBA)	Noise Environments	Qualitative Description
Military jets (200-500 ft) flying through the sound barrier	110-120	Rural open space	
Loud rock music	110	Rock music concert	
Diesel Train (50 ft)	105	Rural open space	Very loud / very annoying
Pile driver (50 feet)	100		
Ambulance siren (100 feet)	90	Boiler room	Annoying
Dirt Bike[2]	86-96	Dirt Bike	
Motorcycle (50 feet)[3]	80	California State Standard for post-1985 motorcycles	
Pneumatic drill (50 feet)	80	Noisy restaurant	
Motorcycle (25 feet)	80	Rural open space	
Freeway traffic (50 feet)	70		Intrusive / Moderately loud
Air conditioning unit (20 feet)	60	Data processing center	
Typical Conversation	60	Average Living Room	
Single auto	60	Rural open space	
Light auto traffic (100 feet); rainfall	50	Private business office	
Bird calls	40	Average living room library	Quiet
Soft whisper (5 feet); rustling leaves	30	Quiet bedroom	Very Quiet
Broadcasting/Recording studio	20		
Normal breathing	10		Threshold of hearing

(1) Source is California Energy Commission 2008, except where otherwise noted.
(2) Source is Dirt Bike Rider 2009
(3) Source is California Code 27202; Realistic Bomber Training Initiative Final EIS, Appendix G. 2000. Dept of Defense, USAF Air Combat Command.

Sound is generally propagated by spherical spreading according to the "inverse square law". For noise, the sound energy decreases with the square of the distance. As such, the sound pressure level would be reduced by 6 dB per doubling of distance from a ground-level stationary or point source. For a noise source which is relatively long, such as a constant stream of highway traffic (line source), the sound pressure spreads at a rate of 3 dB per doubling of distance. The drop-off rate also varies with both terrain conditions and the presence of obstructions in the sound propagation path. At very large distances, beyond several hundred feet (ft), wind and temperature gradients influence sound propagation. Changes in noise levels due to wind are generally short-term without persistent directional winds, where some hours may be a decibel or two louder than others within the margin of precision of such an assessment.

Lower levels are expected in rural or suburban areas than what would be expected for commercial or industrial zones. Nighttime ambient levels in urban environments are about seven decibels lower than the corresponding daytime levels. In rural areas away from roads and other human activity, the day-to-night difference can be considerably less. Areas with full-time human

occupation that are subject to nighttime noise are often considered objectionable because of the likelihood of disrupting sleep. Noise levels above 45 dBA at night can result in the onset of sleep interference effects. At 70 dBA, sleep interference effects become considerable (EPA 1974).

E.13 Travel and Transportation Management Network

E.13.1 Regulatory Framework

A discussion of the regulatory framework associated with the BLM transportation and travel management program is presented in Section 1.2.

E.13.2 Regional and Background Information

The Travel Management Plans (TMPs) for each TMA are presented in Appendix G.

E.14 Paleontological Resources

E.14.1 Regulatory Framework

The management and preservation of paleontological resources on public lands are governed under various laws, regulations, and standards, including the Paleontological Resources Preservation Act summarized in this section. Additional statutes for management and protection include the Federal Land Policy and Management Act (Public Law 94–579, codified at 43 U.S.C. 1701–1782 and 18 U.S.C. 641), which penalizes the theft or degradation of property of the U.S. Government. Other federal acts—the Federal Cave Resources Protection Act (16 U.S.C. 4301 et seq.) and the Archaeological Resources Protection Act (16 U.S.C. 470 et seq.)—protect fossils found in significant caves or in association with archeological resources. The BLM has also developed general procedural guidelines (Manual H-8720-1; IM 2008-009; IM 2009-011) for the management of paleontological resources.

Paleontological Resources Preservation, Omnibus Public Land Management Act, Public Law 111-011, Title VI, Subtitle D.

The Omnibus Public Land Management Act, Paleontological Resource Preservation Subtitle (16 U.S.C. 470aaa et seq.), directs the secretaries of the Department of the Interior and the Department of Agriculture to manage and protect paleontological resources on federal land using scientific principles and expertise. (This act is known by its common names, the Omnibus Act or the Paleontological Resources Preservation Act.) The Paleontological Resources Preservation Act incorporates most of the recommendations of the report of the Secretary of the Interior titled "Assessment of Fossil Management on Federal and Indian Lands" to formulate a consistent paleontological resources management framework. In passing the Paleontological Resources Preservation Act, the U.S. Congress officially recognized the scientific importance of paleontological resources on some federal lands by declaring that fossils from these lands are federal property that must be preserved and protected. The act codifies existing policies of BLM, National Park Service, U.S. Forest Service, Bureau of Reclamation, and the U.S. Fish and Wildlife Service, and provides:

- Uniform criminal and civil penalties for illegal sale and transport, theft, and vandalism of fossils from federal lands.
- Uniform minimum requirements for paleontological resource-use permit issuance (terms, conditions, and qualifications of applicants).
- Uniform definitions for "paleontological resources" and "casual collecting."
- Uniform requirements for curation of federal fossils in approved repositories.

Federal legislative protections for scientifically significant fossils apply to projects that take place on federal lands (with certain exceptions, such as the Department of Defense, which continue to protect paleontological resources under the Antiquities Act). Such protections involve federal funding, require a federal permit, or involve crossing state lines.

Antiquities Act of 1906 (16 U.S.C. 431-433).

The Antiquities Act of 1906 states, in part:

> Any person who shall appropriate, excavate, injure or destroy any historic or prehistoric ruin or monument, or any object of antiquity, situated on lands owned or controlled by the Government of the United States, without the permission of the Secretary of the Department of the Government having jurisdiction over the lands on which said antiquities are situated, shall upon conviction, be fined in a sum of not more than five hundred dollars or be imprisoned for a period of not more than 90 days, or shall suffer both fine and imprisonment, in the discretion of the court.

Although there is no specific mention of natural or paleontological resources in the Antiquities Act, or in the act's uniform rules and regulations (43 Code of Federal Regulations [CFR] 3), "objects of antiquity" has been interpreted by the National Park Service, BLM, the U.S. Fish and Wildlife Service, and other federal agencies to include fossils. Permits to collect fossils on lands administered by federal agencies are authorized under this act. Therefore, projects involving federal lands will require permits for both paleontological resource evaluation and mitigation efforts.

Archaeological and Paleontological Salvage (23 U.S.C. 305).

Statute 23 U.S.C. 305 amends the Antiquities Act of 1906. Specifically, it states:

> Funds authorized to be appropriated to carry out this title to the extent approved as necessary, by the highway department of any State, may be used for archaeological and paleontological salvage in that state in compliance with the Act entitled "An Act for the preservation of American Antiquities," approved June 8, 1906 (PL 59-209; 16 U.S.C. 431-433), and State laws where applicable.

This statute allows funding for mitigation of paleontological resources recovered pursuant to federal aid highway projects, provided that "excavated objects and information are to be used for public purposes without private gain to any individual or organization" (Federal Register 46[19]; 9570).

National Registry of Natural Landmarks (16 U.S.C. 461-467).

The National Natural Landmarks Program, established in 1962, is administered under the Historic Sites Act of 1935. Regulations were published in 1980 under 36 CFR 1212 and the program was re- designated as 36 CFR 62 in 1981. A National Natural Landmark is defined as:

> … an area designated by the Secretary of the Interior as being of national significance to the United States because it is an outstanding example(s) of major biological and geological features found within the boundaries of the United States or its Territories or on the Outer Continental Shelf (36 CFR 62.2).

National significance describes:

> … an area that is one of the best examples of a biological community or geological feature within a natural region of the United States, including terrestrial communities, landforms, geological features and processes, habitats of native plant and animal species, or fossil evidence of the development of life (36 CFR 62.2).

Federal agencies and their agents should consider the existence and location of designated National Natural Landmarks, and of areas found to meet the criteria for national significance, in assessing the effects of their activities on the environment under Section 102(2)(c) of the National Environmental Policy Act (42 U.S.C. 4321). The National Park Service is responsible for providing requested information about the National Natural Landmarks Program for these assessments (36 CFR 62.6[f]). However, other than consideration under the National Environmental Policy Act, National Natural Landmarks are afforded no special protection. Furthermore, there is no requirement to evaluate a paleontological resource for listing as a National Natural Landmark.

BLM Manuals, Handbooks, and Instruction Memoranda

BLM Manual 8270 and BLM Handbook H-8270-1 contain BLM's policy and guidance for the management of paleontological resources on public lands. The manual has more information on the authorities and regulations related to paleontological resources. The handbook gives procedures for permit issuance, requirements for qualified applicants, and information on paleontology and planning. The classification system for potential fossil-bearing geologic formations on public lands in the handbook has been revised and replaced by the PFYC, as discussed in this section.

The manual and handbook will be revised after the new regulations (currently being developed and reviewed) are promulgated under the PRPA. Until that time, BLM will continue to follow the policy and guidelines in the manual and handbook that are not superseded by the PRPA. The BLM's overarching guidance for paleontological resources is that locating, evaluating, and classifying paleontological resources and developing management strategies for them must be based on the best scientific information available. Management of paleontological resources should emphasize:

- The uniqueness of fossils.
- Their usefulness in deciphering ancient and modern ecosystems.

- The public benefits and public expectations arising from their scientific, recreational, and educational values.
- The BLM's interest in and need for the continued advancement of the science of paleontology.
- The importance of minimizing resource conflicts within a multiple use framework.

Potential Fossil Yield Classification System

On October 15, 2007, with the release of IM 2008-009, BLM formalized a new classification system for identifying fossil potential on public lands. This classification system is based on the presence of significant paleontological resources in a geologic unit and its potential risk for impacts to the resource. It is a broad approach to planning efforts and an intermediate step in evaluating specific projects. IM 2008-009 will be incorporated into the next update of BLM Handbook H-8270-1, General Procedural Guidance for Paleontological Resource Management.

Using the PFYC system, geologic units are classified as Class 1 (very low) through Class 5 (very high), based on the relative abundance of vertebrate fossils or scientifically significant invertebrate or plant fossils and their sensitivity to adverse impacts. A higher class number indicates a higher potential for adverse environmental impacts. This system is used to set management policies and is not intended to apply to specific paleontological localities or small areas within geologic units. The PFYC system is used to assess the potential for discovery of significant paleontological resources or the impact of surface disturbing activities to such resources by using a five-class ranking system:

1. Class 1 – Very Low. Geologic units that are not likely to contain recognizable fossil remains. This class usually includes units that are igneous or metamorphic, excluding reworked volcanic ash units; or units that are Precambrian in age or older. Management concern for paleontological resources in Class 1 units is usually negligible or not applicable and assessment or mitigation is usually unnecessary except in very rare or isolated circumstances. The probability for impacting any fossils is negligible and assessment or mitigation of paleontological resources is usually unnecessary.
2. Class 2 – Low. Sedimentary geologic units that are not likely to contain vertebrate fossils or scientifically significant nonvertebrate fossils. This class typically includes vertebrate or significant invertebrate or plant fossils not present or very rare, units that are generally younger than 10,000 years before present, recent aeolian deposits, or sediments that exhibit significant physical and chemical changes (i.e., diagenetic alteration). Management concern for paleontological resources is generally low. Assessment or mitigation is usually unnecessary except in rare or isolated circumstances and the probability for impacting vertebrate fossils or scientifically significant invertebrate or plant fossils is low. Localities containing important resources may exist, but would be rare and would not influence the overall classification. These important localities would be managed on a case-by-case basis.
3. Class 3 – Moderate or Unknown. Fossiliferous sedimentary geologic units where fossil content varies in significance, abundance, and predictable occurrence; or sedimentary units of unknown fossil potential. This class includes sedimentary rocks that are marine in origin with sporadic known occurrences of vertebrate fossils or other rocks where

vertebrate fossils and scientifically significant invertebrate or plant fossils are known to occur intermittently. The predictability of fossils within these units is known to be low or the units have been poorly studied and/or poorly documented. Potential yield cannot be assigned without ground reconnaissance. This class is subdivided into two groups: Class 3(a) and Class 3(b).

a) Class 3(a) is assigned to rock units where sufficient information has been developed to know that the unit has widely scattered occurrences of vertebrate fossils and/or scientifically significant invertebrate or plant fossils. Common invertebrate or plant fossils may be found in the area, and opportunities may exist for hobby collecting.

b) Class 3(b) is assigned to rock units that exhibit geologic features and preservational conditions that suggest significant fossils could be present, but little information about the paleontological resources of the unit or the area is known. This may indicate the unit or area is poorly studied, and the field survey may uncover significant finds. The units in this Class may eventually be placed in another Class when sufficient survey and research is performed.

4. Class 4 – High. Geologic units containing a high occurrence of significant fossils. Vertebrate fossils or scientifically significant invertebrate or plant fossils are known to occur and have been documented, but may vary in occurrence and predictability. Surface disturbing activities may adversely affect paleontological resources in many cases. This class is subdivided into two groups, based primarily on the degree of soil cover: Class 4(a) and Class 4(b):

    a) Class 4(a) is assigned to rock units that are exposed with little or no soil or vegetative cover. Outcrop areas are extensive with exposed bedrock areas often larger than two acres. Paleontological resources may be susceptible to adverse impacts from surface disturbing actions and illegal collecting activities may impact some areas.

    b) Class 4(b) is assigned to areas underlain by geologic units with high potential but have lowered risks of human-caused adverse impacts and/or lowered risk of natural degradation due to moderating circumstances. The bedrock unit has high potential, but a protective layer of soil, thin alluvial material, or other conditions may lessen or prevent potential impacts to the bedrock resulting from the activity.

5. Class 5 – Very High. Highly fossiliferous geologic units that consistently and predictably produce vertebrate fossils or scientifically significant invertebrate or plant fossils, and that are at risk of human-caused adverse impacts or natural degradation. This class is subdivided into Class 5(a) and Class 5(b) in the same manner as Class 4 above.

Assessment and Mitigation of Potential Impacts to Paleontological Resources

On October 10, 2008, BLM introduced guidelines for assessing potential impacts to paleontological resources to determine mitigation steps for federal actions on public lands covered under both the Federal Lands Policy and Management Act of 1976 and the National Environmental Policy Act (IM 2009-011). This IM provides field survey and monitoring

procedures to help minimize impacts to paleontological resources in cases where a federal action could adversely affect significant paleontological resources.

These assessment and mitigation guidelines show the conditions under which no specific paleontology assessment is required, including when:

1. A project will only affect geologic units unlikely to contain significant fossils or that have a very low or low potential for significant fossils (i.e., PFYC Class 1 or 2).
2. No scientifically important localities are identified in the area.

However, pre-project field surveys, a paleontological monitoring program, or other mitigation measures may be needed if a project would disturb geologic units assigned PFYC classes 3, 4, or 5, possible fossil-bearing alluvium, or known significant localities. The BLM guidelines also outline procedures for conducting field surveys and monitoring on-site surface-disturbing activities.

E.14.2 Regional and Background Information

A paleontological resource is defined in the federal Paleontological Resources Preservation Act (PRPA) as the "fossilized remains, traces, or imprints of organisms, preserved in or on the earth's crust, that are of paleontological interest and that provide information about the history of life on earth" (16 United States Code [U.S.C.] 470aaa[1][c]). For the purpose of this analysis, a significant paleontological resource is considered to be of scientific interest, including most vertebrate fossil remains and traces, and certain rare or unusual invertebrate and plant fossils. A significant paleontological resource is considered to be scientifically important for one or more of the following reasons:

- The fossil extends the temporal (stratigraphic) or geographic distribution for a specific taxonomic group of fossils.
- It is a rare or previously unknown species.
- It represents an exceptionally high-quality, well-preserved and morphologically complete specimen.
- It preserves a previously unknown anatomical feature or exhibits other characteristic features which represent ontogenic, pathologic, or traumatic variations.
- It provides new information about the history of life on Earth.
- It has identified educational or recreational value.

Paleontological resources that may be considered not to have paleontological significance include those that lack provenance or context, lack physical integrity because of decay or natural erosion, or are overly redundant or otherwise not useful for academic research (BLM Instruction Memorandum [IM] 2009-011).

The intrinsic value of paleontological resources largely stems from the fact that fossils serve as the only direct evidence of prehistoric life. They are thus used to understand the history of life on earth, the nature of past environments and climates, the biological membership and structure of ancient ecosystems, and the patterns and processes of organic evolution and extinction. Despite the tremendous volume of sedimentary rocks preserved worldwide and the enormous number of

organisms that have lived during the vast expanse of geologic time, preservation of plant and animal remains as fossils is rare. Further, because of the infrequency of fossil preservation and the extinction of most fossilized species, fossils are considered nonrenewable resources. Once destroyed, a particular fossil can never be replaced. Essentially, paleontological resources include fossil remains and traces as well as the fossil-collecting localities and the geological rock units (e.g., formations) containing those localities. Knowing the geographic and topographic distribution of fossil-bearing rock units makes it possible to predict where fossils will, or will not, be encountered.

This chapter discusses applicable regulatory framework and the physical setting relevant to paleontological resources within the WEMO planning area. The chapter provides site-specific details for known paleontological resource areas within the planning area. In addition, the analysis uses the regional scale (1:750,000) mapping of fossil yield potential developed for the 2015 DRECP EIS. The Potential Fossil Yield Classification (PFYC) developed for the DRECP area represents an estimate based on the available regional- scale geologic data; it is not meant to replace the project and site-specific identification and evaluation of potential paleontological resources. Individual route designation actions which involve ground disturbance would be required to evaluate paleontological resources at a project-level of detail and would need to use the most detailed geologic and paleontological data available as part of project-level assessments.

APPENDIX E-1

MOJAVE AIR QUALITY MANAGEMENT DISTRICT REPORT (2013)

West Mojave Plan Air Quality Evaluation Report

This report was prepared by the Mojave Desert Air Quality Management District Planning, Rulemaking and Grants staff on behalf of the West Mojave Planning Area air districts in April, 2013. Contact Alan De Salvio, Supervising Air Quality Engineer at 760-245-1661 x6726 or adesalvio@mdaqmd.ca.gov.

Introduction

The West Mojave (WEMO) Planning Area includes all or portions of five air quality districts (Mojave Desert Air Quality Management District (MDAQMD), Antelope Valley Air Quality Management District (AVAQMD), East Kern Air Pollution Control District (EKAPCD), the Great Basin Unified Air Pollution Control District (GBUAPCD), and the South Coast Air Quality Management District (SCAQMD)).

Air districts have statutory responsibility, in conjunction with the California Air Resources Board (CARB), to monitor air quality data (California Health and Safety Code §39607), with the intent of monitoring the public health, safety and welfare, including, but not limited to, health, illness, irritation to the senses, aesthetic value, interference with visibility, and effects on the economy (H&SC §39606(a)(2)). The WEMO Planning Area air districts (and CARB) operate an extensive ambient air monitoring network to meet this statutory requirement.

This report will summarize the nature of emissions within the WEMO Planning Area, how those emissions are monitored, summarize existing monitoring data, and discuss the existing monitoring network's ability to monitor off-highway vehicles and Open Areas.

WEMO Planning Area Emissions

The WEMO Planning Area includes the full gamut of emissions generated by mankind's activity, with the notable exception of emissions from waterborne activity, as the WEMO Planning Area has no coastal and sparse river and lakefront area. Emissions within the WEMO Planning Area are currently tabulated by CARB and air districts for State and Federal air quality planning purposes. Existing emission inventory efforts meet all State and Federal statutory and guidance inventory requirements. Specific emission inventory elements are presented below:

Substance	Nature	Basis for Inventory
Volatile Organic Compounds (VOC)	Ozone and fine particulate precursor	No direct ambient standard, indirect ozone standard, regional pollutant
Oxides of Nitrogen (NOx)	Ozone and fine particulate precursor, includes air pollutant Nitrogen Dioxide (NO2)	Ambient standard, indirect ozone standard, regional pollutant
Carbon Monoxide (CO)	Air pollutant	Ambient standard, local and regional pollutant
Respirable Particulate Matter (PM10)	Air pollutant, includes PM2.5, interferes with visibility	Ambient standard, local and regional pollutant
Fine Respirable Particulate	Air pollutant, interferes	Ambient standard, regional

Matter (PM2.5)	with visibility	pollutant
Oxides of Sulfur (SOx)	Air pollutant, fine particulate precursor, includes air pollutant Sulfur Dioxide (SO2)	Ambient standard, local and regional pollutant
Hazardous and Toxic Compounds (HAPs and TACs)	Unhealthy	No ambient standard, localized health effects, facility inventory only

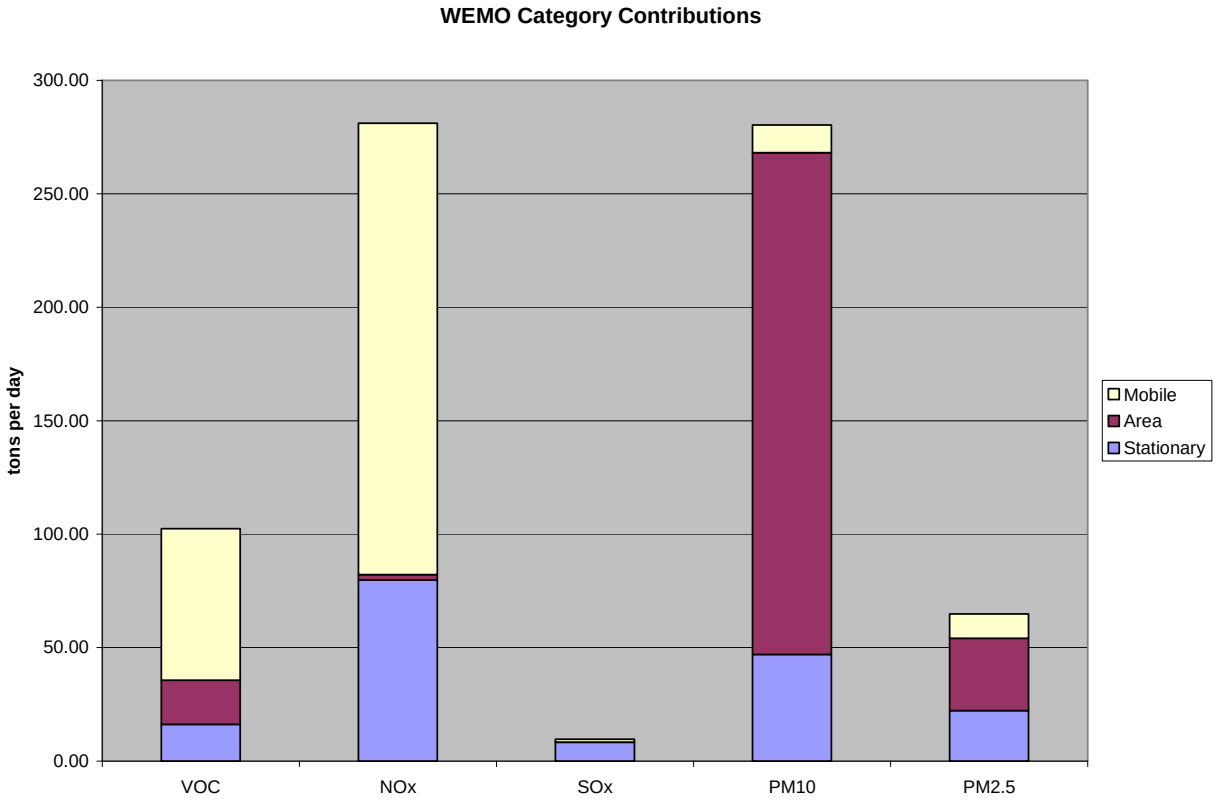
Existing emission inventory efforts cover all sources within the WEMO Planning Area. Emissions are typically grouped into three categories. For complete inventory details please refer to Appendix A of this report.

Inventory Category	**Contributors in WEMO Planning Area**
Stationary Sources	Industrial activity (mining, manufacturing, electricity generation, natural gas transmission) and military bases
Mobile Sources	On-road vehicles, off-road vehicles, aircraft and trains
Area Sources	Solvent use (fuel, paint, chemical), small combustion (fires, heating, cooking), small widespread sources (consumer products)

The WEMO Planning Area emissions inventory is presented below, in tons of emissions per day:

Type	*Category*	*VOC*	*NOx*	*SOx*	*PM10*	*PM2.5*
Stationary	Fuel Combustion	0.90	24.02	2.31	5.20	4.02
Stationary	Waste Disposal	0.27	0.07	0.12	0.30	0.07
Stationary	Cleaning and Surface Coatings	6.62	0.00	0.00	0.40	0.38
Stationary	Petroleum Production and Marketing	5.99	0.02	0.00	0.00	0.00
Stationary	Industrial Processes	2.42	55.69	5.83	41.15	17.83
Area	Solvent Evaporation	13.67	0.00	0.00	0.00	0.00
Area	Miscellaneous Processes	5.78	2.43	0.13	221.03	31.84
Mobile	On-Road Motor Vehicles	28.45	135.88	0.22	6.27	5.16
Mobile	Other Mobile Sources	38.31	62.99	0.99	6.00	5.59
	Totals:	**102.41**	**281.10**	**9.60**	**280.35**	**64.89**

The relative contributions of sources within the WEMO Planning Area are presented below. Note that mobile sources dominate ozone precursor emissions, SOx emissions are relatively minor, and area sources dominate particulate emissions.



Off-Highway Vehicle Exhaust Contribution

Off-Highway Vehicles (OHVs) are directly inventoried as mobile sources, as the subcategory off-highway recreational vehicles. OHV exhaust is a negligible contributor to the WEMO Planning Area inventory except for VOC emissions. OHV VOC emissions are relatively high (in relation to other OHV exhaust emissions) because OHV engines are typically carbureted, rich burn engines without catalytic controls and hence have greater unburned fuel in their exhaust. Nevertheless VOC emissions are not a local pollutant but are a precursor to ozone formation – ozone is a regional pollutant. OHV exhaust is a negligible contributor to local emissions, and is a significant contributor only to VOC (a regional pollutant precursor).

OHV Open Area Contribution

OHV Open Areas are indirectly inventoried as area sources, as an element of the unpaved road dust and the fugitive windblown dust subcategories. OHV Open Areas are not significant contributors to either subcategory due to scale – the WEMO Planning Area includes thousands of miles of maintained and unmaintained unpaved roads and tracks, and tens of millions of acres of disturbed surface, and the contribution of the relatively small OHV Open Areas is equally relatively small. Regional experience with windblown dust has shown that heavily traveled unpaved roads and similar frequently disturbed (on at least a daily basis) surfaces are the primary contributor to regional dust problems. Confining OHV activity to existing defined OHV Open Areas has been an element of regional dust control planning for more than twenty years, and is an element of Federal PM10 planning. OHV Open Areas are not a significant contributor to regional dust (PM10) emissions.

WEMO Planning Area Ambient Monitoring

Forty-six ambient air monitoring sites are located in or adjacent to the WEMO Planning Area, operated by various air quality agencies or on their behalf. This existing network of sites monitors ambient pollutants and meteorological data to meet State and Federal ambient monitoring requirements, and represents a mix of neighborhood and regional scale monitors:

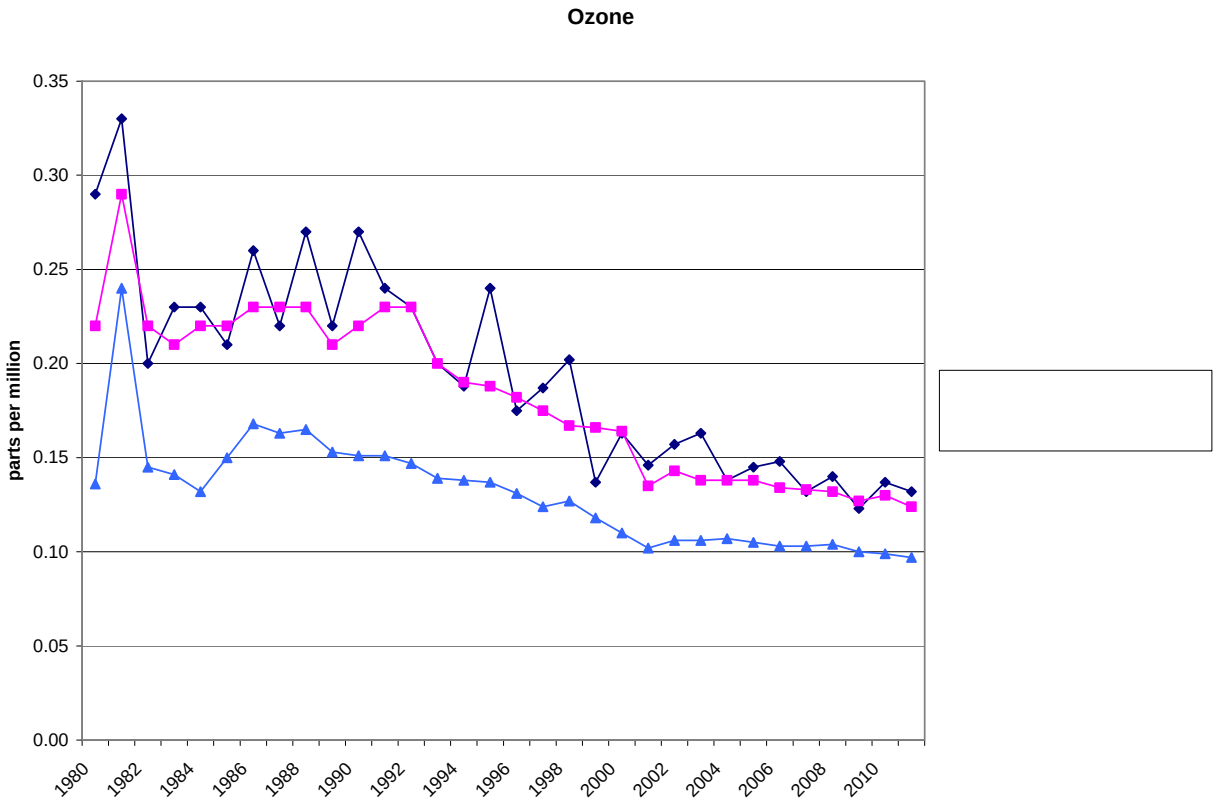
Name	OP Agency	Latitude	Longitude	Elev (m)
Coso Gate	Great Basin Unified APCD	36.0688	-117.755	1329
Coso Junction-10 miles E	Great Basin Unified APCD	36.0338	-117.7988	NA
Coso Junction-Highway 395 Rest Area	Great Basin Unified APCD	36.0497	-117.9438	1027
Death Valley Natl Monument	National Park Service	36.5089	-116.8478	125
Dirty Sox	Great Basin Unified APCD	36.3261	-117.955	1060
Flat Rock-Highway 190	Great Basin Unified APCD	36.4219	-117.8366	1133
Keeler-Cerro Gordo Road	Great Basin Unified APCD	36.4877	-117.8711	1097
Olancha-E Fall Road	Great Basin Unified APCD	36.2755	-117.9897	1097
Olancha-Walker Creek Road	Great Basin Unified APCD	36.2663	-117.9916	1100
Boron-26965 Cote Street	ARB Contractor	35.0036	-117.6511	750
Canebrake	California ARB	35.72778	-118.139312	914
China Lake-Powerline Road	Kern County APCD	35.7102	-117.6397	697
Inyokern-Airport	Great Basin Unified APCD	35.6513	-117.8241	759
Mojave-923 Poole Street	CARB/Kern County APCD	35.0503	-118.1478	853
Ridgecrest-100 West California Avenue	Kern County APCD	35.6211	-117.6731	701
Ridgecrest-Las Flores Avenue	Kern County APCD	35.6299	-117.6692	723
Tehachapi-Jameson Road	California ARB	35.1333	-118.425	1167
Lancaster-43301 Division Street	Antelope Valley APCD	34.6713	-118.1305	725
Lancaster-W Pondera Street	Mojave Desert AQMD	34.6899	-118.1327	725
Palmdale	ARB Contractor	34.5569	-118.1116	841
Blythe-445 West Murphy Street	Mojave Desert AQMD	33.6119	-114.6	83
Joshua Tree National Park-Pinto Wells	National Park Service	33.9397	-115.4108	326
Baldy Mesa	ARB Contractor	34.375	-117.4477	1295
Barstow	Mojave Desert AQMD	34.8938	-117.0244	690
Flash Mountain	ARB Contractor	34.7375	-117.565	1013
Hesperia-Olive Street	Mojave Desert AQMD	34.4158	-117.2861	1006
Joshua Tree-National Monument	National Park Service	34.0694	-116.3888	1244
Lucerne Valley-Middle School	Mojave Desert AQMD	34.4103	-116.9067	1036
Ludlow	ARB Contractor	34.7247	-116.1577	543
Mojave National Preserve	National Park Service	35.1019	-115.7767	1212
Phelan-Beekley Road and Phelan Road	Mojave Desert AQMD	34.425	-117.5897	1250
Quartzite Mountain	ARB Contractor	34.6116	-117.2888	1366
Shadow Mountain	ARB Contractor	34.7375	-117.565	1256
Trona-Athol	Mojave Desert AQMD	35.7742	-117.3686	498
Trona-Athol and Telegraph	Mojave Desert AQMD	35.7744	-117.3722	545
Twentynine Palms-Adobe Road #2	Mojave Desert AQMD	34.1419	-116.0553	607
Victorville-14306 Park Avenue	Mojave Desert AQMD	34.5122	-117.325	913
Victorville-Amargosa Road	Mojave Desert AQMD	34.5041	-117.3297	876
Joshua Tree National Park	National Park Service	33.7411	-115.8206	984
Banning Airport	South Coast AQMD	33.9208	-116.8583	473
Banning-Allesandro	South Coast AQMD	33.9211	-116.8583	722
Riverside-Rubidoux	South Coast AQMD	34.0005	-117.4152	250
Big Bear City-501 W. Valley Blvd	South Coast AQMD	34.2644	-116.8644	2056

Name	OP Agency	Latitude	Longitude	Elev (m)
Crestline	South Coast AQMD	34.2413	-117.2755	1384
Mount Baldy-Mount Baldy Road	California ARB	34.2391	-117.6208	1335
San Gorgonio Wilderness	National Park Service	34.19390	-116.9132	1726

Neighborhood scale monitors are located near population centers, and regional scale monitors are located in rural areas. Neighborhood scale monitors are used to characterize and monitor ambient air affecting nearby population, while tracking attainment of ambient air pollutant standards (or tracking progress towards attainment of those standards). Regional scale monitors are used to evaluate large geographic regions, and track overall background levels of ambient air pollutants.

WEMO Planning Area Ambient Ozone Data

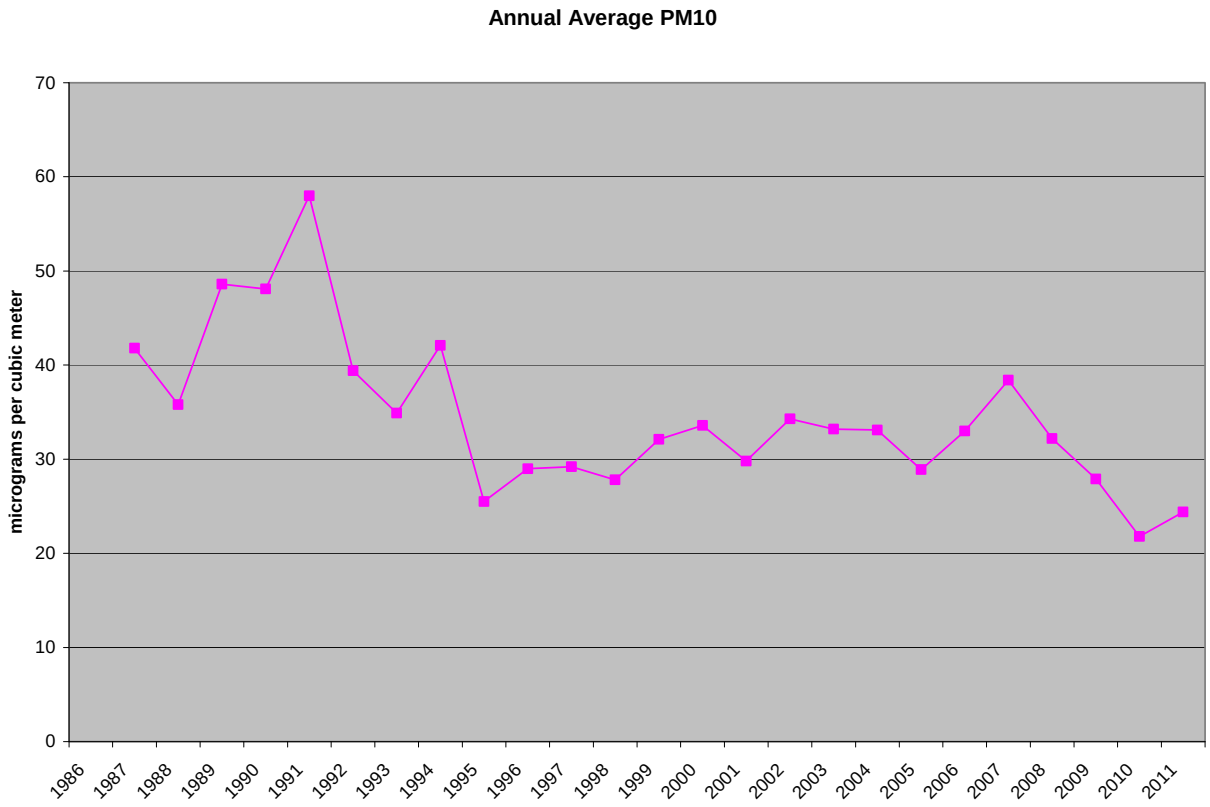
Ambient ozone values in the WEMO Planning Area are trending down as a result of Federal, State and local ozone precursor emission controls. These trends represent significant improvement in population exposure to ozone (at neighborhood scale monitors) and regional improvement in ozone levels (at regional scale monitors), despite significant increases in WEMO Planning Area population and associated emissions. Ambient ozone data for the WEMO Planning Area monitors is presented below.



WEMO Planning Area Ambient PM_{10} Data

Ambient PM10 values in the WEMO Planning Area have been reduced as a direct result of Federal PM10 planning efforts, particularly in Owens Lake and Searles Valley areas.

Construction and demolition PM10 emissions have been reduced throughout the planning area through increased local regulation. The WEMO Planning Area population (and population-related emissions and surface disturbances) has increased over this time period. The WEMO Planning Area is predominately a windy, arid, low vegetation area, with relatively high dust levels due to exposed soils and high winds lifting those soils into the area. As a result the background levels of PM10 tend to be elevated, with common "exceptional" high wind dust events. The annual average ambient PM10 data for the WEMO Planning Area is presented below.



Ambient Monitoring Coverage of OHVs and OHV Open Areas

As discussed above, OHVs and OHV Open Areas are minor contributors to regional pollution, but are monitored by regional scale monitors by definition. The contribution of OHV use and OHV Open Area emissions near population centers are also monitored by the neighborhood scale monitors covering those population centers. The existing ambient air monitoring network in the WEMO Planning Area meets all Federal, State and local ambient air monitoring requirements, including monitoring ambient impacts from OHVs and OHV Open Areas.

Appendix A – WEMO Planning Area Emissions Inventory (Detail)

Type	Category	Subcategory	VOC	NOx	SOx	PM10	PM2.5
Stat	FUEL COMBUSTION	ELECTRIC UTILITIES	0.05	2.09	0.73	0.15	0.11
Stat	FUEL COMBUSTION	COGENERATION	0.03	4.20	0.46	0.17	0.15
Stat	FUEL COMBUSTION	MANUFACTURING AND INDUSTRIAL	0.19	4.36	0.68	0.42	0.44
Stat	FUEL COMBUSTION	FOOD AND AGRICULTURAL PROCESSING	0.06	0.62	0.03	0.03	0.02
Stat	FUEL COMBUSTION	SERVICE AND COMMERCIAL	0.32	9.26	0.13	0.37	0.37
Stat	FUEL COMBUSTION	OTHER (FUEL COMBUSTION)	0.25	3.49	0.28	4.06	2.93
Stat	WASTE DISPOSAL	SEWAGE TREATMENT	0.01	0.00	0.00	0.00	0.00
Stat	WASTE DISPOSAL	LANDFILLS	0.20	0.01	0.06	0.26	0.04
Stat	WASTE DISPOSAL	INCINERATORS	0.01	0.06	0.06	0.01	0.01
Stat	WASTE DISPOSAL	SOIL REMEDIATION	0.00	0.00	0.00	0.00	0.00
Stat	WASTE DISPOSAL	OTHER (WASTE DISPOSAL)	0.05	0.00	0.00	0.03	0.02
Stat	CLEANING AND SURFACE COATINGS	LAUNDERING	0.00	0.00	0.00	0.00	0.00
Stat	CLEANING AND SURFACE COATINGS	DEGREASING	4.13	0.00	0.00	0.00	0.00
Stat	CLEANING AND SURFACE COATINGS	COATINGS AND RELATED PROCESS SOLVENTS	2.26	0.00	0.00	0.21	0.20
Stat	CLEANING AND SURFACE COATINGS	PRINTING	0.05	0.00	0.00	0.19	0.18
Stat	CLEANING AND SURFACE COATINGS	ADHESIVES AND SEALANTS	0.16	0.00	0.00	0.00	0.00
Stat	CLEANING AND SURFACE COATINGS	OTHER (CLEANING AND SURFACE COATINGS)	0.02	0.00	0.00	0.00	0.00
Stat	PETROLEUM PRODUCTION AND MARKETING	OIL AND GAS PRODUCTION	0.08	0.00	0.00	0.00	0.00
Stat	PETROLEUM PRODUCTION AND MARKETING	PETROLEUM REFINING	0.01	0.00	0.00	0.00	0.00
Stat	PETROLEUM PRODUCTION AND MARKETING	PETROLEUM MARKETING	5.89	0.02	0.00	0.00	0.00
Stat	PETROLEUM PRODUCTION AND MARKETING	OTHER (PETROLEUM PRODUCTION AND MARKETING)	0.01	0.00	0.00	0.00	0.00
Stat	INDUSTRIAL PROCESSES	CHEMICAL	0.53	0.98	0.11	0.34	0.26
Stat	INDUSTRIAL PROCESSES	FOOD AND AGRICULTURE	0.03	0.00	0.00	0.02	0.01
Stat	INDUSTRIAL PROCESSES	MINERAL PROCESSES	1.37	49.04	5.51	28.85	10.74
Stat	INDUSTRIAL PROCESSES	METAL PROCESSES	0.02	0.49	0.00	0.01	0.01
Stat	INDUSTRIAL PROCESSES	WOOD AND PAPER	0.00	0.00	0.00	0.65	0.39
Stat	INDUSTRIAL PROCESSES	GLASS AND RELATED PRODUCTS	0.00	1.63	0.08	0.25	0.24
Stat	INDUSTRIAL PROCESSES	ELECTRONICS	0.00	0.00	0.00	0.00	0.00
Stat	INDUSTRIAL PROCESSES	OTHER (INDUSTRIAL PROCESSES)	0.47	3.55	0.13	11.03	6.18
Area	SOLVENT EVAPORATION	CONSUMER PRODUCTS	6.86	0.00	0.00	0.00	0.00
Area	SOLVENT EVAPORATION	ARCHITECTURAL COATINGS AND RELATED PROCESS SOLVENTS	2.73	0.00	0.00	0.00	0.00
Area	SOLVENT EVAPORATION	PESTICIDES/FERTILIZERS	1.71	0.00	0.00	0.00	0.00
Area	SOLVENT EVAPORATION	ASPHALT PAVING / ROOFING	2.37	0.00	0.00	0.00	0.00
Area	MISCELLANEOUS PROCESSES	RESIDENTIAL FUEL COMBUSTION	2.14	2.08	0.09	4.43	4.27
Area	MISCELLANEOUS PROCESSES	FARMING OPERATIONS	1.88	0.00	0.00	6.65	1.03
Area	MISCELLANEOUS PROCESSES	CONSTRUCTION AND DEMOLITION	0.00	0.00	0.00	23.27	2.32
Area	MISCELLANEOUS PROCESSES	PAVED ROAD DUST	0.00	0.00	0.00	17.69	2.66
Area	MISCELLANEOUS PROCESSES	UNPAVED ROAD DUST	0.00	0.00	0.00	113.02	11.66
Area	MISCELLANEOUS PROCESSES	FUGITIVE WINDBLOWN DUST	0.00	0.00	0.00	52.09	7.10
Area	MISCELLANEOUS PROCESSES	FIRES	0.02	0.01	0.00	0.04	0.04
Area	MISCELLANEOUS PROCESSES	MANAGED BURNING AND DISPOSAL	0.88	0.34	0.04	1.28	1.21
Area	MISCELLANEOUS PROCESSES	COOKING	0.86	0.00	0.00	2.56	1.55
Area	MISCELLANEOUS PROCESSES	OTHER (MISCELLANEOUS PROCESSES)	0.00	0.00	0.00	0.00	0.00
Mobile	ON-ROAD MOTOR VEHICLES	LIGHT DUTY PASSENGER (LDA)	6.65	6.54	0.05	0.50	0.30
Mobile	ON-ROAD MOTOR VEHICLES	LIGHT DUTY TRUCKS - 1 (LDT1)	3.90	4.41	0.02	0.19	0.12
Mobile	ON-ROAD MOTOR VEHICLES	LIGHT DUTY TRUCKS - 2 (LDT2)	3.50	5.76	0.03	0.36	0.24
Mobile	ON-ROAD MOTOR VEHICLES	MEDIUM DUTY TRUCKS (MDV)	1.66	3.09	0.02	0.17	0.11
Mobile	ON-ROAD MOTOR VEHICLES	LIGHT HEAVY DUTY GAS TRUCKS - 1 (LHDV1)	0.64	1.05	0.00	0.02	0.01
Mobile	ON-ROAD MOTOR VEHICLES	LIGHT HEAVY DUTY GAS TRUCKS - 2 (LHDV2)	0.28	0.33	0.00	0.00	0.00
Mobile	ON-ROAD MOTOR VEHICLES	MEDIUM HEAVY DUTY GAS TRUCKS (MHDV)	0.42	0.35	0.00	0.00	0.00
Mobile	ON-ROAD MOTOR VEHICLES	HEAVY HEAVY DUTY GAS TRUCKS (HHDV)	0.32	0.80	0.00	0.00	0.00
Mobile	ON-ROAD MOTOR VEHICLES	LIGHT HEAVY DUTY DIESEL TRUCKS - 1 (LHDV1)	0.03	1.25	0.00	0.01	0.01
Mobile	ON-ROAD MOTOR VEHICLES	LIGHT HEAVY DUTY DIESEL TRUCKS - 2 (LHDV2)	0.03	1.09	0.00	0.01	0.01
Mobile	ON-ROAD MOTOR VEHICLES	MEDIUM HEAVY DUTY DIESEL TRUCKS (MHDV)	0.07	3.39	0.00	0.08	0.07
Mobile	ON-ROAD MOTOR VEHICLES	HEAVY HEAVY DUTY DIESEL TRUCKS (HHDV)	7.54	104.92	0.10	4.83	4.23
Mobile	ON-ROAD MOTOR VEHICLES	MOTORCYCLES (MCY)	3.15	0.90	0.00	0.04	0.02
Mobile	ON-ROAD MOTOR VEHICLES	HEAVY DUTY DIESEL URBAN BUSES (UB)	0.01	0.14	0.00	0.00	0.00
Mobile	ON-ROAD MOTOR VEHICLES	HEAVY DUTY GAS URBAN BUSES (UB)	0.02	0.05	0.00	0.00	0.00
Mobile	ON-ROAD MOTOR VEHICLES	SCHOOL BUSES (SB)	0.05	0.88	0.00	0.04	0.04
Mobile	ON-ROAD MOTOR VEHICLES	OTHER BUSES (OB)	0.06	0.33	0.00	0.01	0.00
Mobile	ON-ROAD MOTOR VEHICLES	MOTOR HOMES (MH)	0.12	0.60	0.00	0.01	0.00
Mobile	OTHER MOBILE SOURCES	AIRCRAFT	4.97	3.86	0.43	3.07	3.04
Mobile	OTHER MOBILE SOURCES	TRAINS	3.56	35.22	0.31	1.19	1.09
Mobile	OTHER MOBILE SOURCES	RECREATIONAL BOATS	5.89	1.49	0.00	0.48	0.36
Mobile	OTHER MOBILE SOURCES	OFF-ROAD RECREATIONAL VEHICLES	18.48	0.79	0.23	0.22	0.16
Mobile	OTHER MOBILE SOURCES	OFF-ROAD EQUIPMENT	4.49	20.15	0.02	0.95	0.86
Mobile	OTHER MOBILE SOURCES	FARM EQUIPMENT	0.30	1.48	0.00	0.09	0.08
Mobile	OTHER MOBILE SOURCES	FUEL STORAGE AND HANDLING	0.62	0.00	0.00	0.00	0.00
		Totals (tons per day):	102.41	281.10	9.60	280.35	64.89

Appendix B – WEMO Planning Area Ambient Monitoring Sites (Detail)

County	Name	AIRS ID	AQD ID	CO		NO2		SO2		OZONE		PM10		TSP Pb		PM2_5	
Inyo County	Coso Gate	060270020															
Inyo County	Coso Junction-10 miles E	060271014	1400718									S/SI	NS/RC				
Inyo County	Coso Junction-Highway 395 Rest Area	060271001	1400696									S/SI	NS/RC				
Inyo County	Death Valley Natl Monument	060270101	1403151							SP/UV	NS/RC	--/SI	--/BL				
Inyo County	Dirty Sox	060270022										S/SI	NS/RC				
Inyo County	Flat Rock-Highway 190	060270024										S/SI	NS/RC				
Inyo County	Keeler-Cerro Gordo Road	060271003	1400728									S/SI	NS/RC			S/SQ	NS/RC
Inyo County	Olancha-E Fall Road	060270016	1400725									S/SI	NS/RC				
Inyo County	Olancha-Walker Creek Road	060270021	1400729									S/SI	NS/RC				
Kern County	Boron-26965 Cote Street	060299000								SP/UV	US/BL						
Kern County	Canebrake	060290017										S/SI	--/BL				
Kern County	China Lake-Powerline Road	060291001	1500211									S/SI	US/RC	S/AG	RS/BL		
Kern County	Inyokern-Airport	060290013	1500254									SP/SI	NS/IM				
Kern County	Mojave-923 Poole Street	060290011	1500252			S/CL	US/RC			S/UV	RS/HC	S/SI	RS/HC			S/SQ	NS/HC
Kern County	Ridgecrest-100 West California Avenue	060290015										S/SI	NS/HC			S/SI	NS/HC
Kern County	Ridgecrest-Las Flores Avenue	060290012	1500253									SP/SI	NS/IM			S/SI	--/RC
Kern County	Tehachapi-Jameson Road	060291005	1503165							SP/UV	--/--						
Los Angeles County	Lancaster-43301 Division Street	060379033		S/IR	MS/--	S/CL	MS/--			--/UV	MS/--	S/SI	NS/--			S/--	NS/--
Los Angeles County	Lancaster-W Pondera Street	060379002	7000096	S/IR	NS/RC	S/CL	NS/RC			S/UV	NS/RC	S/SI	NS/RC			S/SQ	NS/RC
Los Angeles County	Palmdale	060379006								SP/UV	RS/BL						
Riverside County	Blythe-445 West Murphy Street	060659003								S/UV	--/--						
Riverside County	Joshua Tree National Park-Pinto Wells	060651004															
San Bernardino County	Baldy Mesa	060719006								SP/UV	NS/BL						
San Bernardino County	Barstow	060710001	3600155	S/IR	NS/RC	S/CL	NS/RC	S/FL	NS/RC	S/UV	NS/RC	S/SI	NS/RC	S/XG	NS/RC		
San Bernardino County	Flash Mountain	060719007								SP/UV	US/BL						
San Bernardino County	Hesperia-Olive Street	060714001	3600201	S/IR	NS/RC	S/CL	NS/RC	S/FL	NS/RC	S/UV	NS/RC	S/SI	NS/RC	S/XG	NS/RC		
San Bernardino County	Joshua Tree-National Monument	060719002	3603152					--/FL	--/BL	SP/UV	RS/RC	--/SI	--/BL				
San Bernardino County	Lucerne Valley-Middle School	060710013	3600208									S/SI	NS/RC				
San Bernardino County	Ludlow	060719000								SP/UV	RS/BL						
San Bernardino County	Mojave National Preserve	060711001															
San Bernardino County	Phelan-Beekley Road and Phelan Road	060710012	3600207	S/IR	NS/RC	S/CL	NS/RC	S/FL	NS/RC	S/UV	NS/RC						
San Bernardino County	Quartzite Mountain	060719008								SP/UV	NS/BL						
San Bernardino County	Shadow Mountain	060719003								SP/UV	US/BL						
San Bernardino County	Trona-Athol	060710015	3600210			S/CL	NS/RC	S/FL	RS/RC	S/UV	RS/RC	S/SI	NS/RC	S/AG	NS/RC		
San Bernardino County	Trona-Athol and Telegraph	060711234				S/CL	NS/RC	S/FL	RS/RC	S/UV	RS/RC	S/SI	NS/RC				
San Bernardino County	Twentynine Palms-Adobe Road #2	060710017	3600211	S/IR	NS/RC	S/CL	NS/RC	S/FL	NS/RC	S/UV	RS/RC	S/SI	NS/RC				
San Bernardino County	Victorville-14306 Park Avenue	060710306		S/--	--/--	S/CL	--/--	S/FL	--/--	S/UV	--/--	--/SI	--/--			S/SQ	NS/RC
San Bernardino County	Victorville-Armagosa Road	060710014	3600209	S/IR	NS/RC	S/CL	NS/RC	S/FL	NS/RC	S/UV	NS/RC	S/SI	NS/RC			S/SQ	NS/RC
Riverside County	Joshua Tree National Park	060650008								--/UV	--/BL						
Riverside County	Banning Airport	060650012	3300164			P,S/CL	NS/RC			P,S/UV	NS/RC	S/SI	NS/RC				
Riverside County	Banning-Allesandro	060650002	3300150	--/IR	NS/RC			--/CM	NS/RC	S/UV	MS/RC	S/SI	NS/RC	S/XG	NS/RC		
Riverside County	Riverside-Rubidoux	060658001	3300144	S/IR	MS/RC	S/CL	US/RC	S/FL	NS/RC	S/UV	US/HC	S/SI	NS/HC	S/AG	NS/RC	S/SQ	NS/HC
San Bernardino County	Big Bear City-501 W. Valley Blvd	060718001														S/SQ	NS/RC
San Bernardino County	Crestline	060710005	3600181	--/IR	--/--	--/CL	--/--			S/UV	NS/HC	S/SI	NS/RC	S/XG	NS/RC		
San Bernardino County	Mount Baldy-Mount Baldy Road	060710217		--/IR	--/--					--/UV	--/--						
San Bernardino County	San Gorgonio Wilderness	060719010										--/SI	--/BL				

Name	OP Agency	Active	WS	WD	Temp	DPT	RH	SOL	UV	Press	Latitude	Longitude	Elevation	Site
Coso Gate	Great Basin Unified APCD	*	97-00	97-00	97-00		97-00				36.0688	-117.755	1329	3252
Coso Junction-10 miles E	Great Basin Unified APCD										36.0338	-117.7988	NA	2366
Coso Junction-Highway 395 Rest Area	Great Basin Unified APCD	*	97-00	97-00	97-00		97-00				36.0497	-117.9438	1027	2248
Death Valley Natl Monument	National Park Service	*	93-09	93-09	93-09		93-09	93-09			36.5089	-116.8478	125	3151
Dirty Sox	Great Basin Unified APCD	*	99-08	99-08	07-08						36.3261	-117.955	1060	3260
Flat Rock-Highway 190	Great Basin Unified APCD	*	01-08	01-08	07-08						36.4219	-117.8366	1133	3497
Keeler-Cerro Gordo Road	Great Basin Unified APCD	*	97-09	97-09	97-09						36.4877	-117.8711	1097	3154
Olancha-E Fall Road	Great Basin Unified APCD		95-97	95-97	95-97		95-97			97-97	36.2755	-117.9897	1097	3118
Olancha-Walker Creek Road	Great Basin Unified APCD	*	97-09	97-09	97-09		97-09			97-09	36.2663	-117.9916	1100	3210
Boron-26965 Cote Street	ARB Contractor		95-95	95-95	95-95						35.0036	-117.6511	750	3218
Canebrake	California ARB	*									35.72778	-118.139312	914	3741
China Lake-Powerline Road	Kern County APCD										35.7102	-117.6397	697	2774
Inyokern-Airport	Great Basin Unified APCD										35.6513	-117.8241	759	3123
Mojave-923 Poole Street	California ARB/Kern County APCD	*	95-09	95-09	95-09					99-09	35.0503	-118.1478	853	3121
Ridgecrest-100 West California Avenue	Kern County APCD	*	08-09	08-09	08-09					08-09	35.6211	-117.6731	701	3492
Ridgecrest-Las Flores Avenue	Kern County APCD										35.6299	-117.6692	723	3122
Tehachapi-Jameson Road	California ARB		95-95	95-95	95-95						35.1333	-118.425	1167	3165
Lancaster-43301 Division Street	Antelope Valley APCD	*	01-09	01-09	01-09					01-09	34.6713	-118.1305	725	3658
Lancaster-W Pondera Street	Mojave Desert AQMD		94-01	94-01	98-01					98-01	34.6899	-118.1327	725	3007
Palmdale	ARB Contractor		95-95	95-95							34.5569	-118.1116	841	3219
Blythe-445 West Murphy Street	Mojave Desert AQMD	*	03-09	03-09	03-09						33.6119	-114.6	83	3673
Joshua Tree National Park-Pinto Wells	National Park Service	*	07-08	07-08	07-08		07-08	07-08			33.9397	-115.4108	326	3732
Baldy Mesa	ARB Contractor		95-95	95-95	95-95						34.375	-117.4477	1295	3259
Barstow	Mojave Desert AQMD	*	94-09	94-09	94-09					01-09	34.8938	-117.0244	690	2923
Flash Mountain	ARB Contractor		95-95	95-95	95-95						34.7375	-117.565	1013	3221
Hesperia-Olive Street	Mojave Desert AQMD	*	94-09	94-09	94-09					01-09	34.4158	-117.2861	1006	2650
Joshua Tree-National Monument	National Park Service	*	93-09	93-09	93-09	93-95	91-09	93-09			34.0694	-116.3888	1244	3152
Lucerne Valley-Middle School	Mojave Desert AQMD	*									34.4103	-116.9067	1036	2961
Ludlow	ARB Contractor		95-95	95-95	95-95						34.7247	-116.1577	543	3257
Mojave National Preserve	National Park Service	*	08-08	08-08	08-08		08-08	08-08			35.1019	-115.7767	1212	3733
Phelan-Beekley Road and Phelan Road	Mojave Desert AQMD	*	94-09	94-09	97-09						34.425	-117.5897	1250	2830
Quartzite Mountain	ARB Contractor		95-95	95-95							34.6116	-117.2888	1366	3222
Shadow Mountain	ARB Contractor		95-95	95-95							34.7375	-117.565	1256	3220
Trona-Athol	Mojave Desert AQMD		94-97	94-97	97-97					97-97	35.7742	-117.3686	498	2990
Trona-Athol and Telegraph	Mojave Desert AQMD	*	97-09	97-09	97-09					97-09	35.7744	-117.3722	545	3215
Twentynine Palms-Adobe Road #2	Mojave Desert AQMD		94-05	94-05	97-05					97-05	34.1419	-116.0553	607	3124
Victorville-14306 Park Avenue	Mojave Desert AQMD	*	00-09	00-09	00-09			00-09		00-09	34.5122	-117.325	913	3500
Victorville-Armagosa Road	Mojave Desert AQMD		94-99	94-99	94-99			94-99		97-99	34.5041	-117.3297	876	2963
Joshua Tree National Park	National Park Service	*	05-09	05-09	05-09		05-09	05-09			33.7411	-115.8206	984	3697
Banning Airport	South Coast AQMD	*	97-09	97-09	97-09		97-09	98-09	01-09	00-09	33.9208	-116.8583	473	3168
Banning-Allesandro	South Coast AQMD		94-99	94-99							33.9211	-116.8583	722	2514
Riverside-Rubidoux	South Coast AQMD	*	94-09	94-09	94-09		04-09				34.0005	-117.4152	250	2596
Big Bear City-501 W. Valley Blvd	South Coast AQMD	*									34.2644	-116.8644	2056	3266
Crestline	South Coast AQMD	*	94-09	94-09			94-09				34.2413	-117.2755	1384	2499
Mount Baldy-Mount Baldy Road	California ARB		97-97	97-97	97-97		97-97				34.2391	-117.6208	1335	3212
San Gorgonio Wilderness	National Park Service						93-04				34.19390	-116.9132	1726	3700

APPENDIX E-2

ASPEN AIR QUALITY ANALYSIS REPORT (2018)

Air Quality Analysis
West Mojave (WEMO) Planning Area Route Network

Prepared for:

BLM Barstow and the Ridgecrest Field Offices

Prepared by:

Aspen Environmental Group
Agoura Hills and San Francisco, California

October 2018

Air Quality Analysis
West Mojave (WEMO) Planning Area Route Network

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Air Quality Analysis
West Mojave (WEMO) Planning Area Route Network

Introduction

This report provides a quantitative air quality analysis for the BLM's West Mojave (WEMO) Route Network Planning Area, in the form of baseline and project alternative emissions inventories and an existing SIP compliance assessment. Information contained in this analysis is intended for use or reference in the *West Mojave (WEMO) Route Network Project Final Supplemental Environmental Impact Statement* (FSEIS). This report is intended as an appendix to the SEIS.

The BLM WEMO planning area covers 9.1 million acres, over 14,600 square miles, of the Western Mojave Desert and includes parts of three air basins and five different local air pollution control district jurisdictions:

Air Basins within WEMO:

1. Mojave Desert Air Basin
2. Great Basin Valleys Air Basin
3. Salton Sea Air Basin

Jurisdictions within WEMO:

1. Mojave Desert Air Quality Management District (MDAQMD)
2. Eastern Kern Air Pollution Control District (EKAPCD)
3. Antelope Valley Air Quality Management District (AVAQMD)
4. Great Basin Unified Air Pollution Control District (GBUAPCD)
5. South Coast Air Quality Management District (SCAQMD)

This Air Quality Analysis includes emissions inventories for the total 2017 WEMO area baseline, the BLM WEMO Route Network, and the BLM Route Network plus BLM OHV Open Riding areas 2017 baseline and 2035 future conditions for five project alternatives, including the no action alternative. The baseline WEMO area emissions inventories are developed using area-based annual inventory information, inventorying methods, and calculation assumptions available from the following agency sources:

1. California Air Resources Board (ARB)
2. United States Environmental Protection Agency (USEPA)
3. Mojave Desert Air Quality Management District (MDAQMD)
4. Bureau of Land Management (BLM)

This report contains four chapters:

Chapter 1 – Baseline WEMO Planning Area Total Emissions Estimate
Chapter 2 – BLM-Attributable WEMO Planning Area Baseline Emissions
Chapter 3 – Current BLM WEMO Planning Area SIP Air Quality Compliance
Chapter 4 – 2035 Nonattainment/Maintenance Area BLM Emissions

Descriptions of the specific methods, assumptions, and data used to complete the emissions inventories summarized in this report are documented in more detail in Chapters 1 through 4. An appendix to this report provides additional tabulated examples of the specific assumptions, data, and calculations used to create these inventories.

Mr. Alan De Salvio of the Mojave Desert Air Quality Management District reviewed and concurs with the general methods and assumptions used to create these emissions inventories.

1. Baseline WEMO Planning Area Total Emissions Estimate

Summary of Results

A summary for all sources contributing criteria pollutants inside the boundaries of the WEMO Planning Area is in Table 1-1 for daily emissions and Table 1-2 for annual emissions.

Table 1-1. WEMO Planning Area 2017 Total Average Daily Emissions by Air District (tons/day)

Jurisdiction	VOC	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$
MDAQMD	23.56	81.52	68.77	2.03	99.53	19.47
AVAQMD	15.66	43.77	10.11	0.24	39.81	8.02
EKAPCD	7.33	38.71	21.66	5.45	28.86	7.34
GBUAPCD	0.55	1.33	0.42	0.01	6.61	1.13
SCAQMD	0.00272	0.01322	0.00049	0.0000023	0.71	0.09
Total	47.11	165.33	100.96	7.72	175.52	36.04

Source: Appendix A.

Table 1-2. WEMO Planning Area 2017 Total Annual Emissions by Air District (tons/year)

Jurisdiction	VOC	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$
MDAQMD	8,600	29,753	25,100	741	36,328	7,105
AVAQMD	5,716	15,974	3,692	88	14,530	2,927
EKAPCD	2,676	14,129	7,906	1,988	10,534	2,679
GBUAPCD	201	485	153	2	2,414	413
SCAQMD	1	5	0	0	260	32
Total	17,194	60,346	36,851	2,819	36,328	7,105

Source: Appendix A.

These emissions inventories do not include emissions that enter the planning area from other nearby sources of emissions such as Owens Lake or the South Coast Air Basin.

Methods and Assumptions

The 2017 baseline year emissions within the WEMO area includes all area-relevant anthropogenic federal criteria pollutant[1] emissions sources, excluding lead, that are included in available inventories of emissions from air quality regulatory agencies. The scope of this inventory does not include toxic air contaminants, greenhouse gases, and certain State of California criteria pollutants such as hydrogen sulfide and vinyl chloride that are not emitted, or are only emitted in negligible quantities, by WEMO Route Network use. The anthropogenic emissions sources inventoried include: stationary sources, such as power plants and cement production facilities; mobile sources, such as on- and off-road vehicle travel, trains, and aircraft; and area sources, such as consumer goods use, construction equipment, and anthropogenic fugitive dust sources stemming from wind erosion of disturbed areas and travel on unpaved roads. For this project natural emissions sources were not included in the prepared inventories, which includes nonanthropogenic biogenic emissions sources (such as emissions from forests), geogenic

[1] Pollutants that are subject to National Ambient Air Quality Standards. These pollutant are ozone (with nitrogen oxides [NOx] and volatile organic compounds [VOC] as precursors), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter (PM10, PM2.5 and lead.

emissions sources (such as emissions from non-disturbed area wind erosion and geothermal areas[2]), and wildfires.

This Air Quality Analysis uses the following steps to determine the entire WEMO area 2017 baseline emissions.

- Step 1. Gather 2017 ARB Emissions Inventories for the Jurisdictions within WEMO.
- Step 2. Adjust the ARB emission inventory data to fit the WEMO area based on area and population.
- Step 3. Determine additional specific adjustments to the ARB inventory data where appropriate.
- Step 4. Provide corrections to the ARB inventory for specific BLM inventory line item values as appropriate based on BLM 2017 WEMO Route Network use and GIS data (PM_{10} and $PM_{2.5}$ only).
- Step 5. Provide corrections to other non-BLM specified ARB Emissions Inventory data for fugitive dust sources as appropriate and where possible based on the corrections made to the BLM-specific line item data (PM_{10} and $PM_{2.5}$ only). These non-BLM specified data sources include road travel fugitive dust on city and county unpaved roads, US Forest Service and State and National Park roads, farm roads, and the windblown dust from the disturbed areas of these unpaved road areas; and windblown dust emissions from agricultural land .

Step 1. Emissions estimates from the California Air Resources Board CEPAM database (ARB 2018a) were used to determine estimated 2017 baseline year emission rates for the areas covered by the WEMO planning area. Specifically, estimates from the following areas with detailed emissions estimates in CEPAM were used:

a. MDAQMD
b. EKAPCD
c. AVAQMD
d. GBUAPCD, Inyo County portion

For the small SCAQMD portion in the WEMO planning area, the emissions were calculated based on the BLM Recreation Management Information System (RMIS) estimated activity within the WEMO BLM area, and these emission were multiplied by two to account for activity related to unpaved road use in this small and very remote area from non-WEMO BLM sources, primarily Joshua Tree National Park,. This remote area has no known stationary sources, paved roads, residences or structures of any kind, or any other anthropogenic emissions sources.

An example of the CEPAM output is provided in the appendix to this report.

[2] Geothermal springs can emit large amounts of carbon dioxide and/or methane greenhouse gas (GHG) emissions and toxic air contaminant emissions (primarily hydrogen sulfide), and these natural emissions occurring within WEMO, such as in the Coso area, may be substantial. However, this air quality analysis does include an inventory of GHG emissions or hydrogen sulfide emissions, just the pollutants that the US EPA regulate as criteria pollutants (excluding lead), and that inventory does include criteria pollutant emissions from geothermal power plants.

Step 2. The CEPAM data for most emissions source categories were adjusted by either area or population ratios depending on whether the emission source being adjusted were more specifically related to the size of the area covered by WEMO or the population within the WEMO area. These specific adjustments were calculated as follows:

WEMO Area Multipliers

Area	In WEMO	Total	Multiplier
AVAQMD	1070	1323	0.809
MDAQMD	9401	20226	0.465
EKAPCD	2453	3792	0.647
MDAB	13208	27404	0.482
GBUAPCD	1298	10227	0.127

WEMO Population Multipliers

Population	In WEMO	Total	Multiplier
AVAQMD	389695	401810	0.970
MDAQMD	504881	567819	0.889
EKAPCD	110829	146050	0.759
MDAB	979286	1048819	0.934
GBUAPCD	3259	18434	0.177

Areas were determined using Graphic Information System (GIS) shapefiles, with the BLM providing the WEMO area shapefile, and the local air district boundaries shapefile coming from online ARB resources. Population was determined using United States Census block data. An example of using these multipliers for a specific air district and emissions source type is shown in the following example for MDAQMD PM_{10} Emissions from cooking:

Base Emissions Estimate for MDAQMD in 2017 = 2.2804 tons/day
WEMO Area MDAQMD adjustment is based on Population Multiplier = 0.889
WEMO Area Cooking PM_{10} Emissions = 2.2804 x 0.889 = 2.0276 tons/day

The vast majority of emissions source types used one of these two simplified emissions multipliers. An example table of which multiplier was used for each emissions source type, for the MDAQMD, is provided in the Appendix to this report.

Step 3. Where area and population multipliers did not seem relevant to particular emissions sources, based on referenced information or observation of the areas being inventoried, other specific WEMO area relevant multipliers were developed for those sources individually. For example, specific multipliers were developed for the Inyo County stationary sources based on available data in the ARB Facility Search Engine database (ARB 2018b), where multipliers were determined by the types of stationary source emissions that existed within the Inyo County portion of WEMO divided by all of the emissions from those source types within Inyo County. An example of those Inyo County stationary source multipliers is a multiplier of 1 for power plant emissions as the only power plant in Inyo County (Coso Generating Station) is located within the WEMO planning area. In specific cases, where data was unavailable, other assumptions based on review of Google Earth or other sources were used. Examples of those include the assumption that there are no recreational boat emissions in Inyo County as the navigable water bodies within the WEMO planning area do not allow motorized recreational boats. The emissions sources with these multiplier assumptions were generally those with limited emissions within the WEMO area.

Step 4. For BLM route network and OHV area use, BLM OHV recreation staffs at the Barstow and Ridgecrest Field Offices provided Recreation Management Information System (RMIS) data on the number of participants and visitor days for each OHV activity in each RMIS geographic sub-division in the WEMO planning area. The staffs also provided data on the average number of passengers for vehicles in each RMIS OHV vehicle class and the ranges of high and low speeds for the vehicle classes. BLM Field Office Managers proposed using the average of the high and low speeds as the basis for Aspen Environmental to correct CEPAM model assumptions and to depict the vehicle velocities for modeling emissions on BLM public lands in the WEMO plan. The BLM California Desert District furnished the GIS data for the Route Network in each EIS alternative. Corrections for these emissions sources include the following:

a. Windblown road fugitive dust emissions for BLM lands were corrected based on the total disturbed area calculated for each route network design, on the miles of route network provided by the BLM, and average estimate across the planning area of a 12-foot route width.
b. Emissions from travel on unpaved BLM roads were corrected using the RMIS generated vehicle miles traveled (VMT) data. The RMIS vehicle category designations were reclassified into the 2011 EMFAC vehicle categories as follows:
    i. The on-road vehicle categories ranged in size from motorcycles and light duty autos through Light Heavy Duty Trucks (such as an F350 pickup truck). Heavy trucks and motorhome use in the route network and in the OHV areas is considered minimal.
    ii. The reclassification of the on-road vehicle categories was based on whether the activity was considered "driving for pleasure" or was considered OHV recreational riding. Where it was considered driving for pleasure the percentages of VMT were based on VMT averaged splits for the assumed vehicle types, while in OHV areas the use of light duty autos and light duty trucks dropped to 10 percent of the normal VMT based use.
    iii. The reclassification in areas with RMIS-category vehicles with both on-road and off-road vehicle use used area-specific assumptions on how much use was on-road and how much was off-road.

The final determined vehicle mix for the RMIS use categories is as follows:

On-Road Vehicle Class	Driving for Pleasure	OHV - UTV	OHV - Car, Trucks, SUVs	OHV- Dunebuggy	OHV - Motorcycle	High Speed Time Trials	Racing - UTV	Racing - Motorcycle	Racing - OHV, Cars. Trucks, Buggies
Light Duty Auto	60.37%	0.00%	13.36%	25.00%	0.00%	50.00%	0.00%	0.00%	12.02%
Light Duty Trucks (LDT1)	4.70%	0.00%	1.04%	0.00%	0.00%	0.00%	0.00%	0.00%	0.94%
Light Duty Trucks (LDT2)	20.25%	0.00%	44.80%	0.00%	0.00%	0.00%	0.00%	0.00%	40.32%
Light Heavy Duty Trucks (LHDT1)	0.00%	0.00%	6.62%	0.00%	0.00%	0.00%	0.00%	0.00%	5.96%
Light Heavy Duty Trucks (LHDT2)	0.00%	0.00%	1.72%	0.00%	0.00%	0.00%	0.00%	0.00%	1.55%
Motorcycles	0.00%	0.00%	0.00%	0.00%	50.00%	0.00%	0.00%	50.00%	0.00%
Medium Duty Trucks (MDV)	14.68%	0.00%	32.47%	0.00%	0.00%	0.00%	0.00%	0.00%	29.23%
Off-Road Recreational Vehicles	0.00%	100.00%	0.00%	75.00%	50.00%	50.00%	100.00%	50.00%	10.00%

For the determination of unpaved road emissions, the emissions factors were determined using the unpaved road methods contained in the US EPA Compilation of Air Pollutant Emissions Factors, Volume

1: Stationary Point and Area Sources, Section 13.2.2, equation 1b methodology for determining emissions factors for publicly accessible unpaved roads (USEPA 2006). The calculated emissions factor was determined as follows:

E = [k * (s/12)^a * (S/30)^d/(M/0.5)^c - C]*[(365-P)/365]
Where:

k =	1.8	lb/VMT Constant for PM_{10} (k = 0.18 lb/VMT Constant for $PM_{2.5}$)
s =	15	Percent Silt Content in Soil (MDPA PM_{10} Plan Assumption)
a =	1	Equation Constant
S =	20	Speed (MPH) (MDPA PM10 Plan Assumption[3])
d =	0.5	Equation Constant
M =	2	Percent Moisture (SCAQMD 1993 CEQA Handbook, "dry")
c =	0.2	Equation Constant
C =	0.00047	Brake Wear emissions constant, 0.00036 for $PM_{2.5}$
P =	15	Days per year with Precipitation over 0.01 inches

EF = 1.335 lb/VMT for PM_{10} EF = 0.133 lb/VMT for $PM_{2.5}$

To estimate emissions for all on-road vehicles, with four or more wheels, the emissions factors shown above remained unaltered, while motorcycles (whether on-road or off-road recreational motorcycles) used these emissions factors divided by eight to account for one half of the wheels and the much lower vehicle weight. Other off-road recreational vehicles emissions were calculated using one-half of these emissions factors to account for much lower average vehicle weights.

The overall WEMO area on-road vehicle tailpipe emissions were assumed to be accurately depicted in the CEPAM WEMO area totals. CEPAM emission inventories use data from the EMFAC2014 model, which is the current State Implementation Plan (SIP) approved model. Separate emissions estimates for a number of different off-road recreational vehicles and associated assumptions (e.g., two-cycle vs. four-cycle engine percentages for each vehicle type) were too complex to re-create or to be useful in determining potential errors in assumptions.

Step 5. Reviewing the GIS and RMIS data from the BLM showed that the inputs used in CEPAM generally substantially underestimated the BLM route network disturbed area and the unpaved traffic VMT as noted above. Additional review found that certain assumptions used in CEPAM were inconsistent for other fugitive dust emissions calculations for other non-BLM specified fugitive dust source emissions in the Mojave Desert. Therefore, two corrections were made to address these inconsistencies to non-BLM emissions sources. These specific corrections are:

a. The windblown emissions estimate for non-BLM roads was corrected using a consistent climatological factor.
b. The windblown emissions estimate for agricultural lands was corrected using a consistent climatological factor.

The climatological factor is a factor for soil erosion used in calculations of windblown emissions that varies directly with the wind velocity and inversely with the soil surface moisture. The entire WEMO

[3] The RMIS WEMO Planning Area VMT estimates are based on various speed estimates depending on use, but the VMT weighted average speed is 19.45 MPH which is nearly identical to, and consistent with, the 20 MPH speed assumption used by MDAQMD in the 1995 MDPA PM10 Attainment Plan.

planning area has a fairly consistent very low soil moisture and high average wind velocity. A climatological factor of 2, from the Final Mojave Desert Planning Area Federal Particulate Matter (PM_{10}) Attainment Plan (MDAQMD 1995a), was consistently applied in the corrected emissions for estimates for non-BLM area windblown emissions. The CEPAM estimates, as documented in the ARB emissions inventory sections 7.12 and 7.13 (ARB 1997), had county-wide climatological factors that did not consider substantially different climate regions within counties, with regional values ranging from 0.061 to 1.274. This correction is a simple ratio of the cited ARB method factor and the corrected factor of 2.

Other Specific Assumptions/Databases Used

Particulate Size Profiles

ARB PM Size Profiles (ARB 2017) were used to determine the share of $PM_{2.5}$ emissions as part of the PM_{10} emissions for limited emissions cases where corrections were made to the CEPAM estimates.

Relevant ARB PM size profiles are as follows:

	$PM_{2.5}/PM_{10}$
WINDBLOWN DUST-UNPAVED RD/AREA	0.1322564
WINDBLOWN DUST - AGRIC. LANDS	0.1730134

EKAPCD Agricultural Lands Windblown Dust Climatological Factor Correction

The windblown dust calculated in CEPAM for the EKAPCD area was disproportionate to the amount of agricultural activity in EKAPCD. CEPAM calculations for agricultural windblown dust likely use an agricultural lands area factor applicable to western Kern County in the San Joaquin Valley where agriculture is extensive. Therefore, in this one case the climatological factor correction was not performed as the emissions estimated for EKAPCD are likely overestimated, not underestimated based on the climatological factor.

BLM WEMO Area Off-Road Recreational Vehicle Emission Assumptions

The general basis for correcting CEPAM area wide emissions to BLM for off-road recreational vehicle attributable emissions relies on the conservative assumption that the BLM has 90 percent of the attributable MDAQMD emission for this emissions category. The BLM attributable emissions for all other areas are based on the ratio of the RMIS assumed VMT for the off-road recreational vehicles.

Miscellaneous Assumptions

Assumption	Value	Source
Route Network Average Unpaved Road Width	12 Feet	BLM
Windblown Unpaved Road Dust Emissions Factor	3,042 lbs/PM_{10}/Mile	MDAQMD 1997

Notes and Limitations

The baseline emissions estimate includes sources known and reported in CEPAM and sources in CEPAM that are corrected to address apparent errors in the estimation methodology or assumptions. Wherever those apparent errors were, they received due-diligence corrections. Sometimes available information was limited. Therefore, the baseline emissions estimate has the following known limitations:

1) The CEPAM database appears to underestimate many of the fugitive dust emissions sources within the WEMO area, as noted above, including the emissions for vehicle travel on unpaved roads and for wind erosion PM_{10} and $PM_{2.5}$ emissions on unpaved roads and other disturbed areas. Corrections were made as identified above, but information was not available to check and correct all of the assumptions and estimates for these types of emissions sources contained in CEPAM.
2) The BLM attributable particulate emissions corrections use BLM supplied estimates. These estimates include the GIS based Route Network length data which is not completely ground-truthed, and the RMIS based vehicle use estimates. Additionally, several other generalized assumptions, much like they are used in CEPAM emissions methodologies or in the various attainment plan emissions estimates. These generalized assumptions also include soil silt content, soil moisture content, and unpaved traffic speed. The following is noted in the MDAQMD MDPA PM10 attainment plan:

   > *Most non-stationary sources are inventoried using planning areawide assumptions, such as a single value for silt content, average vehicle speed, number of trips per mile, etc. The MDAQMD believes these MDPA-wide constants are justified based on the large number of sources within each category; which allows individual differences to average out.*

   This also applies to the assumptions used in the emissions estimate corrections, which are based on agency referenced values or determined through a best engineering estimate.
3) Windblown emissions from OHV disturbed areas (BLM OHV Open Riding areas and State of California Department of Parks and Recreation OHV areas), as opposed to the calculated emission from the route network disturbed area, were not quantified due to the following reasons:
   a. CEPAM includes, or attempts to include, windblown emissions from unpaved roads such as those in the BLM WEMO route network, but CEPAM does not appear to account for fugitive dust emissions resulting directly or indirectly from the disturbance in OHV Open Riding areas.
   b. None of the available attainment plans for the areas that include BLM or other OHV areas appears to attempt to calculate the windblown emissions from OHV Open Riding areas.
   c. The BLM does not have an estimate of the area disturbed within the BLM OHV Open Riding areas located in the WEMO planning area; therefore, reliable estimates for the BLM OHV area windblown emissions cannot be completed.
   d. None of five alternatives in the Route Network Project, the subject of the SEIS, includes any significant changes to BLM WEMO OHV Open Riding areas[4] or anticipates any further changes to the BLM WEMO OHV areas; therefore, these emissions are not directly of concern to the operations of the BLM Route Network.
4) The CEPAM estimate also does not appear to include all federal lands emissions sources, most notably area source emissions, primarily fugitive dust emissions, related to military installation operations. The WEMO planning area is home to all or parts of large military installations, including Edwards Air Force Base, the China Lake Naval Air Weapons Station, Fort Irwin National Army Training Center, and the Twenty-nine Palms Marine Corps Air Ground Combat Center.

[4] The alternatives do include two different OHV Open Riding assumptions for Koehn Dry Lake in Eastern Kern County, whether to designate the area as open use or as open by special permit use. RMIS data limitations do not allow for the estimation of use assumptions at Koehn Dry Lade, and the use of this dry lake is considered insignificant in comparison of the other uses in Eastern Kern County.

These installations have potentially large sources of fugitive dust emissions from the use of large ground-based military off-road equipment and on-road vehicles on unpaved roads and from disturbed areas windblown emissions that do not appear to be included in the CEPAM emissions database.

These limitations will generally result in an underestimation in the total anthropogenic emissions baseline within the entire WEMO planning area. As such, calculations of BLM PM_{10} and $PM_{2.5}$ emissions are disproportionately high to the actual total emissions based on the emissions corrections completed for the BLM attributable emissions. The baseline emissions estimate, with these noted limitations finds the following results in relations to the WEMO BLM attributable baseline emission compared to the total WEMO area baseline emissions. Table 1-3 summarizes the results of BLM attributable emissions found in this air quality analysis as a fraction of all baseline sources calculated for the WEMO planning area.

Table 1-3. BLM Attributable Percentage of 2017 WEMO Area Total Baseline Emissions

	BLM Attributable Percentage of 2017 WEMO Area Total Baseline Emissions					
	VOC	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$
BLM Route Network	0.67%	0.98%	0.05%	0.00%	22.45%	13.07%
BLM Route Network + OHV Areas	1.40%	2.00%	0.11%	0.01%	34.47%	18.92%

Source: Appendix A.

As the table above shows the WEMO BLM Route Network use, with or without the OHV areas included, contributes very small fractions of all emissions of criteria pollutants except for PM_{10} and $PM_{2.5}$. As noted above, the PM_{10} and $PM_{2.5}$ estimated emissions for the BLM are likely shown disproportionately greater than actuality due to the inability to correct and include all other fugitive dust emissions sources within the WEMO planning area.

Future Baseline Emissions Estimate (2035)

In addition to the 2017 WEMO Area Emissions Baseline, the 2035 WEMO Area Future Emissions Baseline was completed (Chapter 4). This future baseline emissions estimate applied the same methods as for the 2017 WEMO Area baseline emissions estimate. The results of the 2035 future baseline estimate are summarized in Table 1-4 for daily emissions and Table 1-5 for annual emissions.

Table 1-4. WEMO Area Total Estimated Average Daily 2035 Emissions by Air District (tons/day)

Jurisdiction	VOC	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$
MDAQMD	25.17	61.15	61.62	2.67	118.82	24.11
AVAQMD	17.70	33.56	6.76	0.30	47.52	9.79
EKAPCD	7.37	37.43	21.50	6.89	29.94	7.74
GBUAPCD	0.55	0.74	0.23	0.01	6.77	1.17
SCAQMD	0.00225	0.01372	0.00045	0.0000024	0.71	0.09
Total	50.79	132.90	90.12	9.86	203.76	42.90

Source: Appendix A.

Table 1-5. WEMO Area Total Estimated Annual 2035 Emissions by Air District (tons/year)

Jurisdiction	VOC	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$
MDAQMD	9,186	22,321	22,492	974	43,369	8,799
AVAQMD	6,461	12,248	2,466	108	17,344	3,574
EKAPCD	2,690	13,662	7,849	2,514	10,929	2,825
GBUAPCD	199	272	85	2	2,471	428
SCAQMD	1	5	0	0	260	32
Total	18,537	48,508	32,892	3,599	74,373	15,658

Source: Appendix A.

2. BLM-Attributable WEMO Planning Area Baseline Emissions

Summary of Results

A summary for the BLM WEMO Planning Area 2017 Emissions is in Table 2-1.

Table 2-1. BLM WEMO Route Network Emissions, Baseline (2017)

BLM Route Network Subtotals	Emissions (tons/day)					
	VOC	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$
On-Road Motor Vehicles	0.10	0.74	0.04	0.000106	0.001013	0.000454
Off-Road Vehicles	0.21	0.87	0.02	0.000130	0.002445	0.001890
Unpaved Road Dust	--	--	--	--	15.45	1.54
Fugitive Windblown Dust	--	--	--	--	23.95	3.17
Grand Total	0.32	1.61	0.06	2.4E-04	39.40	4.71
BLM Route Network Subtotals	Emissions (tons/year)					
	VOC	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$
On-Road Motor Vehicles	38.11	270.36	14.34	0.04	0.37	0.17
Off-Road Vehicles	77.47	319.09	5.78	0.05	0.89	0.69
Unpaved Road Dust	--	--	--	--	5,640.90	562.82
Fugitive Windblown Dust	--	--	--	--	8,740.22	1,155.95
Grand Total	115.58	589.45	20.13	0.09	14,382.39	1,719.63

Source: Appendix A.

A summary for the BLM route network plus the OHV area 2017 emissions is in Table 2-2.

Table 2-2. BLM WEMO Route Network Emissions plus OHV Areas, Baseline (2017)

BLM Route Network + OHV Subtotals	Emissions (tons/day)					
	VOC	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$
On-Road Motor Vehicles	0.19	1.38	0.08	0.000222	0.002168	0.000199
Off-Road Vehicles	0.47	1.92	0.03	0.000286	0.005370	0.004153
Unpaved Road Dust	--	--	--	--	36.55	3.65
Fugitive Windblown Dust	--	--	--	--	23.95	3.17
Grand Total	0.66	3.30	0.11	5.1E-04	60.50	6.82
BLM Route Network + OHV Subtotals	Emissions (tons/year)					
	VOC	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$
On-Road Motor Vehicles	70.88	504.63	27.77	0.08	0.79	0.07
Off-Road Vehicles	170.19	700.94	12.70	0.10	1.96	1.52
Unpaved Road Dust	--	--	--	--	13,340.35	1,331.03
Fugitive Windblown Dust	--	--	--	--	8,740.22	1,155.95
Grand Total	241.07	1205.57	40.47	0.19	22,083.32	2,488.57

Source: Appendix A.

Additionally, this air quality analysis presents a separate table designed to mirror the Draft SEIS Table 3.2-6. Table 2-3 includes both the results for all sources of emissions in the WEMO Planning Area baseline (2017) and the BLM WEMO emissions. The estimate for BLM emissions in Table 2-3 includes the route network and the route network plus OHV area emissions estimates. Table 2-4 presents the same information on an annual basis.

Table 2-3. 2017 Emissions Inventory in WEMO Planning Area (tons/day)

	Emissions (tons/day)					
Emissions Source Type	VOC	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$
Stationary	16.46	19.21	45.45	7.03	34.49	11.54
On-Road Mobile	10.62	84.29	33.56	0.21	2.51	1.15
Off-Road Recreational Vehicles	0.42	1.65	0.03	0.00	0.01	0.00
Other Mobile	7.56	41.88	20.30	0.40	3.02	2.92
Area - Unpaved Road Dust	--	--	--	--	42.74	4.27
Area - Windblown Unpaved Road Dust	--	--	--	--	56.69	7.77
Other Area Sources	12.04	18.30	1.63	0.08	36.07	8.40
All WEMO Sources Totals	47.11	165.33	100.96	7.72	175.52	36.04
BLM On-Road Mobile	0.19	1.38	0.08	0.00	0.00	0.00
BLM Off-Road Mobile	0.47	1.92	0.03	0.00	0.01	0.00
BLM Unpaved Road Dust	--	--	--	--	36.55	3.65
BLM Windblown Unpaved Road Dust	--	--	--	--	23.95	3.17
BLM All WEMO Source Totals	0.66	3.30	0.11	0.00	60.50	6.82
BLM On-Road Mobile	0.10	0.74	0.04	0.00	0.00	0.00
BLM Off-Road Mobile	0.21	0.87	0.02	0.00	0.00	0.00
BLM Unpaved Road Dust	--	--	--	--	15.45	1.54
BLM Windblown Unpaved Road Dust	--	--	--	--	23.95	3.17
BLM Route Network WEMO Source Totals	0.32	1.61	0.06	0.00	39.40	4.71

Source: Appendix A.

Table 2-4. 2017 Emissions Inventory in WEMO Planning Area (tons/year)

	Emissions (tons/year)					
Emissions Source Type	VOC	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$
Stationary	6,009	7,011	16,588	2,567	12,588	4,210
On-Road Mobile	3,877	30,767	12,248	76	917	418
Off-Road Recreational Vehicles	154	601	11	0	2	1
Other Mobile	2,759	15,287	7,409	145	1,101	1,065
Area - Unpaved Road Dust	--	--	--	--	15,600	1,557
Area - Windblown Unpaved Road Dust	--	--	--	--	20,692	2,837
Other Area Sources	4,395	6,681	595	31	13,166	3,066
All WEMO Sources Totals	17,194	60,346	36,851	2,819	64,066	13,156
BLM On-Road Mobile	71	505	28	0	1	0
BLM Off-Road Mobile	170	701	13	0	2	2
BLM Unpaved Road Dust	--	--	--	--	13,340	1,331
BLM Windblown Unpaved Road Dust	--	--	--	--	8,740	1,156
BLM All WEMO Source Totals	241	1,206	40	0	22,083	2,489
BLM On-Road Mobile	38	270	14	0	0	0
BLM Off-Road Mobile	77	319	6	0	1	1
BLM Unpaved Road Dust	--	--	--	--	5,641	563
BLM Windblown Unpaved Road Dust	--	--	--	--	8,740	1,156
BLM Route Network WEMO Source Totals	116	589	20	0	14,382	1,720

Source: Appendix A.

Methods and Assumptions

The BLM WEMO 2017 baseline emissions are limited to the following specific emissions sources that are directly related to the operation of the BLM's WEMO Route Network:

- On-Road Vehicle Emissions
- Off-Road Vehicle Emissions
- Unpaved Road Travel Fugitive Dust Emissions
- Windblown Fugitive Dust Emissions from Unpaved Roads

The methods and assumptions used to develop the emissions totals are as follows:

On-Road Vehicle Emissions

The BLM route network and OHV area on-road vehicle emissions were calculated using emissions factors from the ARB EMFAC2014 model and VMT estimates provided by the BLM RMIS database. The EMFAC2014 model was used to determine emissions factors by vehicle type and local area. The 2017 on-road vehicle emissions factors determined by EMFAC2014 are provided in data tables included in the appendix to this report. On-road vehicle types were reclassified from RMIS category designations into EMFAC2011 categories for determining emissions using the EMFAC2014 derived emissions factors.

Off-Road Vehicle Tailpipe Emissions

The estimate of off-road recreational vehicle tailpipe emissions attributable to the BLM is based on the following two assumptions:

- The BLM MDAQMD attributable off-road recreational emissions are conservatively estimated to be 90 percent of the CEPAM MDAQMD area estimate.

- The BLM attributable off-road recreational emissions for other areas within WEMO are determined as a ratio of the MDAQMD emissions using the ratio of RMIS off-road vehicle VMT in each area. For example, EKAPCD off-road recreational vehicle emissions = MDAQMD emissions x EKAPCD off-road vehicle VMT / MDAQMD off-road vehicle VMT.

Unpaved Road Travel Fugitive Dust Emissions

The assumptions and methods are the same as those described in Chapter 1. The corrections for emissions of fugitive dust from vehicle travel on BLM unpaved roads are the same as those used for the BLM WEMO Area Baseline.

Windblown Fugitive Dust Emissions from Unpaved Roads

The assumptions and methods are the same as those described in Chapter 1. The corrections for emissions of fugitive dust from vehicle travel on BLM unpaved roads are the same as those used for the BLM WEMO Area Baseline.

Notes and Limitations

Several indirect sources of emissions in the BLM WEMO public lands, that would be considered minor or that are not part of the recreational Route Network use, are not included in this estimate. These sources include:

- Cooking or open fires emissions from route network users.
- Consumer products use, such as spray-on suntan lotions, from route network users.
- BLM permitted livestock grazing within WEMO on BLM lands, including their BLM route network roads use.
- Other non-recreational BLM permitted land uses (e.g., mining), including their BLM route network roads use.

3. Current BLM WEMO Planning Area SIP Compliance

This assessment reviews current BLM compliance with air quality regulations and state implementation plans (SIPs) for emissions reduction that apply to BLM public lands in the WEMO planning area. The WEMO planning area includes parts of the following local air quality management districts:

- Mojave Desert Air Quality Management District (MDAQMD)
- Eastern Kern Air Pollution Control District (EKAPCD)
- Antelope Valley Air Quality Management District (AVAQMD)
- Great Basin Unified Air Pollution Control District (GBUAPCD)
- South Coast Air Quality Management District (SCAQMD), with jurisdiction over the small portion of the WEMO planning area in Riverside County.

The primary direct emissions from actions covered by the WEMO SEIS originate from the BLM WEMO route network. This review includes emissions from the following sources:

- On-Road Vehicles Traveling on the Route Network
- Off-Road Recreational Vehicles
- Windblown Dust from Unpaved Routes (when vehicles are not present)
- Fugitive Windblown Dust from Unpaved Routes (generated by vehicles on the route network)

The emissions sources that are either not under BLMs management control are not part of this assessment. Cooking, personal consumer product use, RV generators, and campfires, for example, are assumed to be negligible compared to route network emissions.

California Air Resources Board

The ARB has primary jurisdiction, along with USEPA, for most mobile sources of emissions including on-road vehicles and off-road recreational vehicles that would use unpaved roads/routes in the BLM WEMO route network.[5] A number of regulations control emissions from on-road vehicles and off-road vehicles (BLM 2018). The BLM does not have its own specific control requirements on BLM lands. The BLM monitors compliance with the Department of Motor Vehicles (DMV) green- and red-sticker programs covering OHVs that do not comply with California emissions standards. The ARB limits the use of red-sticker vehicles (higher emitting off-road recreational vehicles) during the peak summer ozone season where OHV recreation is occurring in ozone nonattainment areas. The BLM WEMO Area OHV Open Riding areas that are subject to this program are (ARB 2007):

- Jawbone Canyon
- Dove Springs
- Spangler Hills
- El Mirage
- Stoddard Valley
- Rasor
- Johnson Valley

[5] The BLM custom is to call unpaved/dirt transportation surfaces “routes” to be distinct from maintained paved roads. However, the custom in air quality regulations and emissions estimates is to use the term “unpaved road”, so for consistency with air quality agency and regulation convention the terminology used herein will typically be “unpaved road” rather than “unpaved route”.

The BLM enforces the red-sticker seasonal ban through public education and law enforcement efforts. To date, the Air Districts in the WEMO planning area have not found compliance problems with ARB regulations regarding the BLM's existing WEMO Route Network operations.

Mojave Desert Air Quality Management District

SIP Documents

The MDAQMD has one ozone nonattainment area and two PM_{10} nonattainment/maintenance areas that have relevant SIP documents.

Ozone

The applicable ozone nonattainment area SIP document is the *MDAQMD Federal 75 ppb Ozone Attainment Plan (Western Mojave Desert Nonattainment Area)* (MDAQMD 2017). This attainment plan does not include any emissions reduction measures that would be relevant to the operation of the WEMO Route Network. The MDAQMD Plan provides the following emissions inventory for the two source categories, within the Federal Ozone Nonattainment Area (FONA), relevant to the WEMO Route Network operation (Table 3-1).

Table 3-1. Federal Ozone Attainment Plan Emissions Inventory

	2018 (tons/day)		2026 (tons/day)	
MDAQMD/AVAQMD FONA	VOC	NOx	VOC	NOx
On-Road Mobile	7.65	21.74	5.03	10.40
Off-Road Recreational Vehicles	0.65	0.05	0.57	0.06
Other Source Categories	30.52	61.61	33.27	58.10
Total FONA Ozone Precursor Emissions	38.82	83.40	38.87	68.56

Source: MDAQMD 2017.

These estimates indicate that the on-road mobile plus off-road recreational vehicle emissions are less than 30 percent of the total FONA ozone precursor emissions in 2018, and forecast a decrease to approximately 15 percent of emissions of ozone precursor chemicals (volatile organic compounds, abbreviated as VOC, and nitrogen oxides, abbreviated as NOx) in the ozone nonattainment area in 2026.

This Attainment Plan estimate of emissions does not include specific estimates for emissions from BLM public lands in either the MDAQMD or AVAQMD portions of this FONA. The 2017 baseline emissions within the WEMO area inside this FONA have been estimated using the following methods:

- On-Road Mobile emissions are calculated using vehicle VMT estimates provided by BLM and emissions factors derived from EMFAC2014.
- Off-Road Recreational Vehicle emissions are calculated using BLM-attributable multiplier assumptions of the total CEPAM annual emissions estimates for this emissions category.

Please see Chapter 1 for more detailed information on the methods and assumptions used for emissions calculations.

The estimated BLM baseline ozone precursor (VOC and NO_X) emissions inside this FONA are shown in Table 3-2.

Table 3-2. BLM WEMO Route Network Emissions, MDAQMD/AVAQMD FONA

	2017 (tons/day)	
MDAQMD/AVAQMD FONA	VOC	NOx
On-Road Mobile	0.036	0.016
Off-Road Recreational Vehicles	0.071	0.005
Estimated BLM Emissions in FONA	0.107	0.021

Source: Appendix A

The BLM WEMO Route Network ozone precursor emissions are a very small percentage of precursor emissions for this nonattainment area. The BLM related on-road mobile emissions are a very small percentage of the total on-road mobile emissions. The BLM related off-road mobile emissions are a high percentage of this emissions category, but the emissions from this emissions category are very low in comparison with the total VOC and NO_X emissions within this FONA. Continued operation of the BLM WEMO Route Network in this nonattainment area would not significantly affect the future attainment of the federal ozone air quality standard.

PM_{10}

The MDAQMD jurisdiction area includes two PM_{10} nonattainment areas: the Trona area nonattainment area in Searles Valley in northwestern San Bernardino County and the San Bernardino County nonattainment covering the remainder of the county. These two areas have separate SIP plans completed in 1996 and 1995 respectively.

The MDAQMD focused their San Bernardino County PM_{10} attainment plan within a designated Mojave Desert Planning Area (MDPA) within San Bernardino County (MDAQMD 1995a). The 1995 MDPA attainment plan focused on achieving emissions reductions on unpaved roads in cities and high-travel areas to achieve attainment. This plan provided the following emissions estimates related to BLM roads within the MDPA area. The activities within the BLM WEMO Route Network and OHV areas were found to account for approximately 10 percent of the PM_{10} emission estimated to occur within the MDPA in 1990 and to increase to account for approximately 20 percent of the MDPA PM_{10} emissions by 2000 (refer to Table 3-3).

Table 3-3. MDPA PM_{10} Attainment Plan Emissions Inventory

	PM_{10} (tons/year)	
MDPA PM10	1990	2000
On-road Mobile	1,323	1,003
Off-road Recreational Vehicles	n/a	n/a
BLM Unpaved Road Dust	10,860	18,888
BLM Unpaved Road Windblown Dust	2,476	2,476
Other Source Categories	92,208	62,684
Total MDPA PM10 Emissions	106,867	85,051

Source: MDAQMD 1995a.

The current baseline (2017) and Alternative 1 future (2035) PM_{10} emissions estimated for BLM activities within the MDPA PM_{10} Nonattainment Planning Area are shown in Table 3-4.

Table 3-4. BLM WEMO Route Network Emissions, MDPA

MDPA PM10	PM_{10} (tons/year) 2017
BLM On-Road Mobile Sources	0.46
BLM Off-Road Recreational Vehicles	0.70
BLM Unpaved Road Dust	6,692
BLM Unpaved Road Windblown Dust	3,426
Estimated BLM Emissions in MDPA	10,119

Source: Appendix A

The estimated BLM route network emissions within the MDPA (Table 3-4) are consistent with, and a bit lower than, those estimated in the MDAQMD MDPA PM_{10} Attainment Plan. The differences are that the MDAQMD plan assumed higher total vehicle travel mileages than the BLM is currently estimating. This Plan, unlike the CEPAM inventory data, includes estimates for BLM OHV Open Riding Area traffic unpaved road dust. The MDAQMD population growth forecast in the Attainment Plan increases VMT for the year 2000, resulting in a higher estimate for PM_{10} emissions. However, the Attainment Plan estimate for the total mileage in the route network within the MDPA (1,628 miles) is lower than the BLM's baseline estimate (2,253 miles), which causes the attainment plan to have a lower estimate for windblown fugitive dust emissions from the BLM route network. The estimate of emissions attributable to BLM lands in the MDAQMD MDPA plan did not include an estimate of the windblown dust emissions from the disturbed acreage within the OHV Open Riding Areas

The MDAQMD completed an attainment plan for the Trona portion of the Searles Valley PM_{10} nonattainment area in 1995, and completed a maintenance plan and redesignation request in 1996 (MDAQMD 1995b, 1996). Although the maintenance plan and redesignation request were not approved formally, the emissions from the 1995 attainment plan are considered to be the approved SIP emissions for this nonattainment area. This plan provided the following PM_{10} emissions estimates, where only the BLM unpaved road travel emissions were separately estimated (Table 3-5).

Table 3-5. MDAQMD Searles Valley PM_{10} Plan Emissions Inventory

	PM_{10} (tons/year)		
Searles Valley (Trona)	1987	1990	1994
On-Road Mobile Sources	22	22	22
Off-Road Recreational Vehicles	n/a	n/a	n/a
BLM Unpaved Road Dust	106	106	84
Public Area Windblown Dust	1,248	1,248	898
Other Source Categories	3,526	3,044	3,000
Total Searles Valley PM10 Plan Emissions	4,902	4,420	4,004

Source: MDAQMD 1995b, 1996.

The current baseline (2017) PM_{10} emissions estimated for BLM activities within the MDPA PM_{10} Nonattainment Planning Area are shown in Table 3-6.

Table 3-6. BLM WEMO Route Network Emissions, Searles Valley (Trona) PM_{10} Plan Area

Searles Valley (Trona)	PM_{10} (tons/year) 2017
BLM On-Road Mobile Sources	0.04
BLM Off-Road Recreational Vehicles	0.21
BLM Unpaved Road Dust	1,196
BLM Unpaved Road Windblown Dust	511
Estimated BLM Emissions in Searles Valley (Trona) Area	1,708

Source: Appendix A

The BLM emissions estimate for unpaved road dust is higher in comparison with the 1995 MDAQMD attainment plan. This difference is due to an upwardly adjusted figure to correct for unpaved road use and unpaved road areas within the Trona PM_{10} nonattainment area and does not represent an increase in the baseline emissions. OHV use on BLM lands in this area has not increased over time.

Air monitoring data indicate that the entire MDAQMD jurisdiction is now in attainment of the federal PM_{10} standard. The MDAQMD is not planning at this time to complete and submit redesignation requests and maintenance plans for the either of their two nonattainment areas which remain designated as moderate nonattainment.

Regulations

MDAQMD has three separate fugitive dust rules that apply to the WEMO area as follows (MDAQMD 1977 and 1996):

- Rule 403 applies everywhere.
- Rule 403-1 applies in the Trona portion of the Searles Valley.
- Rule 403-2 applies in the Mojave Desert Planning Area portion of the Mojave PM_{10} nonattainment area.

Rule 403 is a general dust prohibition that does not have any specific requirements that apply to BLM WEMO Area Route Network operations.

Rule 403-1 has a requirement for the BLM to reduce emissions by 20 percent and for the BLM and the MDAQMD to jointly prepare a fugitive dust plan for the BLM to use within the Trona portion of the Searles Valley Nonattainment Area. Shortly after this rule was approved, this area was found to attain the federal PM_{10} standard and the redesignation request/maintenance plan was submitted. This removed the requirement for the BLM to continue to reduce emissions or complete the fugitive dust plan noted in the rule.

Rule 403-2 has a requirement for the BLM to complete and implement a fugitive dust plan that has the following specified fugitive dust mitigation measures:

(a) Stipulate that all new authorizations for stationary emission sources obtain all necessary MDAQMD permits and satisfy all applicable SIP provisions, including project- or activity-specific RACM;
(b) Control dust emissions from certain roads and routes as per the Wilderness classification in the California Desert Protection Act;
(c) Control dust emissions from certain roads and routes as identified through general BLM planning;
(d) Implement those PM_{10} control measures required to manage organized off-road events and/or competitions on public land;

(e) Use BLM-standard road design and drainage specifications when maintaining existing roads or authorizing road maintenance and new road construction; and

(f) Include public educational information on PM_{10} emissions with BLM open area literature and in information in heavily used areas.

The BLM submitted the required dust control plan to the MDAQMD in February 1997 (BLM 1997) that covers specific projects apart from day-to-day management of the OHV route network. BLM has continued to implement the requirements of dust control plan.

MDAQMD Summary

Compliance issues related to air quality regarding the existing WEMO Area Route Network operations have not come up for the BLM within the MDAQMD jurisdiction.

Eastern Kern Air Pollution Control District

The EKAPCD was formed at the same time the San Joaquin Valley Air Pollution Control District (SJVAPCD) was created through the consolidation of all of the county level air districts within the San Joaquin Valley. The western part of Kern County that lies within the San Joaquin Valley Air Basin was absorbed into the SJVAPCD. Air quality management the eastern part of Kern County is now overseen by the EKAPCD. Portions of the northwestern part of the EKAPCD were regulated by EPA, in terms of NAAQS attainment, as if they were located within the San Joaquin Valley Air Basin, but now are considered to be within the Mojave Desert Air Basin. Regulatory remnants of this air basin misidentification remain to this day in the "Eastern Kern County Area" PM_{10} NAAQS nonattainment area designation.

SIP Documents

The EKAPCD jurisdiction includes a federal ozone nonattainment area, a federal PM_{10} nonattainment area, and a federal PM_{10} maintenance area.

Ozone

The applicable SIP document for the ozone nonattainment area is the *2017 Ozone Attainment Plan for 2008 Federal 75 ppb 8-Hour Ozone Standard* (EKAPCD 2017). This attainment plan does not include any emissions reduction measures that cover the operation of the WEMO Area Route Network. This EKAPCD Plan provides the following emissions inventory for project relevant sources, and total emissions, within the Federal Ozone Nonattainment Area (FONA) (Table 3-7).

Table 3-7. Eastern Kern FONA Emissions Inventory

	2017 (tons/day)		2020 (tons/day)	
Eastern Kern FONA	VOC	NOx	VOC	NOx
On-Road Mobile Sources	1.347	4.226	1.052	3.361
Off-Road Recreation Vehicles	0.059	0.001	0.059	0.001
Other Source Categories	5.815	24.945	5.804	25.351
Total Eastern Kern FONA Ozone Precursor Emissions	7.221	29.172	6.915	28.713

Source: EKAPCD 2017.

The estimated BLM baseline ozone precursor (VOC and NO_X) emissions inside this FONA are shown in Table 3-8.

Table 3-8. BLM WEMO Route Network Emissions, Eastern Kern FONA

	2017 (tons/day)	
Eastern Kern FONA	VOC	NOx
On-Road Mobile	0.036	0.012
Off-Road Recreational Vehicles	0.078	0.006
Estimated BLM Emissions in Eastern Kern FONA	0.114	0.018

Source: Appendix A

The BLM WEMO Route Network ozone precursor emissions are a very small percentage of precursor emissions for this nonattainment area. The BLM related on-road mobile emissions are a very small percentage of the total on-road mobile emissions. The BLM related off-road mobile emissions are high percentage of this emissions category, but the emissions from this emissions category are very low in comparison with the total VOC and NO_X emissions within this FONA. Continued operation of the BLM WEMO Route Network in this nonattainment area would not significantly affect the future attainment of the federal ozone air quality standard.

PM_{10}

The applicable PM_{10} SIP document for the Indian Wells PM_{10} Maintenance Area is the PM_{10} (Respirable Dust) Attainment Demonstration, Maintenance Plan, and Redesignation Request, Kern County Portion of the Indian Wells Valley Segment of "Searles Valley" Federal Planning Area (KCAPCD 2002). This document provided BLM Unpaved Road Dust estimates for the entire air district but did not partition the estimates of BLM emissions for the Indian Wells area inventory. This document also provides for expected overall reductions in unpaved road dust emissions, but does not specify any detailed requirements for emissions reductions by the BLM. The Indian Wells Inventory provided in this plan estimates the following annual emissions for PM_{10} (Table 3-9).

Table 3-9. KCAPCD Indian Wells PM_{10} Maintenance Plan Emissions Inventory

	PM_{10} (tons/day)		
Indian Wells PM10 Maintenance Area	1991	1990	1994
On-Road Mobile Sources	0.10	0.10	0.10
Off-Road Recreational Vehicles	n/a	n/a	n/a
Unpaved Road Dust	1.26	0.93	0.93
Unpaved Road Windblown Dust	n/a	n/a	n/a
Other Source Categories	4.97	4.73	4.15
Total Indian Wells Maintenance Area PM10 Emissions	6.33	5.76	5.18

Source: KCAPCD, 2002.

The current baseline (2017) PM_{10} emissions estimated for BLM activities within the Indian Wells PM_{10} Maintenance Area are shown in Table 3-10.

Table 3-10. BLM WEMO Route Network Emissions, Indian Wells PM_{10} Maintenance Area

Indian Wells PM10 Maintenance Area	PM_{10} (tons/day) 2017
BLM On-Road Mobile Sources	0.000105
BLM Off-Road Recreational Vehicles	0.000281
BLM Unpaved Road Dust	1.75
BLM Unpaved Road Windblown Dust	2.29
Estimated BLM Emissions in Indian Wells PM_{10} Maintenance Area	4.04

Source: Appendix A

The BLM emissions estimate is high in comparison to the estimate contained in the 2002 KCAPCD maintenance plan because of upward adjustment of unpaved OHV route use and the amount of unpaved routes areas within the Indian Wells PM_{10} maintenance area. This correction does not represent an actual increase in the baseline emissions, as the BLM recreational vehicle use in this area is not known to have increased over time. In fact, as noted in Appendix E of this Maintenance Plan the overall competitive OHV use demand had dropped 60 percent from the Maintenance Plan's baseline year. Additionally, as noted in Appendix E of the Maintenance Plan, reductions in casual OHV use have also occurred, due to the BLM closing motorized routes in this area following enactment of the California Desert Protection Act (1994) and repurposing other motorized routes to hiking, mountain biking, and equestrian use as part of the Rademacher Hills Trail project. Collectively, the BLM closed over 80 miles of old unpaved OHV use roads (KCAPCD 2002).

The Eastern Kern PM_{10} Nonattainment area, designated as a serious PM_{10} nonattainment area, was part of the Kern County portion of the former San Joaquin Valley nonattainment area. No agencies have prepared attainment or redesignation/maintenance plans for this nonattainment area. EKAPCD does not consider the Eastern Kern PM_{10} Nonattainment area, called the Kern River Valley, Bear Valley, and Cummings Valley by the EKAPCD, to be included within the EKAPCD for the PM_{10} NAAQS (EKAPCD 2018a). PM_{10} monitoring suggests that this area is in attainment of the federal PM_{10} standard, but has not been redesignated by USEPA because the USEPA has not received a request for redesignation. Because no SIP documents exist for this nonattainment area, no SIP-related requirements are applicable to the BLM in this area.

Regulations

The only potentially relevant EKAPCD regulation that has specific control measure requirements is Rule 402 – Fugitive Dust (EKAPCD 2018b). This regulation (part IV.A.14.) exempts unpaved roads that are in officially designated public parks and recreational areas, and (part IV.A.6.) also exempts unpaved roads that are not part of a "large operations" and are outside of the Indian Wells Valley. If inside Indian Wells Valley, the Rule exempts unpaved roads that are less than 75 feet long, or have a traffic volume of less than 25 vehicle trips per day, or have greater than 25 vehicles trips per day not more than six times per year. It appears that most of the BLM WEMO Area Route Network within the EKAPCD would fall under one or more of these exemptions, so that the requirements of this rule, including the dust control Reasonably Available Control Measures (RACM) for unpaved roads are not applicable.

EKAPCD Summary

There do not appear to be any existing BLM WEMO Area Route Network operations compliance issues related to air quality within the EKAPCD jurisdiction.

Great Basin Unified Air Pollution Control District

SIP Documents

The WEMO area within the GBUAPCD jurisdiction includes one federal PM_{10} nonattainment area and one federal PM_{10} maintenance area.

The applicable PM_{10} SIP document for the Owen Valley Planning Area serious PM_{10} nonattainment area is the 2016 Owens Valley Planning Area PM_{10} State Implementation Plan (GBUAPCD 2016). This plan, which is for a subarea of the entire Owens Valley PM_{10} Serious Nonattainment Area, includes only a very small portion of the WEMO planning area near Olancha Dunes OHV Open Riding Area. This plan focuses on the control of dust from Owens Lake and Keeler Dunes, both of which are outside of the WEMO planning area. Therefore, BLM WEMO Area Route Network relevant emissions estimates or emissions mitigation are not part of this plan.

The applicable PM_{10} SIP document for the Coso Junction PM_{10} maintenance area is the 2010 PM_{10} Maintenance Plan and Redesignation Request for the Coso Junction Planning Area (GBUAPCD 2010). The Coso Junction Planning area is part of the former Searles Valley PM_{10} nonattainment area, which was split into three subareas by local air districts. This plan has no BLM-specific references, nor any applicable mitigation measures. The Coso Junction maintenance plan provides the following relevant PM_{10} emissions estimate (Table 3-11).

Table 3-11. Coso Junction PM_{10} Maintenance Plan Emissions Inventory

Coso Junction PM_{10} Maintenance Area	PM_{10} (tons/day) 2008 to 2025
On-Road Mobile Sources	0.006
Off-Road Recreational Vehicles	n/a
Unpaved Road Dust	0.04
Unpaved Road Windblown Dust	n/a
Other Source Categories	0.69
Total Coso Junction PM_{10} Maintenance Plan Emissions	0.74

Source: GBUAPCD 2010.

The current baseline (2017) PM_{10} emissions estimated for BLM activities within the Coso Junction PM_{10} Maintenance Area are shown in Table 3-12.

Table 3-12. BLM WEMO Route Network Emissions, Coso Junction PM_{10} Plan Area

Coso Junction PM_{10} Maintenance Area	PM_{10} (tons/day) 2017
BLM On-Road Mobile Sources	< 0.0001
BLM Off-Road Recreational Vehicles	< 0.0001
BLM Unpaved Road Dust	0.16
BLM Unpaved Road Windblown Dust	1.24
Estimated BLM Emissions in Coso Junction Maintenance Area	1.40

Source: Appendix A

The BLM emissions estimate is higher compared to the 2010 GBUAPCD Coso Junction maintenance plan. This discrepancy is due to corrected unpaved road use and unpaved road areas within the Coso Junction PM_{10} maintenance area, and inclusion of emissions sources not included in the maintenance plan

(primarily windblown dust from unpaved roads). This estimate is a correction and does not represent an increase in the baseline emissions, as the BLM use in this area has not increased overtime.

Regulations

The only potentially relevant GBUAPCD regulation is Rule 401 – Fugitive Dust (GBUAPCD 2018). The applicable part of this regulation requires a person to take reasonable precautions to prevent visible particulate matter from being airborne, under normal wind conditions, beyond the property from which the emissions originates. This rule further identifies application of asphalt, water or suitable chemicals on dirt roads as a potential reasonable precaution. However, the use of asphalt, water, or suitable chemicals is not considered a reasonable precaution for the BLM to apply to their unpaved road network within this jurisdiction, where the total route distance exceeds 300 miles.

GBUAPCD Summary

There do not appear to be any existing BLM WEMO Area Route Network operations compliance issues related to air quality within the GBUAPCD jurisdiction.

Antelope Valley Air Quality Management District

SIP Documents

The AVAQMD has one federal ozone nonattainment area and is attainment/unclassified for the federal PM_{10} ambient air quality standard, so there are no AVAQMD SIP relevant documents for PM_{10}.

Ozone

The applicable ozone nonattainment area SIP document is the *AVAQMD Federal 75 ppb Ozone Attainment Plan (Western Mojave Desert Nonattainment Area)* (AVAQMD 2017). This attainment plan does not include any emissions reduction measures that would be relevant to the operation of the WEMO Area Route Network. This document provides the same emissions inventory for the federal ozone nonattainment area (FONA) that covers the AVAQMD jurisdiction and parts of the MDAQMD jurisdiction. The discussion above under the MDAQMD provides more information and a comparison with this plan's emissions estimate with the estimated BLM baseline emissions.

Regulations

The only potentially relevant AVAQMD regulation is Rule 403 – Fugitive Dust (AVAQMD 2018). This regulation, part (F)(1)(b), exempts unpaved roads that are not part of an industrial complex or commercial facility. Therefore, the BLM WEMO Area Route Network roads are not subject to this rule.

AVAQMD Summary

There do not appear to be any existing BLM WEMO Area Route Network operations compliance issues related to air quality within the AVAQMD jurisdiction.

South Coast Air Quality Management District

SIP Documents

The BLM WEMO area within the SCAQMD includes areas within the Salton Sea Air Basin, which has no BLM lands or roads, and a portion within the Mojave Desert Air Basin (MDAB). This portion of the MDAB

is designated as in attainment of all federal ambient air quality standards. Therefore, while SCAQMD has SIP documents, such as the *2016 Air Quality Management Plan* (SCAQMD 2016) and the *2003 Coachella Valley PM_{10} State Implementation Plan* (SCAQMD 2003) that address nonattainment and maintenance within the South Coast Air Basin and the Salton Sea Air Basin, these plans do not specifically address their jurisdiction within the Mojave Desert Air Basin. Therefore, at this time no control measures from these plans would potentially apply to BLM WEMO area operations in the SCAQMD portion of the MDAB.

Regulations

The only potentially relevant SCAQMD regulations that have specific control measure requirements are Rule 403, Fugitive Dust, and Rule 1186, PM_{10} Emissions from Paved and Unpaved Roads and Livestock Operations (SCAQMD 2018).

Under Rule 403 there is a partial exemption for "officially-designated public parks and recreational areas, including national parks, national monuments, national forests, state parks, state recreational areas, and county regional parks." This exemption covers additional requirements for large operations, which do not specifically apply to an unpaved road network. There do not appear to be any other exemptions related to the Rule 403 dust control requirements. This rule requires that the roads meet the required rule performance standards as follows:

- *No person shall cause or allow the emissions of fugitive dust from any active operation, open storage pile, or disturbed surface area such that:*
    - *the dust remains visible in the atmosphere beyond the property line of the emission source; or*
    - *the dust emission exceeds 20 percent opacity (as determined by the appropriate test method included in the Rule 403 Implementation Handbook), if the dust emission is the result of movement of a motorized vehicle.*

To meet those performance standards, in Table 1 of Rule 403, SCAQMD specifies are two control measures for unpaved road fugitive dust control:

- *Control Measure 19-1. Stabilize soils to meet the applicable performance standards; and*
- *Control Measure 19-2. Limit vehicular travel to established unpaved roads (haul routes) and unpaved parking lots.*

While the BLM may not be actively initiating actions related to Control Measure 19-1, the BLM does enforce Control Measure 19-2, to keep vehicles on BLM-designated unpaved roads within the BLM WEMO Area Route Network. There are no known instances of rule violation enforcement by the SCAQMD; so it is assumed that these roads are being maintained in a manner to meet the Rule 403 performance standards.

SCAQMD Rule 1186 has an exemption for all unpaved roads 3,000 feet above sea level with fewer than 500 average daily trips (ADT) and unpaved roads owned by government agencies if that agency notifies the Executive Officer that its unpaved roads have 20 average daily trips or less. A portion of the BLM roads located in the SCAQMD MDAB area are more than 3,000 feet above sea level. Based on data provided by the BLM, the daily ADT throughout the WEMO Area Route Network in this area appears to be less than 20 ADT. Therefore, it appears that the BLM is exempt from the requirements of Rule 1186 in its SCAQMD MDAB WEMO Area Route Network.

SCAQMD Summary

There do not appear to be any existing BLM WEMO Planning Area Route Network operations compliance issues related to air quality within the SCAQMD jurisdiction.

Overall Compliance Summary

The BLM WEMO Planning Area Route Network activities appear to comply with the SIP-approved applicable rules and regulations for all of the jurisdictions covered by the WEMO area. While stationary source operators, permitted to operate on BLM lands within the WEMO area have received notices of violation from local air districts in the past, the BLM itself has never received an official notice of violation of any rule or regulation related to the operation of the WEMO Planning Area Route Network.

A separate review of the compliance with the federal General Conformity Rule is provided in the Chapter 4 discussion.

4. 2035 Nonattainment/Maintenance Area BLM Emissions

General Conformity Applicability Analysis

Summary of PM_{10} Nonattainment/Maintenance Area Results

There is no assumed change in vehicle use on the route network between 2017 and 2035, so the change in emissions from baseline is solely based on change in the miles of open route and the related amount of windblown fugitive dust coming from the associated disturbed area. For alternatives that will have miles of route removed from service and rehabilitated, it is assumed that the windblown dust emissions potential will be reduced to natural conditions over time. The estimated route network mileage by non-attainment/maintenance area by alternative is provided in Appendix A. A summary of the alternatives PM_{10} emissions in 2035 compared to the 2017 baseline PM_{10} emissions and the General Conformity applicability thresholds for each of the relevant air quality nonattainment and maintenance management areas is provided in Table 4-1.

Table 4-1. 2035 Forecast Nonattainment/Maintenance Areas Windblown PM_{10} Emissions (tons/year)

	PM_{10} Non-Attainment/Maintenance Areas					
Alternative	Coso Junction	East Kern	Indian Wells	Owens Valley	SB County	Trona (SVPA)
Nonattainment/Maintenance Status	Maintenance	Serious	Maintenance	Serious	Moderate	Moderate
General Conformity Threshold	100	70	100	70	100	100
2017 Baseline/2035 Alternative 1 PM_{10}	451	141	834	237	5,625	511
Alternative 2 2035 PM_{10}	353	154	754	189	4,888	416
Change from 2017 Baseline	-99	13	-80	-48	-737	-96
Exceeds Threshold?	No	No	No	No	No	No
Alternative 3 2035 PM_{10}	707	284	1,923	439	8,879	934
Change from 2017 Baseline	256	144	1,088	202	3,254	422
Exceeds Threshold?	YES	YES	YES	YES	YES	YES
Alternative 4 2035 PM_{10}	470	217	970	282	5,654	517
Change from 2017 Baseline	19	76	136	45	30	6
Exceeds Threshold?	No	YES	YES	No	No	No
Alternative 5 2035 PM_{10}	486	219	1,039	289	5,935	557
Change from 2017 Baseline	34	78	205	52	310	45
Exceeds Threshold?	No	YES	YES	No	YES	No

Source: General Conformity Applicability Thresholds (USEPA 2010), Appendix A

Please note that by definition as the No Action Alternative, Alternative 1 and baseline conditions have the same route mileage assumptions and so there would be no emissions fugitive dust differences, so Alternative 1 would not exceed any of the General Conformity applicability thresholds. The changes in tailpipe PM_{10} emissions from 2017 to 2035 are not presented as they are negligible in comparison to the General Conformity applicability thresholds.

Summary of Ozone Nonattainment Area Results

All alternatives have the same emissions, for ozone precursors (VOC and NO_X), as all alternative assume no growth in traffic. Unlike the PM_{10} emissions, the amount of route network length does not influence the estimate of ozone precursor emissions. Ozone precursor emissions in 2035 under all alternatives in the relevant air quality management areas are provided in Table 4-2.

Table 4-2. 2035 Forecast Nonattainment Areas Ozone Precursor Emissions (tons/year)

	Ozone Non-Attainment Areas			
	West Mojave Desert		Eastern Kern	
All Alternatives	VOC	NO_X	VOC	NO_X
Non-Attainment Status	Severe		Serious	
On-Road 2017 Baseline	13.28	5.77	13.31	4.43
Off-Road Rec Vehicle 2017 Baseline	25.92	1.93	28.35	2.12
Total 2017 Baseline	39.20	7.70	41.67	6.54
On-Road 2035	11.34	4.46	11.19	4.00
Off-Road Rec Vehicle 2035	21.99	2.89	24.05	3.16
Total 2035	33.33	7.34	35.24	7.16
Change from 2017 Baseline	-5.87	-0.36	-6.42	0.61
General Conformity Threshold	25	25	50	50
Exceeds?	No	No	No	No

Source: General Conformity Applicability Thresholds (USEPA 2010), Appendix A

General Conformity Applicability Conclusions

PM_{10} Inventory Results Discussion

The PM_{10} emissions results, as provided above in Table 4-1, show that there is the potential for future PM_{10} to increase above the general conformity applicability thresholds depending on the alternative and the specific assumptions for the route network in that alternative. The General Conformity Regulation has the following definitions for direct and indirect emissions (USEPA 2010):

> *Direct emissions* means those emissions of a criteria pollutant or its precursors that are caused or initiated by the Federal action and originate in a nonattainment or maintenance area and occur at the same time and place as the action and are reasonably foreseeable.
>
> *Indirect emissions* means those emissions of a criteria pollutant or its precursors:
> (1) That are caused or initiated by the Federal action and originate in the same nonattainment or maintenance area but occur at a different time or place as the action;
> (2) That are reasonably foreseeable;
> (3) That the agency can practically control; and
> (4) For which the agency has continuing program responsibility.

Both direct and indirect emissions are counted as emissions when identifying whether a federal action would exceed a General Conformity applicability threshold. However, whether the emissions from route network use are considered direct or indirect emissions, any growth of use in the route network is not

considered reasonably foreseeable. So, while emissions for a population growth-based case are provided later in this section they are not relevant to the General Conformity applicability findings. Since the BLM cannot reasonably control use on the route network while maintaining the route network for its purpose of public recreation, General Conformity findings should be based on BLMs identified non-elastic, no increase in growth, assumption for the route network.

Assuming no growth is the proper case for General Conformity assessment purposes, Alternatives 3 through 5 have an assumed emissions increase that exceeds one or more of the PM_{10} nonattainment/maintenance area General Conformity emissions applicability thresholds.

Based on the emissions methodologies and assumptions, the derived emissions factor for windblown fugitive dust emissions on unpaved roads indicate that the following increases in route length would exceed the General Conformity thresholds:

- Serious Nonattainment Areas – 70 Ton/Year PM_{10} Threshold = 46 miles
- Moderate Nonattainment/Maintenance Areas – 100 Ton/Year PM_{10} Threshold = 66 miles

Therefore, in order to avoid a full general conformity analysis the route network length should not be increased by these quantities as appropriate for each nonattainment/maintenance area.

Ozone Nonattainment Area Inventory Results Discussion

The inventory results, as provided above in Table 4-1, indicate that the ozone precursor emissions will not exceed the General Conformity applicability thresholds regardless of the alternative.

Methods and Assumptions

For estimating emissions of all pollutants in 2035, EMFAC2014 emissions factors were used for the 2035 horizon with the EMFAC2011 vehicle categories included in the on-road vehicle emissions estimates. The 2035 EMFAC2014 on-road vehicle emissions factors are presented in the report Appendix.

The other methods and assumptions are the same as those discussed in Chapters 1 and 3, where the only other differences in assumptions are the specific route network disturbed areas, based on the route length in each PM_{10} non-attainment/maintenance area, and the VMT assumptions for each of the non-attainment/maintenance areas. The BLM RMIS and GIS data used to calculate the emissions for the various nonattainment and maintenance areas are presented in the Appendix.

The estimates for the ozone precursor 2035 emissions for off-road recreational vehicles are higher than 2017 estimates as they are based on the CEPAM 2035 estimates that are must assume some growth in vehicle use (ARB 2018a). Those growth assumptions are not readily available, and this assumption does not impact the findings, so no adjustment to remove this growth assumption was made.

2035 Emissions Analyses With Population Growth Assumption

For informational purposes, in addition to the General Conformity applicability emissions analysis presented above, an emissions estimate for PM_{10} and ozone precursors emissions for a population growth based route network traffic increase case was prepared. The population growth was determined by using State of California population projections for the five counties that make up the WEMO area (CDOF 2018), with the overall increase being a population weighted average for the population between the ages of 18 to 70. This population based use/VMT increase from 2017 to 2035 was determined to be

7.775 percent, which translates to a 7.775 percent increase in the baseline road travel fugitive dust for all alternatives.

PM_{10} Emissions Estimates for Population Based Traffic Growth Case

A comparison of the alternatives estimated 2035 PM_{10} emissions versus 2017 baseline for the population based traffic growth case, in the relevant nonattainment and maintenance air quality management areas, is provided in Table 4-3.

Table 4-3. 2035 Forecast Nonattainment/Maintenance Areas PM_{10} Windblown plus Traffic Fugitive Dust Emissions – Traffic Growth Proportional to Adult Population Growth (tons/year)

	PM_{10} Non-Attainment/Maintenance Areas					
Alternative	Coso Junction	East Kern	Indian Wells	Owens Valley	SB County	Trona (SVPA)
2017 Baseline PM_{10}	511	201	1,435	268	8,847	774
Alternative 1 with w/growth PM_{10}	515	206	1,482	270	9,098	794
Change from 2017 Baseline	5	5	47	2	251	20
Alternative 2 w/growth PM_{10}	417	219	1,402	222	8,360	699
Change from 2017 Baseline	-94	18	-34	-46	-487	-75
Alternative 3 w/growth PM_{10}	771	350	2,571	473	12,352	1,217
Change from 2017 Baseline	261	148	1,135	205	3,505	443
Alternative 4 w/growth PM_{10}	534	282	1,618	315	9,127	801
Change from 2017 Baseline	23	80	183	47	280	27
Alternative 5 w/growth PM_{10}	550	284	1,687	322	9,408	840
Change from 2017 Baseline	39	83	251	54	561	66

Source: Appendix A

As Table 4.3 (in comparison with Table 4.1), indicates the increase in PM_{10} emissions, change from 2017 baseline, for the population growth based traffic increase case is fairly substantial, ranging from 2 to 251 tons per year .

Ozone Precursor Emissions Estimates for Population Based Traffic Growth Case

A comparison of the project alternatives estimated 2035 ozone precursor emissions versus 2017 baseline for the population based traffic growth case, in the relevant nonattainment air quality management areas, is provided in Table 4-4.

Table 4-4. 2035 Forecast Ozone Nonattainment Areas Ozone Precursor Emissions – Traffic Growth Proportional to Adult Population Growth (tons/year)

	Ozone Non-Attainment Areas			
	West Mojave Desert		Eastern Kern	
All Alternatives	VOC	NO_X	VOC	NO_X
Total 2017 Baseline	39.20	7.70	41.67	6.54
Total 2035 with Population Increase	35.92	7.91	37.98	7.72
Change from 2017 Baseline	-3.28	0.21	-3.68	1.17

Source: Appendix A

As Table 4.4 (in comparison with Table 4.2), indicates the increase in ozone precursor emissions for the population growth based traffic increase case is not substantial, less than 3 tons per year for VOC and less than a ton per year for NO_X.

Emissions Inventory Results for $PM_{2.5}$ State Nonattainment Area

In addition to the Federal non-attainment and maintenance area emissions estimates prepared for the purposes of General Conformity Rule review, a calculation of BLM Route Network emissions in the State of California $PM_{2.5}$ nonattainment area was prepared for baseline 2017 conditions and for future 2035 no traffic growth assumption conditions for all 5 project alternatives. The State $PM_{2.5}$ nonattainment covers the southwestern part of San Bernardino County in the Mojave Desert Air Basin. Table 4-5 shows the BLM Route Network emissions for $PM_{2.5}$ in the nonattainment area for informational purposes.

Table 4-5. Forecast for State $PM_{2.5}$ Nonattainment Area BLM WEMO Area Emissions (tons/year)

	2017 Baseline	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
BLM Route Network	857.92	857.94	783.37	1245.22	869.47	895.27
BLM Route Network + OHV	1341.28	1341.34	1266.77	1728.62	1352.88	1378.68

Source: Appendix A

These emissions were calculated using the assumptions and methods previously discussed. The only different information is the GIS and RMIS route network specific to each alternative within the boundaries of this state-level $PM_{2.5}$ nonattainment area. That GIS and RMIS VMT data are summarized in Appendix A.

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Appendix A.
Air Quality Emission Calculations

APPENDIX E-3

SPECIAL STATUS SPECIES SUMMARY

Table E.3-1. Special Status Species

Species	Status[1]	Range/Habitat within the WEMO Planning Area	Potential For Occurrence within the Vicinity of the Proposed Action	Potentially affected by TMA Route Designations	Sources
Mammals					
Bighorn Sheep (*Ovis canadensis nelsoni*)	BLM-S	Bighorn sheep require a variety of habitat characteristics and prefer areas on or near mountainous terrain that are visually open, as well as steep and rocky. Alluvial fans and washes in flatter terrain are also used for forage and water and as connectivity habitat between more rugged areas. Aerial surveys in 2009 and 2010 documented 1,022 bighorn sheep, including ewes, lambs, and rams, in the following mountain ranges: Marble Mountains; Clipper Mountains; Kelso Peak and Old Dad Peak; Clark, Kingston, and Mesquite Mountains; Orocopia Mountains; Sheephole Mountains; South Bristol Mountains; Cady Mountains; White Mountains; and San Gorgonio Mountains.	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	BLM 2005 and 2013a; Dudek 2012 and ICF International 2012; CNDDB 2018
Mohave Ground Squirrel (*Xerospermophilus mohavensis*)	BLM-S; ST	Range: Endemic to California, the Mohave ground squirrel is exclusively found in the northwestern Mojave Desert in San Bernardino, Los Angeles, Kern, and Inyo counties. Habitat: The MGS generally occurs in flat to moderate terrain and is not found in steep terrain. Substrates in occupied habitats have ranged from being very sandy to, less frequently, very rocky.	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	BLM 2005 and 2013a; Dudek 2012 and ICF International 2012
California Leaf-Nosed Bat (*Macrotus californicus*)	BLM-S; SSC	Range: In California, the California leaf-nosed bat occurs in the desert regions of eastern San Bernardino (i.e., excluding the western Mojave region), Riverside, and San Diego counties and all of Imperial County. The recent records for this species are generally concentrated in southern portions of the planning area, including several records for Joshua Tree National Park, with four roost sites observed. Habitat: The California leaf-nosed bat is primarily a cave and mine dwelling species, but also occupies buildings.	No	No. No further analysis for this species for the proposed action.	BLM 2005 and 2013a; Dudek 2012 and ICF International 2012

Table E.3-1. Special Status Species

Species	Status[1]	Range/Habitat within the WEMO Planning Area	Potential For Occurrence within the Vicinity of the Proposed Action	Potentially affected by TMA Route Designations	Sources
Hoary Bat (*Lasiurus cinereus*)	None	Range: The hoary bat winters in Southern California There are no recent (i.e., since 1990) records of occurrence for this species within the planning area, but historic records indicate occurrence near Hesperia and Joshua Tree National Park. Habitat: This species typically roosts in tree foliage and sometimes cavities. Habitat exists for this species within the planning area.	Yes	No. No further analysis for this species for the proposed action.	Dudek 2012 and ICF International 2012
Long-legged Myotis (*Myotis volans*)	None	Range: The Dale Mining District in the Pinto Mountains, including portions of Joshua Tree National Park, contains many shafts and adits known to harbor bats of several species. Six significant roosts have been located, and the potential for several more is present. Habitat: The long-legged myotis is primarily a tree-dweller occurring at higher elevations than those found in the planning area.	No	No. No further analysis for this species for the proposed action.	BLM 2005 and 2013a
Pallid Bat (*Antrozous pallidus*)	BLM-S; SSC	Range: The known occurrence data for this species would not change from the previous analysis included in the affected environment of the 2005 WEMO Final EIS (BLM 2005 and 2013a) and is not discussed further in this supplemental EIS. For a general discussion of this species, please refer to Section 3.3.4, pp. 3-169 to 3-170. Habitat: In desert habitats, pallid bats roost mostly in rock crevices, although they might be found in tree cavities, old buildings, under bridges, in caves and mine adits, and mud tubes when these sites are available.	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	BLM 2005 and 2013a; Dudek 2012 and ICF International 2012; CNDDB 2018
Spotted Bat (*Euderma maculatum*)	BLM; SSC	This species would not change from the previous analysis included in the affected environment of the 2005 WEMO Final EIS (BLM 2005 and 2013a) and is not discussed further in this supplemental EIS. For a general discussion of this species, please refer to Section 3.3.4, pp. 3-169 to 3-170.	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	BLM 2005 and 2013a; CNDDB 2018

Table E.3-1. Special Status Species

Species	Status[1]	Range/Habitat within the WEMO Planning Area	Potential For Occurrence within the Vicinity of the Proposed Action	Potentially affected by TMA Route Designations	Sources
Western Mastiff Bat (*Eumops perotis*)	BLM; SSC	This species would not change from the previous analysis included in the affected environment of the 2005 WEMO Final EIS (BLM 2005 and 2013a) and is not discussed further in this supplemental EIS. For a general discussion of this species, please refer to Section 3.3.4, pp. 3-169 to 3-170.	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	BLM 2005 and 2013a; Dudek 2012 and ICF International 2012; CNDDB 2018
Townsend's Big-eared Bat (*Corynorhinus townsendii*)	BLM; SSC	Range: The known occurrence data for this species would not change from the previous analysis included in the affected environment of the 2005 WEMO Final EIS (BLM 2005 and 2013a) and is not discussed further in this supplemental EIS. For a general discussion of this species, please refer to Section 3.3.4, pp. 3-169 to 3-170. Habitat: The Townsend's big-eared bat is a colonial cave dwellers thought to have declining populations. The Townsend's big-eared bat is dependent on riparian habitat within five miles of the roosts.	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	BLM 2005 and 2013a; Dudek 2012 and ICF International 2012; CNDDB 2018
Fringed Myotis (*Myotis thysanodes*)	BLM-S	Range: The fringed myotis is widespread in California, with its range occurring along the western and northern boundaries of the planning area. Habitat: The fringed myotis occurs in a wide variety of habitats, but optimal habitats include pinyon-juniper, valley foothill hardwood and hardwood-conifer, generally at 1300-2200 m (4000-7000 ft). This species roosts in caves, mines, buildings, and crevices.	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	Zeiner, D.C. et al 1988-1990; CNDDB 2018
Western Small-footed Myotis (*Myotis ciliolabrum*)	BLM-S	Range: This species occurs from on the west and east sides of the Sierra Nevada, and in Great Basin and desert habitats from Modoc to Kern and San Bernardino counties, with its range occurring along the western and northern boundaries of the planning area. Habitat: This species roosts in caves, mines, buildings, and crevices and is a common resident of arid uplands in California	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	Zeiner, D.C. et al 1988-1990

Table E.3-1. Special Status Species

Species	Status[1]	Range/Habitat within the WEMO Planning Area	Potential For Occurrence within the Vicinity of the Proposed Action	Potentially affected by TMA Route Designations	Sources
Western Red Bat (*Lasiurus blossevillii*)	BLM; SSC	Range: Breeding are from the Sacramento and San Joaquin rivers, with other breeding records from the San Diego, Santa Ana, and Los Angeles rivers. There are no records of occurrence for this species within the planning area, but suitable habitat exists for this species. Habitat: The western red bat, as a tree bat, is closely associated with well-developed riparian habitats that provide suitable roosting sites.	Yes	No. No further analysis for this species for the proposed action.	Dudek 2012 and ICF International 2012
Mojave River Vole (*Microtus californicus mohavensis*)	SSC	This species would not change from the previous analysis included in the affected environment of the 2005 WEMO Final EIS (BLM 2005 and 2013a) and is not discussed further in this supplemental EIS. For a general discussion of this species, please refer to Section 3.3.5.2, pg. 3-172.	No	No. No further analysis for this species for the proposed action.	BLM 2005 and 2013a
Yellow-eared Pocket Mouse (*Perognathus xanthonotus*)	BLM-S	This species would not change from the previous analysis included in the affected environment of the 2005 WEMO Final EIS (BLM 2005 and 2013a) and is not discussed further in this supplemental EIS. For a general discussion of this species, please refer to Section 3.3.5.3, pg. 3-172.	Yes	No. No further analysis for this species for the proposed action.	BLM 2005 and 2013a
Birds					
Bendire's Thrasher (*Toxostoma bendirei*)	BLM; SSC	This species would not change from the previous analysis included in the affected environment of the 2005 WEMO Final EIS (BLM 2005 and 2013a) and is not discussed further in this supplemental EIS. For a general discussion of this species, please refer to Section 3.3.6.1, pg. 3-173.	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	BLM 2005 and 2013a
Brown Crested Flycatcher (*Myiarchus tyrannulus*)	SSC	This species would not change from the previous analysis included in the affected environment of the 2005 WEMO Final EIS (BLM 2005 and 2013a) and is not discussed further in this supplemental EIS. For a general discussion of this species, please refer to Section 3.3.6.2, pp. 3-173 to 3-174.	No	No. No further analysis for this species for the proposed action.	BLM 2005 and 2013a

Table E.3-1. Special Status Species

Species	Status[1]	Range/Habitat within the WEMO Planning Area	Potential For Occurrence within the Vicinity of the Proposed Action	Potentially affected by TMA Route Designations	Sources
Burrowing Owl (*Athene cunicularia*)	BLM; SSC	Range: In California, the burrowing owl's range extends throughout the lowlands from the northern Central Valley to the U.S.–Mexico border, with large populations in the Imperial Valley region of southeast California (Gervais et al. 2008) and a small (perhaps extirpated) population in the Great Basin bioregion in northeast California. Habitat: This species requires habitats with three basic attributes: open, well-drained terrain; short, sparse vegetation generally lacking trees; and underground burrows or burrow-like structures.	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	BLM 2005 and 2013a; Dudek 2012 and ICF International 2012; CNDDB 2018
Ferruginous Hawk (*Buteo regalis*)	SSC	This species would not change from the previous analysis included in the affected environment of the 2005 WEMO Final EIS (BLM 2005 and 2013a) and is not discussed further in this supplemental EIS. For a general discussion of this species, please refer to Section 3.3.6.4, pg. 3-174.	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	BLM 2005 and 2013a
Golden Eagle (*Aquila chrysaetos*)	BLM-S; SFP	Range: There are golden eagle concentrations in the west Mojave, the region between Victorville and Barstow east on I-15, the Mojave National Preserve, and the eastern portion of Joshua Tree National Park. The BLM identified "Key Raptor Areas" for golden eagles encompassing the Granite, El Paso, Newberry, and Red mountains (Raptor Research Foundation 1989), as well as important occupied habitat in the Clark Mountain Range and Calico Mountains. Habitat: In California, golden eagles inhabit open grasslands and oak savanna, but can also be found in desert grasslands and chaparral habitats. Secluded cliffs with overhanging ledges and large trees are used for nesting and cover.	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	BLM 2005 and 2013a; Dudek 2012 and ICF International 2012

Table E.3-1. Special Status Species

Species	Status[1]	Range/Habitat within the WEMO Planning Area	Potential For Occurrence within the Vicinity of the Proposed Action	Potentially affected by TMA Route Designations	Sources
Gray Vireo (*Vireo vicinior*)	BLM; SSC	This species would not change from the previous analysis included in the affected environment of the 2005 WEMO Final EIS (BLM 2005 and 2013a) and is not discussed further in this supplemental EIS. For a general discussion of this species, please refer to Section 3.3.6.6, pp. 3-175 to 3-176.	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	BLM 2005 and 2013a
Inyo California Towhee (*Pipilo crissalis eremophilus*)	FT; SE	Range: Southern Argus Range and the upland areas immediately surrounding them. Recent records for this species are generally concentrated north of Ridgecrest within the planning area. Habitat:The principal habitat consists of dense riparian willow thickets along a few isolated streams, springs, and rocky canyons.	Yes	No. No further analysis for this species for the proposed action.	BLM 2005 and 2013a; Dudek 2012 and ICF International 2012
LeConte's Thrasher (*Toxostoma lecontei*)	SSC	This species would not change from the previous analysis included in the affected environment of the 2005 WEMO Final EIS (BLM 2005 and 2013a) and is not discussed further in this supplemental EIS. For a general discussion of this species, please refer to Section 3.3.6.8, pg. 3-177.	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	BLM 2005 and 2013a
Long-eared owl (*Asio otus*)	SSC	This species would not change from the previous analysis included in the affected environment of the 2005 WEMO Final EIS (BLM 2005 and 2013a) and is not discussed further in this supplemental EIS. For a general discussion of this species, please refer to Section 3.3.6.9, pp. 3-177 to 3-178.	Yes	No. No further analysis for this species for the proposed action.	BLM 2005 and 2013a
Prairie Falcon (*Falco mexicanus*)	SSC	This species would not change from the previous analysis included in the affected environment of the 2005 WEMO Final EIS (BLM 2005 and 2013a) and is not discussed further in this supplemental EIS. For a general discussion of this species, please refer to Section 3.3.6.10, pg. 3-178.	Yes	No. No further analysis for this species for the proposed action.	BLM 2005 and 2013a

Table E.3-1. Special Status Species

Species	Status[1]	Range/Habitat within the WEMO Planning Area	Potential For Occurrence within the Vicinity of the Proposed Action	Potentially affected by TMA Route Designations	Sources
Southwestern Willow Flycatcher (*Empidonax traillii* extimus)	FE; SE	Range: In addition to the known breeding sites documented it the 2005 WEMO Final EIS (Section 3.3.6.11, pp. 3-178 to 3-179), the CNDDB contains one historical (i.e., pre-1990) occurrence for the southwestern willow flycatcher located north of Independence in Inyo County (CDFG 2012b). Four additional historical occurrences for willow flycatchers (subspecies not identified) are located in the vicinity of the cities of Mojave and California City (Dudek 2012 2011). Habitat: In California, the southwestern willow flycatcher is restricted to riparian habitats occurring along streams or in meadows.	Yes	Yes. Habitat for this species exists within the proposed action area.	BLM 2005 and 2013a; Dudek 2012 and ICF International 2012
Summer Tanager (*Piranga rubra*)	SSC	This species would not change from the previous analysis included in the affected environment of the 2005 WEMO Final EIS (BLM 2005 and 2013a) and is not discussed further in this supplemental EIS. For a general discussion of this species, please refer to Section 3.3.6.12, pg. 3-179.	Yes	No. No further analysis for this species for the proposed action.	BLM 2005 and 2013a
Vermillion Flycatcher (*Pyrocephalus rubinus*)	SSC	This species would not change from the previous analysis included in the affected environment of the 2005 WEMO Final EIS (BLM 2005 and 2013a) and is not discussed further in this supplemental EIS. For a general discussion of this species, please refer to Section 3.3.6.13, pg. 3-179 to 3-180.	Yes	No. No further analysis for this species for the proposed action.	BLM 2005 and 2013a
Western Snowy Plover (*Charadrius alexandrinus nivosus*)	SSC	This species would not change from the previous analysis included in the affected environment of the 2005 WEMO Final EIS (BLM 2005 and 2013a) and is not discussed further in this supplemental EIS. For a general discussion of this species, please refer to Section 3.3.6.14, pg. 3-180.	Yes	No. No further analysis for this species for the proposed action.	BLM 2005 and 2013a
Western Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*)	FC; BLM-S; SE	This species would not change from the previous analysis included in the affected environment of the 2005 WEMO Final EIS (BLM 2005 and 2013a) and is not discussed further in this supplemental EIS. For a general discussion of this species, please refer to Section 3.3.6.15, pg. 3-181.	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	BLM 2005 and 2013a; Dudek 2012 and ICF International 2012

Table E.3-1. Special Status Species

Species	Status[1]	Range/Habitat within the WEMO Planning Area	Potential For Occurrence within the Vicinity of the Proposed Action	Potentially affected by TMA Route Designations	Sources
Yellow-breasted Chat (*Icteria virens*)	SSC	This species would not change from the previous analysis included in the affected environment of the 2005 WEMO Final EIS (BLM 2005 and 2013a) and is not discussed further in this supplemental EIS. For a general discussion of this species, please refer to Section 3.3.6.16, pg. 3-181.	Yes	No. No further analysis for this species for the proposed action.	BLM 2005 and 2013a
Yellow Warbler (*Setophaga petechia*)	SSC	This species would not change from the previous analysis included in the affected environment of the 2005 WEMO Final EIS (BLM 2005 and 2013a) and is not discussed further in this supplemental EIS. For a general discussion of this species, please refer to Section 3.3.6.17, pp. 3-181 to 3-182.	Yes	No. No further analysis for this species for the proposed action.	BLM 2005 and 2013a
American Peregrine (*Falcon Falco peregrinus anatum*)	SFP	Range: Within the planning area, one historic nesting location has been documented within the BLM Ridgecrest Field Office Boundary. Additionally, eBird data within the species occurrence database includes numerous occurrences in the planning area dating back to 2003. The occurrences in the planning area generally occur north of Independence at the northern end of the planning area, and south in Inyo, near Lancaster. Habitat: Peregrine falcons in general use a large variety of open habitats for foraging, including tundra, marshes, seacoasts, savannahs, grasslands, meadows, open woodlands, and agricultural areas. Sites are often located near rivers or lakes.	Yes	No. No further analysis for this species for the proposed action.	Dudek 2012 and ICF International 2012
Bald Eagle (*Haliaeetus leucocephalus*)	BLM-S; SE; SFP	Range: The bald eagle's main breeding population in California is still largely restricted to the northern part of the state in Butte, Lake, Lassen, Modoc, Plumas, Shasta, Siskiyou, and Trinity counties. Populations in Southern California remain low with only two successful nests documented since the year 2000 on Santa Catalina Island, and none within the planning area. Habitat: Bald eagles typically occupy forested areas adjacent to large bodies of water.	Yes	No. No further analysis for this species for the proposed action.	Dudek 2012 and ICF International 2012

Table E.3-1. Special Status Species

Species	Status[1]	Range/Habitat within the WEMO Planning Area	Potential For Occurrence within the Vicinity of the Proposed Action	Potentially affected by TMA Route Designations	Sources
Bank Swallow (*Riparia riparia*)	BLM-S; ST	Range: Historic occurrences (i.e., pre-1990), or occurrences with unknown observation date, are located within the planning area. These include records in the following areas: north of Hesperia, Edwards Air Force Base, east of Barstow along the Mojave River, and west of Barstow near the town of Lockhart, evidently in association with wetlands marginal to Harper Dry Lake. Habitat: Breeding habitat for the bank swallow in California consists exclusively of vertical banks or bluffs with friable soils suitable for burrow excavation by the birds.	No	No. No further analysis for this species for the proposed action.	Dudek 2012 and ICF International 2012
Least Bell's Vireo (*Vireo bellii pusillus*)	FE; SE	Range: Recent occurrence records of least Bell's vireo in the planning area in the following areas: near Lancaster and Palmdale, north of Hesperia, north of Victorville, and southwest of Yucca Valley. Habitat: This species is largely associated with early successional cottonwood-willow and are known to nest in riparian woodlands dominated by willow and Fremont cottonwood.	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	Dudek 2012 and ICF International 2012
California Condor (*Gymnogyps californianus*)	FE; SE; SFP	Range: The California condor occurs principally along the western edges of the planning area, specifically within the Tehachapi Mountains east of Interstate 5, the Wind Wolves Preserve and Bitter Creek and Hopper Mountain National Wildlife Refuges (NWRs), and portions of the Los Padres National Forest west of Interstate 5. Habitat: California condors nest in rock formations (crevices, overhung ledges, and potholes), and deep caves. Nesting has not been documented in the planning area; condor use of the planning area is limited to foraging and temporary roosting.	Yes	No. No further analysis for this species for the proposed action.	Dudek 2012 and ICF International 2012

Table E.3-1. Special Status Species

Species	Status[1]	Range/Habitat within the WEMO Planning Area	Potential For Occurrence within the Vicinity of the Proposed Action	Potentially affected by TMA Route Designations	Sources
Greater Sandhill Crane (*Grus canadensis tabida*)	BLM-S; ST; SFP	Range: The greater sandhill crane is considered a winter migrant through the planning area and a recent documented occurrence was located within the planning area in Kern County, south of Ridgecrest. Habitat: Greater sandhill cranes are found primarily in open freshwater wetlands, including shallow marshes and wet meadows.	Yes	No. No further analysis for this species for the proposed action.	Dudek 2012 and ICF International 2012
Mountain Plover (*Charadrius montanus*)	BLM; SSC	Range: Within the planning area, there are recent (i.e., since 1990) documented occurrences near Palmdale, west of Lancaster, and in the Harper Lake area. Habitat: This species occupies open, flat lands or sparsely vegetated areas, including xeric shrublands, short-grass prairie, and barren agricultural fields.	Yes	No. No further analysis for this species for the proposed action.	Dudek 2012 and ICF International 2012
Swainson's Hawk (*Buteo swainsoni*)	BLM-S; ST	Range: There are multiple historical occurrence records in the planning area located east of Lancaster, north of Fremont Wash and east of SR 395 (CDFG 2012b; Dudek 2012 2011). Recent Swainson's hawk breeding populations inside the planning area have occurred in the Antelope Valley and Owens River Valley. The vast majority of these occurrences are clustered in the western Mojave region along the base of the San Gabriel and Tehachapi mountain ranges and in Antelope Valley. Scattered occurrences are located in the Fremont Valley and the Ridgecrest/China Lake Naval Air Weapons Station. Habitat: Swainson's hawks are primarily a grassland bird but they are also found in sparse shrubland and open woodlands.	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	Dudek 2012 and ICF International 2012; CNDDB 2018

Table E.3-1. Special Status Species

Species	Status[1]	Range/Habitat within the WEMO Planning Area	Potential For Occurrence within the Vicinity of the Proposed Action	Potentially affected by TMA Route Designations	Sources
Tricolored Blackbird (*Agelaius tricolor*)	BLM-S; SSC	Range: Breeding colonies occur in eastern Kern County from Ridgecrest along the base of the Tehachapi Mountains to Antelope Valley, around Palmdale and Lancaster in northeast Los Angeles County, and east of Barstow in San Bernardino County. There are 41 recent (i.e., since 1990) occurrences for the planning area (CDFG 2012b; Dudek 2012 2011). These occurrences generally are located in the Lancaster/Palmdale area; in the southwestern portion of Edward Air Force Base; just north of SR 138; along SR 158 in the Tehachapi Mountain range foothills; west and south of Red Rock Canyon State Park; along the Trona Road cutoff north of SR 395; in the southern portion of the China Lake Naval Air Weapons Station north of Ridgecrest; and along the Mojave River east of Barstow. Habitat: Breeding tricolored blackbirds form large colonies, typically in freshwater wetlands dominated by cattails or bulrushes and thorny vegetation.	Yes	No. No further analysis for this species for the proposed action.	Dudek 2012 and ICF International 2012
White-tailed Kite (*Elanus leucurus*)	SFP	Range: Numerous sightings of white-tailed kite for the period of March through July have also been reported in the eBird database for the planning area. White-tailed kite have been observed at the following locations in the Antelope Valley: Holiday Lake (May 1994 near the community of Neenach); Piute Ponds (most recently in July 2006 north of Lancaster); 60th Street East at East Avenue H and East Avenue G (May 1993 in Lancaster): 110th Street East at East Avenue J (May 1996); and Lake Palmdale (April 2007 in Palmdale). Habitat: White-tailed kites are associated with riparian, wetland, and irrigated habitats.	Yes	No. No further analysis for this species for the proposed action.	Dudek 2012 and ICF International 2012
Yuma Clapper Rail (*Rallus longirostris yumanensis*)	FE; ST; SFP	Range: All recent observations of this species are located outside the planning area to the south and west (Dudek 2012 and ICF International 2012). However, there is one historic occurrence documented within the planning area from 1977 at Harper Lake. Habitat: The Yuma clapper rail is the only rail known to breed in freshwater marshes and the preferred habitat consists of cattails and bulrush.	Yes	No. No further analysis for this species for the proposed action.	Dudek 2012 and ICF International 2012

Table E.3-1. Special Status Species

Species	Status[1]	Range/Habitat within the WEMO Planning Area	Potential For Occurrence within the Vicinity of the Proposed Action	Potentially affected by TMA Route Designations	Sources
Fish					
Mojave Tui Chub (*Gila bicolor mohavensis*)	FE; SE; SFP	Range: The current populations are located in primarily man-made or man-supported habitats. The population in Lark Seep is in a perennial body of water that is fed from the wastewater treatment facility in Ridgecrest, California. The population at Camp Cady is located in a man-made, lined pond that receives water from a pump. The populations at Soda Springs occur in two bodies of water, one is a man-made pond that receives water from a pump, and the other is an isolated spring on the edge of Soda Lake. The population at the Lewis Center is in two small man-made ponds with water supplied from a pump, and at Morning Star Mine, the population is in a man-made pond created by a perched aquifer. Habitat: Historically, within the Mojave River, the Mohave tui chub was associated with deep pools and sloughs of the river and was not found very far into small tributaries.	Yes	No. No further analysis for this species for the proposed action.	Dudek 2012 and ICF International 2012
Reptiles/Amphibians					
Tehachapi Slender Salamander (*Batrachoseps stebbinsi*)	BLM-S; ST	Range: The Tehachapi slender salamander is endemic to California and is reported to occur only in Kern County and Los Angeles counties. According to the USFWS 12-month review, there are two populations of the Tehachapi slender salamander that represent two DPSs of a single species: the Tehachapi Mountains DPS and the Caliente Canyon DPS, which together constitute the entire range of the species (76 FR 62900–62926). Habitat: The Tehachapi slender salamander inhabits moist canyons and ravines in oak and mixed woodlands.	Yes	No. No further analysis for this species for the proposed action.	Dudek 2012 and ICF International 2012

Table E.3-1. Special Status Species

Species	Status[1]	Range/Habitat within the WEMO Planning Area	Potential For Occurrence within the Vicinity of the Proposed Action	Potentially affected by TMA Route Designations	Sources
Mojave Fringe-Toed Lizard (*Uma scoparia*)	BLM-S; SSC	Range: This species is currently found within more than 35 named and unnamed sand dune complexes within the three major river drainages in the planning area: the Amargosa, Mojave, and Colorado rivers. Habitat: This species is an obligate sand-dweller, found in dunes, sand fields, sand hummocks, and other sand deposits throughout the Mojave Desert in California. Its elevation ranges from 300 to 3000 feet.	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	BLM 2005 and 2013a; Dudek 2012 and ICF International 2012; CNDDB 2018
Desert Tortoise (*Gopherus agassizii*)	FT; ST	Range: It is anticipated that the desert tortoise will occur throughout the planning area, although its abundance may vary locally due to habitat characteristics, including anthropocentric disturbances. Habitat: The desert tortoise can be found in a wide variety of habitats, such as alluvial fans, washes, canyons, and saltbush plains. Occupied habitat for populations in the Western Mojave Desert includes valleys, bajadas, and hills with sandy loams to rocky substrates.	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	BLM 2005 and 2013a; Dudek 2012 and ICF International 2012
Southwestern Pond Turtle (*Clemmys marmorata pallida*)	BLM-S; SSC	This species would not change from the previous analysis included in the affected environment of the 2005 WEMO Final EIS (BLM 2005 and 2013a) and is not discussed further in this supplemental EIS. For a general discussion of this species, please refer to Section 3.3.7.3, pp. 3-183 to 3-184.	Yes	Yes. There are two river crossings in Afton Canyon where potentially occupied habitat may be impacted.	BLM 2005 and 2013a
Panamint Alligator Lizard (*Elgaria panamintina*)	BLM-S; SSC	This species would not change from the previous analysis included in the affected environment of the 2005 WEMO Final EIS (BLM 2005 and 2013a) and is not discussed further in this supplemental EIS. For a general discussion of this species, please refer to Section 3.3.7.4, pg. 3-184.	Yes	No. No further analysis for this species for the proposed action.	BLM 2005 and 2013a

Table E.3-1. Special Status Species

Species	Status[1]	Range/Habitat within the WEMO Planning Area	Potential For Occurrence within the Vicinity of the Proposed Action	Potentially affected by TMA Route Designations	Sources
Coast Horned Lizard/San Diego Horned Lizard (*Phrynosoma coronatum blainvillei*)	BLM-S; SSC	Range: The coast horned lizard is a fringe species in relation to the planning area. Primarily sequestered on the coast and the coastal valleys, it spills over into the planning area in four principal locations: the Tehachapi (California Poppy Reserve) area, the Palmdale area, the Cajon Pass area, and the Morongo Valley/Little San Bernardino Mountain areas. Habitat: This species is found in a fairly wide variety of habitats within its range. These habitats can include various scrublands, grasslands, coniferous and broadleaf forests, and woodlands.	No	No. No further analysis for this species for the proposed action.	CNDD 2011; BLM 2005 and 2013a; Dudek 2012 and ICF International 2012
Northern Sagebrush Lizard *Scleroporus graciosus*)	BLM-S	Range: This species is widely distributed in montane chaparral, hardwood and conifer habitats, eastside pine and juniper habitats, and Great Basin shrub habitats of the Cascades and Sierra Nevada, and also east of the Sierra-Cascade crest in northern California. Isolated populations exist at Sutter Buttes in the Sacramento Valley, in the Coast Ranges along the entire length of the state, in the mountains of southern California, and in the desert mountains of Inyo County. Elevation: 900-3200 m (3000-10,400 ft). Habitat: The sagebrush lizard occurs in a wide variety of open forest and shrub habitat types and utilizes mammal burrows and rock crevices as hibernation sites during cold periods.	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	Zeiner, D.C. et al 1988-1990; CNDDB 2018

Table E.3-1. Special Status Species

Species	Status[1]	Range/Habitat within the WEMO Planning Area	Potential For Occurrence within the Vicinity of the Proposed Action	Potentially affected by TMA Route Designations	Sources
Plants					
Alkali Mariposa-lily (*Calochortus striatus*)	BLM-S	Range: Known mostly from California, with several occurrences in western Nevada. The Western Mojave comprises the majority of the species' range. Occurrences in the Plan Area include Red Rock Canyon, Edwards AFB, the Lancaster area, Box "S" Springs, Cushenbury Springs, Rabbit Springs, Paradise Springs, and Joshua Tree National Park. Population estimates are crude due to wide fluctuations in numbers from year to year, but Edwards AFB is estimated to host > 100,000 individuals with smaller, scattered populations occurring elsewhere. Habitat: Found in seasonally moist, alkaline habitats such as meadows, seeps and springs, washes, sinks, playas, along dune drainages, and on claypans. Substrate may be calcareous sandy or alkali soils. Found in chaparral, chenopod scrub, Mojavean desert scrub, and saltbrush scrub vegetation communities, with associated species including saltgrass, rushes, sedges (*Carex* spp.), beard grass (*Polypogon* sp.), dock, alkali sacaton (*Sporobolus airoides*), beardless wildrye (*Elymus triticoides*), dwarf checkerbloom (*Sidalcea malviflora*), rabbitbrush, Baltic rush (*Juncus balticus*), and small melilot (*Melilotus indicus*). Elevation range 224 to 5,240 feet amsl. Flowering April to June.	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	BLM 2005 and 2013a; Dudek 2012 and ICF International 2012

Table E.3-1. Special Status Species

Species	Status[1]	Range/Habitat within the WEMO Planning Area	Potential For Occurrence within the Vicinity of the Proposed Action	Potentially affected by TMA Route Designations	Sources
Amargosa Beardtongue (*Penstemon fruticiformis* var. *amargosae*)	BLM-S	Range: Known mostly from California (Inyo and San Bernardino Counties) and western Nevada (Nye and Clark Counties), with most of the occurrences in the vicinity of Death Valley. Occurrence in the Plan Area is limited to one population in the northeast corner. Population within the Plan Area estimated at approx. 20 to 58 individuals. Habitat: Found in rocky or sandy washes and adjacent slopes within steep-walled canyons. Substrate is sand or gravel soils. Found in Mojave Desert scrub and pinyon-juniper woodland vegetation communities, with associated species including desert almond (*Prunus fasciculata*), skunk bush sumac (*Rhus trilobata*), desert needle grass (*Stipa speciosa*), Parry's beargrass (*Nolina parryi*), Mojave yucca (*Yucca schidigera*), Mojave aster (*Xylorhiza tortifolia*), Utah mortonia (*Mortonia utahensis*), and Utah agave (*Agave utahensis*). Elevation range 1,148 to 6,200 feet amsl. Flowering April to June.	No	No. No further analysis for this species for the proposed action.	Dudek 2012 and ICF International 2012
Barstow Woolly Sunflower (*Eriophyllum mohavense*)	BLM-S	Range: Endemic to California (San Bernardino and Kern Counties) in the west-central portion of the Mojave Desert. The current range is restricted to within 30 miles of Barstow, with most occurrences in the area between Kramer Junction and Harper Dry Lake. The Plan Area contains all 63 known occurrences. Total population estimated at approx. 10,600 individuals. Habitat: Found on bare areas with little soil. Substrate is sandy or rocky often containing a shallow subsurface caliche layer. Found in Chenopod scrub, Mojavean desert scrub, and Creosote bush scrub vegetation communities. Elevation range 1,640 to 3,150 feet amsl. Flowering March to April or May.	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	BLM 2005 and 2013a; Dudek 2012 and ICF International 2012

Table E.3-1. Special Status Species

Species	Status[1]	Range/Habitat within the WEMO Planning Area	Potential For Occurrence within the Vicinity of the Proposed Action	Potentially affected by TMA Route Designations	Sources
Beaver dam scurfpea, also beaver dam breadroot (*Pediomelum castoreum*)	BLM-S	Range: Known from California (San Bernardino County), Arizona, and Nevada (CNPS 2013) in the Mojave Desert (Jepson 2013). Present in the Project Area (pers. comm. Chavez 2013). Known occurrences within the Project Area are widely distributed between Barstow and Victorville and in one area on the north side of the San Bernardino NF (CNPS 2013). Habitat: Found in open areas and on roadcuts (Jepson 2013) and in washes. Substrate is sandy. Found in Joshua tree woodland and Mojavean desert scrub vegetation communities. Elevation range 2,001 to 5,003 feet amsl (CNPS 2013) or < 5,741 feet amsl (Jepson 2013). Flowering April to May (Calflora 2013).	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	Calflora 2013; Chavez 2013; CNPS 2013; Jepson 2013; CNDDB 2018
Boyd's monardella (*Monardella boydii*)	BLM-S	Range: Endemic to California (San Bernardino County) (CNPS 2013) in the south-central Mojave Desert (Jepson 2013). Present in the Project Area (pers. comm. Chavez 2013). Known occurrences within the Project Area are clustered to the southeast of Barstow, near Ord Mountain, Camp Rock Mine, and Silver Bell Mine (CNPS 2013). Habitat: Found on rocky slopes and in canyon bottoms or washes (Jepson 2013). Substrate is usually alluvial soils and bedrock cracks. Found in Mojavean desert scrub, pinyon and juniper woodland, and desert riparian scrub vegetation communities. Elevation range 4,593 to 5,413 feet amsl (CNPS 2013). Flowering August to October (Calflora 2013).	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	Calflora 2013; Chavez 2013; CNPS 2013; Jepson 2013; CNDDB 2018

Table E.3-1. Special Status Species

Species	Status[1]	Range/Habitat within the WEMO Planning Area	Potential For Occurrence within the Vicinity of the Proposed Action	Potentially affected by TMA Route Designations	Sources
Charlotte's Phacelia (*Phacelia nashiana*)	BLM-S	Range: Endemic to California (Tulare, Inyo, Kern, and San Diego Counties) in the desert-facing foothills of the Sierra Nevada and in the El Paso Mountains. Occurrences in the Plan Area are concentrated in northeast Kern County in the areas of Red Rock Canyon and southwest of Indian Wells. No population estimates available. Habitat: Found on unstable sites, including steep slopes, flats, canyons, washes and adjacent slopes, and on recently disturbed sites. Substrate is sandy or rocky soils of granitic origin, or talus. Found in Joshua tree woodland, Mojavean desert scrub, and pinyon-juniper woodland vegetation communities, often associated with green ephedra (*Ephedra viridis*) and single-leaf pinyon (*Pinus monophylla*). Elevation range 1,600 to 7,200 feet amsl. Flowering March or April to June.	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	BLM 2005 and 2013a; Dudek 2012 and ICF International 2012
Clokey's Cryptantha (*Cryptantha clokeyi*)		Range: Endemic to California (Inyo, Kern, Los Angeles, and San Bernardino Counties) (CNPS 2013). Found in the northwest Mojave Desert and in the north desert mountains. Habitat: Found on slopes and ridge crests. Substrate is rocky to gravelly. Found in desert woodland vegetation communities (CNPS 2013). Elevation range 3,445 to 5,413 feet amsl. Flowering April to May (Jepson 2013).	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	Calflora 2013; CNPS 2013; Jepson 2013; CNDDB 2018
Cushenbury Buckwheat (*Eriogonum ovalifolium var. vineum*)	FE	Range: Endemic to California (San Bernardino County) in the San Bernardino Mountains. Occurrences in the Plan Area are on BLM land adjacent to the northern border of the San Bernardino NF. Total population estimated at approx. 13,000 individuals. Habitat: Found on stable slopes and bedrock outcrop. Closely associated with carbonate (limestone and dolomite) substrates and fine-textured soils. Found in pinyon-juniper woodland, Joshua tree woodland, and Mojavean desert scrub vegetation communities with a wide range of associated species. Elevation range 4,600 and 7,900 feet amsl. Flowering May and June.	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	BLM 2005 and 2013a; Dudek 2012 and ICF International 2012; CNDDB 2018

Table E.3-1. Special Status Species

Species	Status[1]	Range/Habitat within the WEMO Planning Area	Potential For Occurrence within the Vicinity of the Proposed Action	Potentially affected by TMA Route Designations	Sources
Cushenbury Milk-vetch (*Astragalus albens*)	FE	Range: Endemic to California (San Bernardino County) in the San Bernardino Mountains. Occurrences in the Plan Area are on BLM land adjacent to the northern border of the San Bernardino NF. Total population estimated at approx. 5,000 to 10,000 individuals. Habitat: Found on carbonate soils and bedrock outcrop, as well as carbonate alluvium over granite. Closely associated with carbonate (limestone and dolomite) substrates. Found in pinyon-juniper woodland, Joshua tree woodland, Mojavean desert scrub, rabbitbrush, blackbush, and Great Basin sagebrush vegetation communities with a wide range of associated species. Elevation range 4,000 and 6,600 feet amsl. Flowering late March to mid June.	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	BLM 2005 and 2013a; Dudek 2012 and ICF International 2012; CNDDB 2018
Cushenbury Oxytheca (*Acanthoscyphus parishii* var. *goodmaniana*)	FE	Range: Found in California with the majority of the population in the San Bernardino NF. Occurrences in the Plan Area are on BLM land adjacent to the northern border of the San Bernardino NF. No population estimates available. Habitat: Found on limestone and other carbonate talus slopes. Substrate is limestone and dolomite derived soils with very little organic horizon. Found mostly in pinyon-juniper woodland, but also found in Joshua tree woodland, Mojavean desert scrub, Jeffrey pine-western juniper woodland vegetation communities, and with associated species including single-leaf pinyon pine (*Pinus monophylla*), Utah juniper (*Juniperus osteosperma*),. Elevation range 4,000 to 7,800 feet amsl. Flowering May to October.	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	BLM 2005 and 2013a; Dudek 2012 and ICF International 2012; CNDDB 2018
Darwin Mesa Milk-vetch (*Astragalus atratus* var. *mensanus*)	BLM-S	Range: Endemic to California (Inyo County) (CNPS 2013). Found in the desert mountains to the north and west of Panamint Valley (Jepson 2013). Habitat: Found on open foothills (Jepson 2013). Substrate is volcanic clay or gravelly. Found in Great Basin scrub, sagebrush, Joshua tree woodland, and pinyon and juniper woodland vegetation communities. Elevation range 4,396 to 7,595 feet amsl. Flowering April to June (CNPS 2013).	No	No. No further analysis for this species for the proposed action.	Calflora 2013; CNPS 2013; Jepson 2013

Table E.3-1. Special Status Species

Species	Status[1]	Range/Habitat within the WEMO Planning Area	Potential For Occurrence within the Vicinity of the Proposed Action	Potentially affected by TMA Route Designations	Sources
Death Valley Sandpaper-plant (*Petalonyx thurberi* ssp. *gilmanii*)	BLM-S	Range: Endemic to California (Inyo and San Bernardino Counties). Found in the north Mojave Desert (Jepson 2013). Known within the Project Area from Old Ibex Pass (CNPS 2013). Habitat: Found on dunes and in sandy washes (Jepson 2013). Substrate is sandy. Found in desert dunes and Mojavean desert scrub vegetation communities (CNPS 2013). Elevation range reported as 0 to 3,937 (Jepson 2013) and 853 to 4,741 feet amsl (CNPS 2013). Flowering May to June and September to November (Calflora 2013).	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	Calflora 2013; CNPS 2013; Jepson 2013
Dedecker's Clover (*Trifolium dedeckerae also Trifolium kingii* ssp. *dedeckerae*)	BLM-S	Range: Endemic to California (Inyo, Kern, Mono, and Tulare Counties) (CNPS 2013) in the southern high Sierra Nevada Mountains and to the east (Jepson 2013). Known occurrences within the Project Area include Coso Peak north of Ridgecrest and in the foothills adjacent to Sequoia NF from Ridgecrest north to Owens Lake (CNPS 2013). Habitat: Found on alpine crests and in rock crevices (Jepson 2013). Substrate is granitic and rocky. Found in lower montane coniferous forest, pinyon and juniper woodland, subalpine coniferous forest, and upper montane coniferous forest vegetation communities. Elevation range 6,890 to 11,483 feet amsl (CNPS 2013). Flowering May to July (Calflora 2013).	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	Calflora 2013; CNPS 2013; Jepson 2013

Table E.3-1. Special Status Species

Species	Status[1]	Range/Habitat within the WEMO Planning Area	Potential For Occurrence within the Vicinity of the Proposed Action	Potentially affected by TMA Route Designations	Sources
Desert Cymopterus (*Cymopterus deserticola*)	BLM-S	Range: Endemic to California (San Bernardino, Kern, and Los Angeles Counties) in the western Mojave Desert. Found from California City east to the Superior Valley and from the Cuddeback Lake area south to near Kramer Junction. Total population estimates unknown, but the population on Edwards AFB is approx. 14,093 individuals. Habitat: Found on alluvial fans and basins, stabilized sand fields, and occasionally sandy slopes of desert dry lake basins, especially on the east side of desert playas where blowsand has accumulated. Substrate is loose, sandy soils. Found in Joshua tree woodland, saltbush scrub, and Mojavean desert scrub vegetation communities. Elevation range 2,000 to 3,000 feet amsl. Flowering early March to mid May. NOTE: flowering can be irregular and the above-ground portion of the plant dies back after the flowering season.	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	BLM 2005 and 2013a; Dudek 2012 and ICF International 2012; CNDDB 2018
Forked buckwheat (*Eriogonum bifurcatum*)	BLM-S	Range: Known from California (Inyo and San Bernardino Counties) and Nevada (CNPS 2013) in the Mojave Desert (Jepson 2013). Wide-spread distribution in plan area (pers. comm. Chavez 2013). Known occurrences within the Project Area appear to be limited (compared to "wide-spread") to the northeast corner of the Project Area in northern San Bernardino County (CNPS 2013). Habitat: Found on sand. Substrate is sandy. Found in Chenopod scrub vegetation communities (CNPS 2013). Elevation range is 1,969 to 2,625 feet amsl (Jepson 2013) or 2,116 to 2,657 feet amsl (CNPS 2013). Flowering April to June (Calflora 2013).	No	No. No further analysis for this species for the proposed action.	Calflora 2013; Chavez 2013; CNPS 2013; Jepson 2013

Table E.3-1. Special Status Species

Species	Status[1]	Range/Habitat within the WEMO Planning Area	Potential For Occurrence within the Vicinity of the Proposed Action	Potentially affected by TMA Route Designations	Sources
Hall's Daisy (*Erigeron aequifolius*)	BLM-S	Range: Endemic to California (Fresno, Kern, and Tulare Counties) (CNPS 2013) in the southern high Sierra Nevada Mountains (Jepson 2013). Known within the Project Area from Owens Peak west of Indian Wells (CNPS 2013). Habitat: Found on rock ledges and in crevices (Jepson 2013). Substrate is granitic and rocky. Found in broadleafed upland forest, lower montane coniferous forest, pinyon and juniper woodland, and upper montane coniferous forest vegetation communities. Elevation range 4,921 to 8,005 feet amsl (CNPS 2013). Flowering June to August (Calflora 2013).	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	Calflora 2013; CNPS 2013; Jepson 2013; CNDDB 2018
Kelso Creek Monkeyflower (*Mimulus shevockii*)	BLM-S	Range: Endemic to California (Kern County) in the southern Sierra Nevada Foothills and western edge of the Mojave Desert within the Kern River drainage. Total population estimated at approx. 53,400 individuals. Habitat: Found on alluvial fans, dry streamlets, or washes and granitic deposits. Substrates are usually granitic or metamorphic, and sandy or gravelly. Found in Joshua tree or California juniper xeric woodland vegetation communities, and is strongly associated with pygmy poppy (*Canbya candida)*, silver cholla (*Cylindropuntia echinocarpa)*, purple sage (*Salvia dorrii*), golden gilia (*Leptosiphon aureus)*, Tehachapi monkeyflower *(Mimulus androsaceus*), Fremont's monkeyflower (*M. fremontii*), and cheesebush or burrobrush (*Ambrosia salsola*). Elevation range 2,625 to 4,396 feet amsl. Flowering March to May.	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	BLM 2005 and 2013a; Dudek 2012 and ICF International 2012; CNDDB 2018

Table E.3-1. Special Status Species

Species	Status[1]	Range/Habitat within the WEMO Planning Area	Potential For Occurrence within the Vicinity of the Proposed Action	Potentially affected by TMA Route Designations	Sources
Kern Buckwheat (*Eriogonum kennedyi* ***var.*** *pinicola*)	BLM-S	Range: Endemic to California (Kern County) and located in the Sweet Ridge area of the southeastern Sierra Nevada Foothills. Known within the Ridgecrest Recreation Area and on the Zond Windfarms property. All known occurrences are within the Project Area. Total population estimated at approx. 10,000 individuals. Habitat: Found on ridge tops in poorly draining depressions in white bentonite clay soils thought to be from volcanic ash. Substrate may have pebbles, gravel and rock cemented into the soil surface. Found in chaparral and pinyon and juniper woodland vegetation communities with associated species including California sagebrush (*Artemisia californica*), Great Basin sagebrush (*Artemisia tridentata*), adobe yampah (*Perideridia pringlei*), fivetooth spineflower (*Chorizanthe watsonii*), and old fallen Jeffrey pines (*Pinus jeffreyi*). Elevation range 4,396 to 6,397 feet amsl. Flowering May to June.	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	BLM 2005 and 2013a; Dudek 2012 and ICF International 2012
Lane Mountain Milk-vetch (*Astragalus jaegerianus*)	FE	Range: Endemic to California (San Bernardino County) and located entirely within the Project Area. Four populations are known from a 13 mile radius area north of Barstow including NASA Goldstone, Brinkman Wash/Montana Mine, Paradise Valley, and Coolgardie Mesa. Total population estimated at approx. 14,120 to 141,200 individuals. Habitat: Found on Jurassic or Cretaceous granitic bedrock growing with a host species for support. Substrate is granitic, shallow soils. Found in Mojave creosote scrub and Mojave mixed woody scrub with widely scattered Joshua trees (*Yucca brevifolia*) and almost always associated with a host species, such as turpentinebroom (*Thamnosma montana*), white bursage (*Ambrosia dumosa*), Eastern Mojave buckwheat (*Eriogonum fasciculatum* ssp. *polifolium*), Cooper's goldenbush (*Ericameria cooperi*), and Nevada jointfir (*Ephedra nevadensis*). Elevation range 3,100 to 4,200 feet amsl. Flowering April and May.	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	BLM 2005 and 2013a; Dudek 2012 and ICF International 2012

Table E.3-1. Special Status Species

Species	Status[1]	Range/Habitat within the WEMO Planning Area	Potential For Occurrence within the Vicinity of the Proposed Action	Potentially affected by TMA Route Designations	Sources
Little San Bernardino Mtns. Linanthus (*Linanthus maculatus*)	BLM-S	Range: Endemic to Southern California (San Bernardino, Riverside, and Imperial Counties) in the Little San Bernardino Mountains. Known occurrences within the Project Area are near Desert Hot Springs and the north side of Joshua Tree NP. No total population estimates available, but one population at the mouth of Big Morongo Canyon was estimated at approx. 10,000 individuals. Habitat: Found in dry canyons and on sandy benches along desert washes, or on alluvial fans. Substrate is sandy, well-aerated soil on flat ground with few or no competing species. Found in desert wash systems, desert dunes, and sparse Joshua tree woodland vegetation communities and is associated with species including sigmoid threadplant (*Nemacladus sigmoideus*), blushing threadplant (*N. rubescens*), evening primrose (*Camissonia pallida*), common loeflingia (*Loeflingia squarrosa*), Arizona nest straw (*Filago arizonica*), and Wallace's woolly sunflower (*Eriophyllum wallacei*). Elevation range 305 to 4,002 feet amsl. Flowering March to May.	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	BLM 2005 and 2013a; Dudek 2012 and ICF International 2012
Mojave menodora (*Menodora spinescens* var. *mohavensis*)	BLM-S	Range: Endemic to California (Inyo and San Bernardino Counties) (CNPS 2013) on the north slope of the San Bernardino Mountains (Jepson 2013). Wide-spread distribution in Project Area (pers. comm. Chavez 2013). Known occurrences within the Project Area occur in the general vicinity of Barstow and on the north side of Joshua Tree NP into the Yucca Valley (CNPS 2013). Habitat: Found on rocky desert hillsides and in canyons (Jepson 2013). Substrate is andesite gravel. Found in Mojavean desert scrub vegetation communities. Elevation range 2,264 to 6,562 feet amsl (CNPS 2013). Flowering April to May (Calflora 2013).	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	Calflora 2013; Chavez 2013; CNPS 2013; Jepson 2013; CNDDB 2018

Table E.3-1. Special Status Species

Species	Status[1]	Range/Habitat within the WEMO Planning Area	Potential For Occurrence within the Vicinity of the Proposed Action	Potentially affected by TMA Route Designations	Sources
Mojave Monkeyflower (*Mimulus mohavensis*)	BLM-S	Range: Endemic to California (San Bernardino County) in the Mojave Desert. Known occurrences within the Project Area are restricted to areas south of Daggett and Barstow. No population estimates available. Habitat: Found in areas not subjected to water flow, including the gravelly banks of desert washes with granitic soils and rocky slopes above washes, as well as the sandy openings. Substrate is sandy, granitic soils. Found in Joshua tree woodland and Mojavean desert scrub, specifically creosote bush scrub vegetation communities, and is associated with species including creosote bush (*Larrea tridentata*), desert senna (*Senna armata*), cheese bush (*Ambrosia salsola*), ratany (*Krameria erecta* and *K. grayi*), chollas (*Cylindropuntia* spp.), burro bush (*Ambrosia dumosa*), prairie-clovers (*Dalea* spp.), catclaw (*Senegalia greggii*), Bigelow's monkeyflower (*Mimulus bigelovii*), desert bells (*Phacelia campanularia*), desert fivespot (*Eremalche rotundifolia*), spiny hopsage (*Grayia spinosa*), and desert trumpet (*Eriogonum inflatum* var. *inflatum*). Elevation range 1,968–3,937 feet amsl. Flowering period unknown; it appears to be dependent on rainfall.	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	BLM 2005 and 2013a; Dudek 2012 and ICF International 2012
Mojave Tarplant (*Deinandra mohavensis*)	SE; BLM-S	Range: Known from California (Kern, Riverside, and San Diego Counties) on the desert slopes of the southern Sierra Nevada Mountains. Known occurrences within the Project Area include eight sites located west of Highway 14 and east of the Sequoia National Forest. No population estimates available. Habitat: Found near springs, seeps, wetland margins, swales and stream channels. Substrate is clay or silty soils that are saturated with water early in the year. Found near the margins of the desert, within chaparral, coastal scrub, and riparian scrub vegetation communities. Elevation range 2,100–5,250 feet amsl. Flowering June to January.	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	BLM 2005 and 2013a; Dudek 2012 and ICF International 2012; CNDDB 2018

Table E.3-1. Special Status Species

Species	Status[1]	Range/Habitat within the WEMO Planning Area	Potential For Occurrence within the Vicinity of the Proposed Action	Potentially affected by TMA Route Designations	Sources
Nine Mile Canyon Phacelia (*Phacelia novenmillensis*)	BLM-S	Range: Endemic to California (Inyo, Kern, and Tulare Counties) (CNPS 2013) on the east slope of the southern high Sierra Nevada Mountains and on the west edge of the Mojave Desert (Jepson 2013). Known occurrences within the Project Area are concentrated in the Sierra Nevada foothills west of Indian Wells including Owens Peak, Ninemile Canyon, Lamont Peak, and Walker Pass. Habitat: Found in open foothills. Substrate is sandy to gravelly soil (Jepson 2013). Found in broadleafed upland forest, Cismontane woodland, pinyon and juniper woodland, and upper montane coniferous forest vegetation communities. Elevation range is 5,397 to 8,661 feet amsl (CNPS 2013). Flowering May to June (Calflora 2013) or February to June (CNPS 2013).	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	Calflora 2013; CNPS 2013; Jepson 2013; CNDDB 2018
Owens Peak Lomatium, also Owens Peak desertparsley (*Lomatium shevockii*)	BLM-S	Range: Endemic to California (Kern County) (CNPS 2013) in the southern high Sierra Nevada Mountains (Jepson 2013). Known within the Project Area from Owens Peak and Mt. Jenkins west of Indian Wells (CNPS 2013). Habitat: Found on rocky slopes and talus (Jepson 2013). Substrate is rocky. Found in lower montane coniferous forest and upper montane coniferous forest vegetation communities. Elevation range 5,807 to 7,218 feet amsl (CNPS 2013) or 7,218 to 8,202 feet amsl (Jepson 2013). Flowering April to May (Calflora 2013).	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	Calflora 2013; CNPS 2013; Jepson 2013; CNDDB 2018
Parish's Alkali Grass (*Puccinellia parishii*)	BLM-S	Range: Known from California (San Bernardino County), Arizona, and New Mexico. Known occurrence in the project area is limited to one disjunct population at Rabbit Springs, near Lucerne Valley. Population at the known occurrence is estimated at approx. 150 individuals. Habitat: Found in alkali seeps and springs. Substrate is wet, alkaline clay soils without dense vegetation. Strongly alkaline and/or saline surface water must be present for at least part of the year. Elevation range 2,296 to 7,216 feet amsl. Flowering April to May.	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	BLM 2005 and 2013a; Dudek 2012 and ICF International 2012

Table E.3-1. Special Status Species

Species	Status[1]	Range/Habitat within the WEMO Planning Area	Potential For Occurrence within the Vicinity of the Proposed Action	Potentially affected by TMA Route Designations	Sources
Parish's Daisy (*Erigeron parishii*)	FT	Range: Endemic to California on the slopes of the San Bernardino Mountains and the Little San Bernardino Mountains. Known occurrences within the Project Area are concentrated in areas adjacent to the northeast edge of the San Bernardino NF and both in and adjacent to the northwest corner of Joshua Tree NP. Total population estimated at approx. 16,000 individuals. Habitat: Found along washes on canyon bottoms or on loose carbonate alluvium. Substrate is often carbonate soils, but it can also grow on granitic soils. Found in Mojavean desert scrub and pinyon and juniper woodland vegetation communities and can co-occur with Cushenbury oxytheca (*Acanthoscyphus parishii var. goodmaniana*). Elevation range 3,000 to 6,600 feet amsl. Flowering May to August.	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	BLM 2005 and 2013a; Dudek 2012 and ICF International 2012; CNDDB 2018
Parish's Phacelia (*Phacelia parishii*)	BLM-S	Range: Known from California (San Bernardino and Inyo Counties), Nevada, and Arizona. Known occurrences within the Project Area are concentrated in the vicinity of Barstow, south of Fort Irwin, and around Lucerne Dry and Coyote Dry Lakes. Total population estimates are far ranging, with a single occurrence once estimated at 200 million plants in a good year, but completely absent in a dry year. Habitat: Found along dry lake margins and on playas and valley floors. Substrate is clay and alkaline soils. Found in Playas, alkali sinks, and Mojavean desert scrub vegetation communities, usually in sparsely vegetated areas. Elevation range 1,772 to 3,937 feet amsl. Flowering April to July.	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	BLM 2005 and 2013a; Dudek 2012 and ICF International 2012; CNDDB 2018

Table E.3-1. Special Status Species

Species	Status[1]	Range/Habitat within the WEMO Planning Area	Potential For Occurrence within the Vicinity of the Proposed Action	Potentially affected by TMA Route Designations	Sources
Piute Mountains Jewel-flower (*Streptanthus cordatus* var. *piutensis*)	BLM-S	Range: Endemic to California (Kern County) in the southern Sierra Nevada. Known occurrences within the project area are concentrated near Sweet Ridge, south of Cache Peak near the City of Mojave. Total population estimates are unavailable, but an estimate of the largest known occurrence is approx. 75 individuals. Habitat: Found on metamorphic rocks and sandy slopes, though the limited distribution makes it difficult to generalize these observations. Substrates range from metamorphic rock, reddish clay-like soils, heavy clay, stony gabbro substrate, and very dark brown-red soil and rock. Found in broadleaf upland forests, closed-cone coniferous forest, and pinyon-juniper woodland vegetation communities and is associated with species including associated with Bodfish Piute cypress (*Cupressus nevadensis*) and California juniper (*Juniperus californica*). Elevation range 3,592 to 7,000 feet amsl. Flowering June to July.	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	Dudek 2012 and ICF International 2012; CNDDB 2018
Red Rock Poppy (*Eschscholzia minutiflora* ssp. *Twisselmannii*)	BLM-S	Range: Endemic to California (Kern and San Bernardino Counties) in the western Mojave Desert in the Rand and El Paso mountains. Known occurrences within the Project Area are concentrated in Red Rock Canyon State Park with one other occurrence on Edwards AFB. Total population estimated at approx. 41,000 individuals. Habitat: Found on desert washes, flats, bajadas, alluvial fans, and slopes. Substrate includes sedimentary mounds, limestone, metamorphic rocks, and rocky basalt, but has also been reported as being restricted to rhyolite tuffs and granitic soils. Found in Mojavean desert scrub vegetation communities. Elevation range 2,176 to 4,040 feet amsl. Flowering March to May.	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	BLM 2005 and 2013a; Dudek 2012 and ICF International 2012; CNDDB 2018

Table E.3-1. Special Status Species

Species	Status[1]	Range/Habitat within the WEMO Planning Area	Potential For Occurrence within the Vicinity of the Proposed Action	Potentially affected by TMA Route Designations	Sources
Red Rock Tarplant (*Deinandra arida*)	SR; BLM-S	Range: Endemic to California (Kern County) in the el Paso Mountains. Known occurrences within the Project Area are in Red Rock and Last Chance Canyons in Red Rock Canyon State Park and on adjacent BLM land. Total population estimated at approx. 3,400 individuals, but high annual variability exists. Habitat: Found in sandy to gravelly washes, moist alkaline margins of seeps and springs, sandy alluvium at the foot of ridges and cliffs, and ledges of dry colluvium supported by ribs of bedrock on cliffs. Substrate is clay soils and volcanic tuft. Found in Mojavean desert scrub communities and is associated with seep-spring monkeyflower (*Mimulus guttatus*) and Palmer's monkeyflower (*Mimulus palmeri*) at moist sites. Elevation range 900 to 2,850 feet amsl. Flowering April to November.	No	No. No further analysis for this species for the proposed action.	BLM 2005 and 2013a; Dudek 2012 and ICF International 2012
Robison's Monardella (*Monardella robisonii*)	BLM-S	Range: Endemic to California (Riverside and San Bernardino Counties) (CNPS 2013) in the Little San Bernardino Mountains (Jepson 2013). Known occurrences within the Project Area are in the general area north of Desert Hot Springs and Yucca Valley, parts of Joshua Tree NP, and adjacent lands to the north (CNPS 2013). Habitat: Found among granite boulders. Found in desert scrub (Jepson 2013) and pinyon and juniper woodland vegetation communities. Elevation range 2,001 to 4,921 feet amsl (CNPS 2013). Flowering April to September (Calflora 2013) or February to October (CNPS 2013).	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	Calflora 2013; CNPS 2013; Jepson 2013; CNDDB 2018

Table E.3-1. Special Status Species

Species	Status[1]	Range/Habitat within the WEMO Planning Area	Potential For Occurrence within the Vicinity of the Proposed Action	Potentially affected by TMA Route Designations	Sources
Sanicle Cymopterus (*Cymopterus ripleyi* var. *saniculoides*)	BLM-S	Range: Known from California (Inyo County) and Nevada in the southern high Sierra Nevada Mountains, southeast of the Sierra Nevada Mountains, and in the north desert mountains (Jepson 2013). Known occurrences within the Project Area are located to the south and east of Owens Lake (CNPS 2013). Habitat: Substrate is gravelly, sandy, or carbonate soils. Found in Joshua tree woodland and Mojavean desert scrub vegetation communities. Elevation range 3,609 to 5,446 feet amsl (CNPS 2013). Flowering April to June (Calflora 2013).	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	Calflora 2013; CNPS 2013; Jepson 2013; CNDDB 2018
Short-joint Beavertail (*Opuntia basilaris* var. *brachyclada*)	BLM-S	Range: Known from California (Los Angeles and San Bernardino Counties) (Calflora 2013) from the Anaverde Valley west of Palmdale east to the Cajon Pass. Also found within the Angeles National Forest south of the West Mojave boundary. Habitat: Found in open streambeds and on rocky slopes. Substrate is variable, ranging from sandy to rocky. Found in Joshua tree, pinyon pine, and juniper woodlands, although it also occurs in chaparral and Mojave desert scrub vegetation communities. Elevation range 3,000 to 6,500 feet amsl. Flowering April to June (Calflora 2013).	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	BLM 2005 and 2013a; Calflora 2013; CNDDB 2018
Spanish Needle Onion (*Allium shevockii*)	BLM-S	Range: Known from California (Kern County). Known occurrences within the Project Area include Spanish Needle Peak and the Horse Canyon/Jawbone Canyon area in the Tehachapi Mountains. No population estimates available. Habitat: Found at the edge of rock outcrops and talus derived from volcanic and metamorphic rock. Substrate is rocky soil. Found in sparsely vegetated areas. Elevation range 1,050 to 5,400 feet amsl. Flowering May to June or June to July (not well documented).	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	Dudek 2012 and ICF International 2012

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Species	Status[1]	Range/Habitat within the WEMO Planning Area	Potential For Occurrence within the Vicinity of the Proposed Action	Potentially affected by TMA Route Designations	Sources
Stephen's Beardtongue (*Penstemon stephensii*)	BLM-S	Range: Endemic to California (Inyo and San Bernardino Counties) (CNPS 2013) in the desert mountains (Jepson 2013). Populations near Yucca Valley (pers. comm. Chavez 2013). Known occurrences within the Project Area are undocumented (CNPS 2013) except for the personal communication. Habitat: Found on rocky slopes and in washes and rock crevices (Jepson 2013). Substrate is usually carbonate and rocky. Found in Mojavean desert scrub and pinyon and juniper woodland vegetation communities. Elevation range 3,806 to 6,070 feet amsl (CNPS 2013) or 3,281 or 7,218 feet amsl (Jepson 2013). Flowering April to June (Calflora 2013).	No	No. No further analysis for this species for the proposed action.	Calflora 2013; Chavez 2013; CNPS 2013; Jepson 2013
White-margined Beardtongue (*Penstemon albomarginatus*)	BLM-S	Range: Known from California (San Bernardino County), Nevada, and Arizona. Known occurrences within the Project Area are in the vicinity of Pisgah Crater. No total population estimates available. Habitat: Found on desert dunes and in washes and along roadsides. Substrate is deep, stabilized desert sands and fine alluvial sands. Found in Mojave Desert scrub and desert dune vegetation communities and is associated with species including big galleta (*Hilaria* [*Pleuraphis*] *rigida*), winter fat (*Krascheninnikovia lanata*), and Shockley's goldenhead (*Acamptopappus shockleyi*). Elevation range 1,398 to 3,494 feet amsl. Flowering March to April.	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	BLM 2005 and 2013a; Dudek 2012 and ICF International 2012

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Species	Status[1]	Range/Habitat within the WEMO Planning Area	Potential For Occurrence within the Vicinity of the Proposed Action	Potentially affected by TMA Route Designations	Sources
Parish's Popcorn Flower (*Plagiobothrys parishii*)	None	Range: Endemic to California (Inyo, Los Angeles, Mono, and San Bernardino Counties) (CNPS 2013) and found east of the Sierra Nevada Mountains and in the central Mojave Desert (Jepson 2013). Wide-spread distribution in Project Area (pers. comm. Chavez 2013). A single site at Rabbit Springs in Lucerne Valley supports this species. The only other recent records of this plant in California are from freshwater springs at the edge of Owens Lake in Inyo County (BLM 2005 and 2013a). Habitat: This species is a wetland obligate. It is supported in the Project Area due to the reliability of the groundwater at the known alkali seep. Substrate is alkaline, mesic soils. Found in Great Basin scrub and Joshua tree woodland vegetation communities (CNPS 2013). Elevation range 2,461 to 4,593 (CNPS 2013) or 7,251 feet amsl (Jepson 2013). Flowering May to June (Calflora 2013) or March to November (CNPS 2013).	No	No. No further analysis for this species for the proposed action.	BLM 2005 and 2013a; Calflora 2013; Chavez 2013; CNPS 2013; Jepson 2013
Salt Springs Checkerbloom (*Sidalcea neomexicana*)	None	Range: Known from California (Kern, Los Angeles, Orange, Riverside, San Bernardino, San Diego, and Ventura Counties), Arizona, Colorado, Idaho, New Mexico, Nevada, Oregon, Sonora (Mexico), Texas, Utah, and Wyoming (CNPS 2013). Only population in Project Area on private land (pers. comm. Chavez 2013). Although formerly widespread outside the desert, virtually no records are available since 1966. A single site at Rabbit Springs in Lucerne Valley supports this species, which emerges and flowers every year because of the reliability of the groundwater at this alkali seep (BLM 2005 and 2013a). Habitat: Found in alkaline springs and marches (Jepson 2013). Substrate is alkaline mesic soils (CNPS 2013). Found in chaparral, coastal sage scrub and yellow pine forest. In the desert, it appears to be restricted to alkali seeps and springs. Elevation range 49 to 5,020 feet amsl (CNPS 2013). Flowering April to June then dying back to ground level in the late summer, fall and winter.	No	No. No further analysis for this species for the proposed action.	BLM 2005 and 2013a; Chavez 2013; CNPS 2013

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Species	Status[1]	Range/Habitat within the WEMO Planning Area	Potential For Occurrence within the Vicinity of the Proposed Action	Potentially affected by TMA Route Designations	Sources
Shockley's Rock Cress (*Boechera shockleyi*)	None	Range: Known from California (Inyo, Mono, and San Bernardino Counties), Nevada, and Utah, primarily in the San Bernardino National Forest on the north slope of the San Bernardino Mountains. Nine occurrences have been reported by the NDDB within the planning area, 3 on public lands and 6 on private lands. The latter have been surveyed more intensively. In 1998, this plant was found within 51 plots randomly placed across the proposed carbonate plants conservation area, mainly within the San Bernardino National Forest. One isolated historical record is from Highway 247 north of its junction with Highway 18 in Lucerne Valley. Habitat: Found on limestone and quartzite outcrops. Substrates are gravelly (BLM 2005 and 2013a). Found in pinyon and juniper woodland vegetation communities (CNPS 2013). Elevation range 3,000 - 6,000 feet amsl (BLM 2005 and 2013a). Flowering April to May (Jepson 2013) or May to June (CNPS 2013).	No	No. No further analysis for this species for the proposed action.	BLM 2005 and 2013a; CNPS 2013; Jepson 2013

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Species	Status[1]	Range/Habitat within the WEMO Planning Area	Potential For Occurrence within the Vicinity of the Proposed Action	Potentially affected by TMA Route Designations	Sources
Triple-ribbed Milkvetch (*Astragalus tricarinatus*)	FE	Range: Known from California (Riverside and San Bernardino Counties), mainly in the eastern San Bernardino Mountains/Whitewater Canyon area, Morongo Canyon, and the western part of the Little San Bernardino Mountains, with disjunctive occurrences in the Orocopia and Santa Rosa mountain ranges. On edge of Project Area, no designated routes in habitat (pers. comm. Chavez 2013). Known occurrences within the Plan Area are in Big Morongo Canyon and adjacent canyons. Rangewide population estimated at approx. 500 individuals, but surveys have not been extensive. Habitat: Found commonly on rocky slopes and ridges that are mostly barren. Substrate is coarse and granitic. Found in Joshua tree woodland and Sonoran desert scrub vegetation communities with associated species including associated plants including giant needlegrass (*Achnatherum coronatum*), California buckwheat (*Eriogonum fasciculatum*), ceanothus (*Ceanothus greggii*), bush poppy (*Dendromecon rigida*), bigberry manzanita (*Arctostaphylos glauca*), bitter snakewood (*Condalia globosa*), yerba santa (*Eriodictyon trichocalyx*), and Spanish bayonet (*Yucca schidigera*). Elevation range 2,300 to 4,000 feet amsl. Flowering February to May.	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	BLM 2005 and 2013a; Chavez 2013; Dudek 2012 and ICF International 2012; CNDDB 2018

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Species	Status[1]	Range/Habitat within the WEMO Planning Area	Potential For Occurrence within the Vicinity of the Proposed Action	Potentially affected by TMA Route Designations	Sources
San Bernardino Mountains dudleya (*Dudleya abramsii* ssp. *affinis*)	BLM-S	Range: Endemic to California (San Bernardino County) and known from a small area of the San Bernardino Mountains. Only population on BLM land in the Bighorn Mountain Wilderness (pers. comm. Chavez 2013). Known occurrences within the project area are limited to Cushenbury Springs and the northeast slope of White Mountain. No good population estimates are available. Habitat: Found on pebble plain or pavement. Substrate is granitic or quartzite and rarely limestone. Found in pinyon and juniper woodland and upper montane coniferous forest vegetation communities with associated species including junipers (*Juniperus* spp.), pines (*Pinus* spp.), mountain-mahogany (*Cercocarpus* spp.), hedgehog cactus (*Echinocereus* spp.), Cushenbury milkvetch (*Astragalus albens*), Parish's daisy (*Erigeron parishii*), Cushenbury buckwheat (*Eriogonum ovalifolium* ssp. *vineum*), and Cushenbury oxytheca (*Acanthoscyphus parishii* var. *goodmaniana*). Elevation range 4,101 to 8,530 feet amsl. Flowering April to June.	Yes	Yes. Habitat has been documented for this species within the proposed action area on BLM lands.	Chavez 2013; Dudek 2012 and ICF International 2012; CNDDB 2018
Tracy's eriastrum (*Eriastrum tracyi*)	SR	Range: Known from California (Colusa, Fresno, Glenn, Kern, Santa Clara, Shasta, Stanislaus, Tehama, Trinity, and Tulare Counties) in the foothills on the east and west sides of the Central Valley. Known occurrences within the Project Area are clustered on the desert slope of the southern Sierra Nevada Mountains in Kern County. No population estimates available. Habitat: Found in openings, sometimes recently disturbed. Substrate unspecified. Found in chaparral and cismontane woodland vegetation communities commonly in association with cheatgrass (*Bromus tectorum*) and red brome (*B. madritensis*). Elevation range 950 to 3,400 feet amsl. Flowering June to July.	No	No. No further analysis for this species for the proposed action.	Dudek 2012 and ICF International 2012