United States Department of the Interior

FISH AND WILDLIFE SERVICE
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File No. 1-5-00-FW-575

Memorandum

To: Manager, California Nevada Operations Office, Sacramento, California

From: Field Supervisor, Nevada Fish and Wildlife Office, Reno, Nevada

Subject: Intra-Service Biological and Conference Opinion on Issuance of an Incidental Take Permit to Clark County, Nevada for a Multiple Species Habitat Conservation Plan

This memorandum transmits the Fish and Wildlife Service's (Service) biological and conference opinions (Opinion) based on our review of the subject permit application and associated habitat conservation plan. Clark County; the cities of Las Vegas, North Las Vegas, Boulder City, Mesquite, and Henderson; and the Nevada Department of Transportation (NDOT) (Applicants), are applying for an incidental take permit (Permit) for the threatened desert tortoise (*Gopherus agassizii*); endangered southwestern willow flycatcher (*Empidonax traillii extimus*); and 77 unlisted species identified in Table 1, that may become listed under the Endangered Species Act of 1973, as amended (Act) (16 U.S.C. 1531 et seq.) during the 30-year term of the Permit, if issued. In accordance with the *"No Surprises" Policy* (63 FR 8859), the Service has also prepared an Opinion for 76 of the 77 unlisted species proposed to be covered (Covered Species) that have been addressed in the Clark County Multiple Species Habitat Conservation Plan (MSHCP) and Environmental Impact Statement (EIS) (RECON 2000). The Service will not include the western chuckwalla (*Sauromalus obesus obesus*) under the proposed Permit for reasons discussed in the *Description of the Proposed Action* section below.

The scope of this Permit is limited to activities that may directly or indirectly affect the Covered Species as a result of activities on 145,000 acres (ac) of non-Federal lands in Clark County. As an applicant, NDOT requests incidental take for desert tortoise south of the 38th parallel in Nye, Lincoln, Esmeralda, and Mineral counties, below 5,000 feet (ft) elevation, and other Covered Species in Clark County only, in association with the construction and maintenance of roads, highways, and material sites. *Covered Activities* are those activities that are otherwise lawful activities which occur upon non-Federal lands, including but not limited to agriculture, flood-control, livestock grazing, mineral extraction, off-highway vehicle (OHV) activities, parks and recreation, residential and commercial development, solid waste facilities, transportation, utilities, and water and sewer facilities, as described below and in section 2.3.2.2 of the MSHCP.

Table 1. Species Included in Clark County's MSHCP and Proposed for Coverage under the Permit by the Applicants

Mammals
Silver-haired bat, *Lasionycteris noctivagans*
Long-eared myotis, *Myotis evotis*
Long-legged myotis, *Myotis volans*
Palmer's chipmunk, *Tamias palmeri*

Birds
Yellow-billed cuckoo, *Coccyzus americanus*[1]
Southwestern willow flycatcher, *Empidonax traillii extimus*[1]
American peregrine falcon, *Falco peregrinus anatum*
Blue grosbeak, *Guiraca caerulea*[1]
Phainopepla, *Phainopepla nitens*
Summer tanager, *Piranga rubra*[1]
Vermilion flycatcher, *Pyrocephalus rubinus*[1]
Arizona Bell's vireo, *Vireo bellii arizonae*[1]

Reptiles and Amphibian
Glossy snake, *Arizona elegans*
Western banded gecko, *Coleonyx variegatus*
Sidewinder, *Crotalus cerastes*
Speckled rattlesnake, *Crotalus mitchelli*
Mojave green rattlesnake, *Crotalus scutulatus scutulatus*
Great Basin collared lizard, *Crotaphytus insularis bicinctores*
Desert iguana, *Dipsosaurus dorsalis*
Western red-tailed skink, *Eumeces gilberti rubricaudatus*
Large-spotted leopard lizard, *Gambelia wislizenii wislizenii*
Desert tortoise, *Gopherus agassizii*
California (common) kingsnake,
Lampropeltis getula californiae
Western leaf-nosed snake, *Phyllorhynchus decurtatus*
Relict leopard frog, *Rana onca*
Western long-nosed snake, *Rhinocheilus lecontei lecontei*
Western chuckwalla, *Sauromalus obesus obesus*[2]
Sonoran lyre snake, *Trimorphodon biscutatus lambda*

Invertebrates
Spring Mountains acastus checkerspot butterfly,
Chlosyne acastus robusta
Dark blue butterfly, *Euphilotes enoptes purpurea*
Morand's checkerspot butterfly, *Euphydryas anicia morandi*
Spring Mountains comma skipper,
Hesperia comma mojavensis
Spring Mountains icarioides blue butterfly,
Icaricia icarioides austinorum
Mount Charleston blue butterfly,
Icaricia shasta charlestonensis
Nevada admiral, *Limentitus weidemeyerii nevadae*
Spring Mountains springsnail, *Pyrgulopsis deaconi*
Southeast Nevada springsnail, *Pyrgulopsis turbatrix*
Carole's silverspot butterfly, *Speyeria zerene carolae*

Vascular Plants
Rough angelica, *Angelica scabrida*
Charleston pussytoes, *Antennaria soliceps*
Sticky ringstem, *Anulocaulis leisolenus*
Las Vegas bearpoppy, *Arctomecon californica*
White bearpoppy, *Arctomecon merriamii*
Rosy King sandwort, *Arenaria kingii* ssp. *rosea*
Clokey milkvetch, *Astragalus aequalis*
Threecorner milkvetch, *Astragalus geyeri* var. *triquetrus*
Clokey eggvetch, *Astragalus oophorus* var. *clokeyanus*
Spring Mountains milkvetch, *Astragalus remotus*
Clokey paintbrush, *Castelleja martinii* var. *clokeyi*
Clokey thistle, *Cirsium clokeyi*
Alkali mariposa lily, *Calochortus striatus*
Jaeger whitlowgrass, *Draba jaegeri*
Charleston draba, *Draba paucifructa*
Pahrump Valley buckwheat, *Eriogonum bifurcatum*
Sticky buckwheat, *Eriogonum viscidulum*
Inch high fleabane, *Erigeron uncialis* ssp. *conjugans*
Clokey greasebush, *Glossopetalon clokeyi*
Smooth pungent (dwarf) greasebush,
Glossopetalon pungens var. *glabra*
Pungent dwarf greasebush,
Glossopetalon pungens var. *pungens*
Red Rock Canyon aster, *Ionactis caelestis*
Hidden ivesia, *Ivesia cryptocaulis*
Jaeger ivesia, *Ivesia jaegeri*
Hitchcock bladderpod, *Lesquerella hitchcockii*
Blue Diamond cholla,
Opuntia whipplei var. *multigeniculata**
Charleston pinewood lousewort,
Pedicularis semibarbata var. *charlestonensis*
White-margined beardtongue, *Penstemon albomarginatus*
Charleston beardtongue, *Penstemon leiophyllus* var. *keckii*
Jaeger beardtongue, *Penstemon thompsoneae* var. *jaegeri*
Parish's phacelia, *Phacelia parishii*
Clokey mountain sage, *Salvia dorrii* var. *clokeyi*
Clokey catchfly, *Silene clokeyi*
Charleston tansy, *Sphaeromeria compacta*
Charleston kittentails, *Synthyris ranunculina*
Charleston grounddaisy, *Townsendia jonesii* var. *tumulosa*
Limestone (Charleston) violet,
Viola purpurea var. charlestonensis

Non-Vascular Plants
Anacolia menziesii, unnamed moss
Claopodium whippleanum, unnamed moss
Dicranoweisia crispula unnamed moss
Syntrichia princeps, unnamed moss

Currently listed species are in **bold**. Candidate species are identified with an asterisk (*).
[1] Coverage for these species conditioned upon accomplishment of permit Special Terms and Conditions.
[2] Coverage not provided for this species under this permit.

Otherwise lawful activities on non-Federal lands which result in take of Covered Species upon Federal property are not Covered Activities. Activities that may adversely affect spring discharge in the Warm Springs area of the Muddy River, surface waters of the Virgin, Muddy, and Colorado rivers systems, lakes Mead and Mohave, or the 100-year floodplain of the Virgin River, are not Covered Activities. This consultation is in accordance with section 7 of the Act and 50 CFR § 402 of the interagency regulations governing section 7 of the Act.

This Opinion is based on information provided in the following documents: Clark County's permit application; MSHCP/EIS; Clark County Desert Conservation Plan (DCP) (RECON 1995); the existing permit for the DCP (PRT 801045) and all supporting documents; *Desert Tortoise (Mojave Population) Recovery Plan* (Desert Tortoise Recovery Plan); and other information on file in the Service's Southern Nevada Field Office.

Consultation History

When the desert tortoise was emergency listed as endangered in October 1989 (54 FR 42270), Clark County and the cities of Las Vegas, North Las Vegas, Henderson, Boulder City, and Mesquite (collectively, Cities) began investigating the possibility of applying for a Permit from the Service for desert tortoise, pursuant to the provisions of section 10(a)(1)(B) of the Act. Shortly thereafter, the County and Cities entered into an Inter-local Agreement wherein the County and Cities agreed to fund the preparation of a Habitat Conservation Plan (HCP) to provide conservation measures in support of an application to allow the incidental take of desert tortoise. That plan was designated the Short-Term HCP for the Desert Tortoise. On May 23, 1991, the Service issued an intra-Service biological opinion (File No. 1-5-91-FW-40) on issuance of a Permit for desert tortoise to the County and Cities. On August 24, 1991, the Service approved the permit application and issued a Permit (PRT 756260) for an initial term of 3 years. During this period the County and Cities agreed to continue working to develop appropriate additional conservation measures for the desert tortoise and to thereafter apply for a long-term permit with a term of 30 years.

Over the next several years, the Implementation and Monitoring Committee, appointed by the Clark County Board of County Commissioners (I & M Committee), continued to work on the long-term HCP for the desert tortoise, which was designated the Clark County DCP. On July 14, 1995, the Service issued an intra-Service biological opinion (File No. 1-5-95-FW-233) on issuance of a Permit for desert tortoise to the County and the Cities. On or about August 5, 1995, the Service approved the permit application and issued a Permit (PRT 801045) to the County and Cities to allow the incidental take of desert tortoises for a term of 30 years under the DCP.

In August 1996, the Board of County Commissioners and the City Councils of the Cities authorized preparation of an MSHCP. At this time, the County requested technical assistance from the Service to prepare an MSHCP. The Service and County prepared a draft MSHCP/EIS which was provided to the public for review and comment from June 9 to July 24, 2000.

On October 16, 2000, the Service's Portland Regional Office requested initiation of formal consultation/conference for issuance of a section 10(a)(1)(B) permit to the Applicants authorizing

incidental take of threatened and endangered species, and unlisted species should they become listed in the future. Formal consultation/conference was initiated upon receipt of this request.

Other Listed Species in the Permit Area

Federally listed species, other than the desert tortoise and southwestern willow flycatcher, that potentially occur in Clark County but are not proposed for coverage under the MSHCP and Permit include the threatened bald eagle (*Haliaeetus leucocephalus*) and Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*); and endangered Yuma clapper rail (*Rallus longirostris yumanensis*), Devils Hole pupfish (*Cyprinodon diabolis*), Pahrump poolfish (*Empetrichthys latos*), humpback chub (*Gila cypha*), Colorado pikeminnow (*Ptychocheilus lucius*), bonytail chub (*Gila elegans*) with critical habitat, razorback sucker (*Xyrauchen texanus*) with critical habitat, Virgin River chub (*Gila seminuda*) with critical habitat, woundfin (*Plagopterus argentissimus*) with critical habitat, and Moapa dace (*Moapa coriacea*).

Bald eagles migrate through southern Nevada, but are not known to nest in the area. Bald eagles require large trees for diurnal perching and nocturnal roosting, and are attracted to large bodies of water where they feed on fish and waterfowl. Issuance of the Permit is not likely to adversely affect bald eagles because they are only migrants through the area, and any habitat disturbance is unlikely to affect this species.

The Yuma clapper rail is regarded as an occasional migrant through the Permit Area, with documented occurrences within the Las Vegas Wash and the Virgin River delta. In 1998, the Southern Nevada Water Authority established the Las Vegas Wash Coordination Committee (LVWCC) which is comprised of representatives for the Applicants, the Service, and other local, State, and Federal agencies, as well as members of the public. The LVWCC (2000) developed the Las Vegas Wash Comprehensive Adaptive Management Plan to address issues and concerns relative to long-term management of the Las Vegas Wash. As proposed in this plan, avian surveys would be conducted prior to habitat disturbance within the wash. Habitat disturbance within the Virgin River delta and activities in the wash with a Federal nexus (e.g., actions authorized by the Bureau of Reclamation (BOR)) would be subject to future consultation under section 7 of the Act. Because of this level of oversight and coordination, and deference to future consultation under section 7, issuance of the Permit is not likely to adversely affect the Yuma clapper rail.

Pahrump poolfish, and Devils Hole pupfish occur within the Permit Area, only within refugia. The Pahrump poolfish is currently covered under a 1994 HCP for the Spring Mountain Ranch State Park. The other poolfish refugium is on the Desert National Wildlife Range (DNWR) at Corn Creek which is identified as a conserved area in the MSHCP/EIS. The only occurrence of Devils Hole pupfish in Clark County is at a refugium managed by the Nevada Division of Wildlife (NDOW) near Hoover Dam on BOR-managed lands which are inaccessible by the public. Lahontan cutthroat trout also occur within the Permit Area. An introduced population of the Lahontan cutthroat trout occurs within Carpenter Canyon in the Spring Mountains National Recreation Area (NRA) which is outside the historic range of the species. This out-of-basin, isolated population is included in the Spring Mountains Conservation Agreement (CA) (MSHCP,

Appendix G). For the reasons stated above, these three listed fish species are not likely to be adversely affected by permitted activities.

The humpback chub is endemic to the Colorado River Basin and believed to be extirpated from Nevada. The only known self-sustaining population of the humpback chub in the lower Basin (below Glen Canyon Dam) occurs in the Colorado River and its tributaries through the Grand Canyon National Park. The Colorado pikeminnow is also endemic to the Colorado River Basin and believed to be extirpated from Nevada. The pikeminnow is presently restricted to rivers in the Upper Basin (above Glen Canyon Dam). Because the humpback chub and Colorado pikeminnow are not considered to occur in the Permit Area, these fishes are not likely to be adversely affected or critical habitat adversely modified by issuance of the Permit.

The bonytail chub was once abundant in the Colorado River and its major tributaries throughout the Colorado River Basin. Within the Permit Area, the bonytail chub occurs only in Lake Mohave. On March 21, 1994, the Service designated among other areas, the Colorado River from Hoover Dam to Davis Dam, including the full pool elevation of Lake Mohave as critical habitat (59 FR 13374). Based on the scope of, and areas impacted by, the Covered Activities, the proposed action would not impact Lake Mohave and therefore, issuance of the Permit is not likely to adversely affect the bonytail chub or adversely modify its critical habitat.

The razorback sucker occurs within the Colorado River system within the Permit Area. On March 21, 1994, the Service designated, among other areas, portions of the Colorado River from Pierce Ferry to Hoover Dam including Lake Mead to its full pool elevation, and from Hoover Dam to Davis Dam, including Lake Mohave to its full pool elevation as critical habitat (59 FR 13374). Razorback suckers are known from two populations within Lake Mead; Las Vegas Bay and Echo Bay. The Las Vegas Bay population also utilizes the lower portion of Las Vegas Wash.

Water supplies in Clark County include the Colorado River, wastewater reuse, and groundwater. Colorado River water is highly regulated, and the net withdrawal from the mainstream for all of Nevada is limited to 300,000 acre-feet per year under terms of the Colorado River Compact. Water from the Colorado River represents 80 to 85 percent of the valley's water supply, with the balance coming from groundwater. Groundwater withdrawals are regulated by the State of Nevada under the Nevada Revised Statutes (NRS). The State Engineer (Division of Water Resources) permits groundwater rights in hydrogeographic basins subject to the amount of unallocated water determined to be available. The Las Vegas Valley water basin is fully allocated, and the State Engineer will grant no further permanent water rights permits in the basin.

The potential effects to fishes that result from the return flow of treated municipal sewage effluent, storm water runoff, and re-surfacing ground water that flow into Las Vegas Wash and into Lake Mead is under evaluation. Recent information indicates that degraded habitat conditions and environmental contaminants associated with Las Vegas Wash and Bay have the potential to adversely affect razorback suckers. More research is necessary to determine impacts to razorback suckers, if any. Several steps have been taken to address water quality issues in

Las Vegas Wash and Bay including formation of the Lake Mead Water Quality Forum and the LVWCC. In addition, this Permit in coordination with other established programs, may provide an opportunity to develop conservation actions necessary to minimize the potential impacts to razorback suckers. Based on the existing information, and programs that are in place to address water quality issues, and opportunities for conservation actions to be developed in the future under this Permit, issuance of the Permit is not likely to adversely affect the razorback sucker or result in adverse modification of its critical habitat.

The woundfin and the Virgin River chub occur in portions of the Virgin River in Nevada. On January 26, 2000, the Service designated 87.5 miles of the Virgin River and its flood plain as critical habitat for the woundfin and Virgin River chub (65 FR 4140). The designation includes portions of the mainstem Virgin River and its associated 100-year floodplain in southwestern Utah, northwestern Arizona, and southeastern Nevada, and extends from the confluence of La Verkin Creek, Utah, downstream to Halfway Wash, Nevada. Through the Mesquite Lands Act of 1986, as amended, Bureau of Land Management (BLM) is proposing to transfer by direct sale approximately 10,540 ac of specified lands owned by the United States to the City of Mesquite. The sale of the land is considered a Federal action; therefore, potential affects to listed species would be considered under separate section 7 consultation. In addition, ongoing or future actions that may benefit Virgin River fishes include acquiring allotments and interests in real property and water rights on a willing-seller/willing-buyer basis by Clark County, a recovery action plan for the Virgin River fishes drafted by the Lower Virgin River Recovery Implementation Team, and a watershed conservation plan. Because these ongoing actions may benefit habitat and listed fish in the future, and the scope of the permit and this Opinion do not include activities that may affect surface waters or the 100-year flood plain of the Virgin River, issuance of the Permit is not likely to adversely affect these listed endangered fish species, or result in adverse modification of critical habitat.

The endangered Moapa dace occurs only in the Muddy River including the Moapa Valley National Wildlife Refuge (NWR). The Virgin River chub also occurs in the Muddy River. The Moapa Valley Water District (MVWD) has submitted to the Nevada State Engineer a Muddy Springs Monitoring Plan. The State Engineer is the regulatory authority for the approval and implementation of the monitoring plan. The plan represents the MVWD's long-term strategy for the cooperative monitoring of hydrologic conditions in the Muddy Springs area (also known as Warm Springs area). The monitoring plan should provide the information needed to establish the impact of increased water withdrawals by the MVWD from their Arrow Canyon well. In addition, ongoing or future actions that may benefit fishes in the Muddy River include, acquiring allotments and interests in real property and water rights on a willing-seller/willing-buyer basis by Clark County, a recovery action plan for the Muddy River fishes drafted by the Muddy River Recovery Implementation Team, and a watershed conservation plan. Because these ongoing actions may benefit habitat and listed fish in the future, and the scope of the permit and this Opinion do not include activities that may adversely affect spring discharge in the Warm Springs area or surface waters of the Muddy River in the Permit Area, issuance of the Permit is not likely to adversely affect this listed endangered fish species.

BIOLOGICAL AND CONFERENCE OPINION

DESCRIPTION OF THE PROPOSED ACTION

The Service proposes to issue a Permit to the Applicants, under the authority of section 10(a)(1)(B) and section 10(a)(2) of the Act for a period of 30 years. The Applicants are requesting coverage under a Permit for a total of 79 species, including: 4 mammal, 8 bird, 15 reptile, 1 amphibian, 10 invertebrate, and 41 plant species (Table 1). The Permit would cover 78 species, including 2 listed species, 1 candidate species, and 75 other species that may become listed in the future but are not currently listed or candidates for listing. The Applicants request coverage for those species identified in Table 1 that occur within the Permit Area, as described in the *Status of the Species/Critical Habitat (Rangewide)* section below.

The Service proposes not to cover the western chuckwalla under the Permit because insufficient information is available on the long-term effects of commercial collection on the species and adequate conservation measures have not been established. The chuckwalla in Clark County occurs within the Mojave desert scrub and salt desert scrub ecosystems, and to a lesser degree, the mesquite/catclaw ecosystem. The range of the western chuckwalla within the Permit Area represents 15 to 20 percent of its rangewide distribution. Although chuckwallas are widely distributed across much of the Permit Area, they are found only within a relatively small portion of these ecosystems that provide suitable substrate conditions. Most occurrence records for chuckwallas include the southernmost portion of the Permit Area, south of State Route 163, particularly the Newberry Mountains. An investigation, funded in part by the DCP, is underway to understand the resiliency and recovery rates of chuckwalla populations following significant reductions in localized populations resulting from factors such as heavy collection pressure. However, no comprehensive studies have been completed for this species in Clark County, and population status and trend are currently unknown.

Chuckwallas are extensively collected both by hobbyists and commercial collectors. From 1986 through August 1998, 6,263 chuckwallas were reported as commercially collected in Nevada under NDOW permits in Nevada, of which a total of 6,189 chuckwallas were collected within 291 square miles of the Permit Area. No season of collection has been defined nor limits established for numbers, sizes, or reproduction status of individuals that may be collected. Because of their tendency to bask on large rocks or boulders, chuckwallas are highly visible to collectors. The selective removal of dominant males or adult females, or gravid females, through collection, may impact the populations by disrupting the breeding behavior, territories, genetics, recruitment, and structure and dynamics of the population. These effects are particularly concerning for long-lived species such as the chuckwalla, that requires 3 to 5 years to reach sexual maturity. Chuckwallas may produce only a single clutch of eggs every other year, or none at all during years with less than ideal climate/seasonal conditions. Collecting gravid female chuckwallas may be detrimental to the population by reducing reproduction and recruitment success for the population over several years. The Service will consider covering the western chuckwalla under an amendment to the Permit based on the results of a scientifically-credible study of long-term effects of collection on the chuckwalla.

The Service proposes to condition coverage of the southwestern willow flycatcher, yellow-billed cuckoo (*Coccyzus americanus*), Arizona Bell's vireo (*Vireo bellii arizonae*), blue grosbeak (*Guiraca caerulea*), summer tanager (*Piranga rubra*), and vermilion flycatcher (*Pyrocephalus rubinus*) under the Permit upon completion of certain conservation actions. Early in the process of developing the MSHCP, the Applicants and the Service recognized that there were significant opportunities for conservation benefits to these species through enhanced and coordinated management of desert riparian habitats within the County, as could be provided through the MSHCP. As discussed in later sections, 31 percent of the County's desert riparian habitats are on lands providing the reserve system for the MSHCP, while 34 percent are on lands functioning as corridors and buffers. The remainder of the desert riparian habitat (35 percent) occurs on private lands that are potentially available for development, or on the Moapa Indian Reservation. An important conservation action of the MSHCP is the identification of habitat on private lands that could be acquired from willing sellers and placed under Federal management through the Southern Nevada Public Lands Management Act (PLMA). Approximately 2,700 ac of desert riparian habitat occurs on private lands in Clark County. Coverage under the Permit, for the southwestern willow flycatcher, yellow-billed cuckoo, Arizona Bell's vireo, blue grosbeak, summer tanager, and vermilion flycatcher, would be conditioned upon special permit terms and conditions requiring acquisition of private lands in desert riparian habitats along the Muddy and Virgin River and Meadow Valley Wash. The total number and location of acres to be acquired within each watershed would be identified through development of conservation management plans.

The Permit would authorize incidental take of Covered Species, when listed, on non-Federal lands up to a total maximum of 145,000 ac which are subject to future development, including current Federal disposal areas. Approximately 418,200 ac of Federal and non-Federal lands occur within the Permit Area that are potentially available for future development (Figure 1). This total includes existing development, BLM disposal areas (175,000 ac), designated portions of the lands transferred to the City of Boulder City under the Eldorado Valley Land Transfer Act (PL 85-339), and State lands managed for wildlife values and parks.

Types of Covered Activities

Activities proposed to be covered under the permit include all otherwise lawful activities which occur on non-Federal lands, including agriculture, flood control, livestock grazing, mineral extraction, OHV activities, parks and recreation, residential and commercial development, solid waste facilities, transportation, utilities, and water and sewage facilities. These activities would be covered by the Permit for incidental take of Covered Species on non-Federal lands within Clark County and for NDOT activities within portions of adjacent counties. Activities on non-Federal lands which result in take of Covered Species on Federal lands are not covered activities.

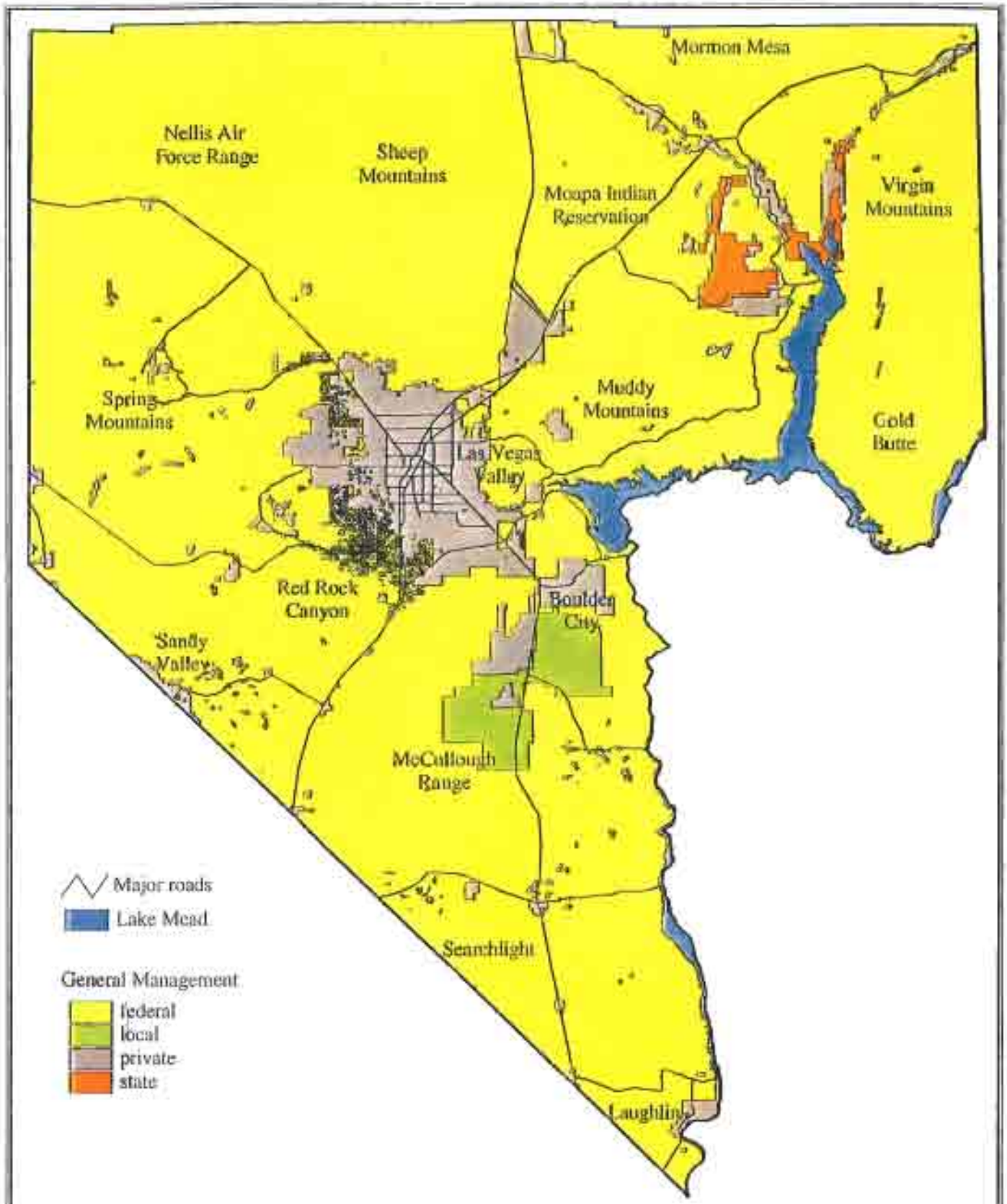

FIGURE 1

Plan Area

(not including NDOT rights-of-way in Lincoln, Nye, Mineral and Esmerelda counties)

- **Agriculture**: Both farming and ranching, including livestock grazing, occur within Clark County. Irrigated agriculture occurs on a small scale within the Las Vegas and Moapa valleys, and in the Mesquite area.

- **Flood-Control**: The Clark County Regional Flood Control District is developing a comprehensive, integrated flood control system for Las Vegas Valley and nearby areas. This system will include 21 detention basins, 1 debris basin, and over 160 kilometers (km) (100 miles (mi)) of channels, pipelines, dikes, and levees. Planned facilities are located on BLM land and private lands. Flood-control activities on Federal land would be covered under section 7 of the Act.

- **Mineral Extraction**: Mineral resources in Clark County have been extracted since 1855 on both Federal and non-Federal lands. Subsequently, gold and silver mines were developed; today, however, the extraction of gypsum, limestone, sand, and gravel predominates. Mineral extraction activities occur on Federal and non-Federal lands under patented claims, unpatented leases, permits, and sales. Mining claims on patented lands may fall under purview of the MSHCP and Permit. All other mining disturbances on Federal lands are subject to consultation under section 7 of the Act and not covered under permit.

- **Parks and Recreation**: The Clark County Comprehensive Plan differentiates between regional and urban parks and recreation facilities. *Regional sites* are those composed primarily of Federal and State lands and serve the dual function of protecting resources and providing recreation opportunities. Development of these sites on Federal lands typically involves consultation between the Federal agency and the Service under section 7 of the Act. *Urban sites* are those within the jurisdiction of the local governments, and allow for playing fields, tennis courts, swimming pools, stables, golf courses, and arenas. Activities on the urban sites fall under purview of the MSHCP and Permit.

- **Residential/Commercial/Industrial Development**: Historically, the urbanized core of Clark County has centered around the axis formed by Boulder Highway, Interstate 15, and the Union Pacific Railroad. By the 1970s, however, urbanization had spread in a somewhat loosely-knit, leapfrog fashion to outlying areas of non-Federal land. This pattern continued through the 1980s and is apparent in the land-use analysis prepared for Clark County in 1989 by Planning Information Corporation. The analysis covers 235,400 ac in Las Vegas Valley, including the cities of Las Vegas, Henderson, and North Las Vegas, and the communities of East Las Vegas, Paradise, Sunrise Manor, Winchester, Spring Valley, Enterprise, and Lone Mountain. It indicates that more than 26 percent of the urban development within the Las Vegas Valley occurred within the unincorporated areas. The Service estimates that most of the habitat loss covered under the MSHCP and Permit would fall under this category of activities.

- **Solid Waste Management**: As a result of Environmental Protection Agency regulations for landfills (Subtitle D, October 9, 1991), Clark County closed all but two landfill sites under county jurisdiction, Apex and Laughlin. Because compliance with the new ruling will significantly increase costs presently incurred from owning and operating a landfill, existing landfills are being closed and replaced by transfer stations. A majority of the solid waste in the county will be sent to the Apex site. Boulder City owns its own landfill. Landfills are sited on non-Federal land and would be covered under the permit.

- **Transportation**: Planned improvements include a beltway around Las Vegas from Interstate 15 to Interstate 515; continued widening of Route 160 between Las Vegas and Pahrump; a 55.5-ac expansion of McCarran Airport; widening of Highway 95 (including the segments between Railroad Pass and Route 163 and adjacent to the Las Vegas Valley Water District North Well Field); a Hoover Dam bypass; a Boulder City bypass; a proposed rail system within the Las Vegas Valley; and a proposed high-speed train from California to Nevada. Transportation facilities occur on both non-Federal and Federal lands in Clark County. Most major highways cross Federal lands, involve Federal highway funds, and require consultation under section 7 of the Act between Federal Highway Administration and the Service and thus, are not covered activities. In addition, NDOT has the responsibility for maintaining approximately 1,000 miles of highway through desert tortoise and other habitats, and for necessary improvements to these existing roads to meet the demands of increased traffic volumes in a manner consistent with public safety standards. Activities within railroad rights-of-way that do not result in take on Federal lands may be Covered Activities. Finally, the proposed development of a cargo handling airport facility in the Ivanpah Valley is currently under consideration, as is a general aviation airport in Mesquite.

- **Utilities:** Numerous major utility rights-of-way transect Clark County from north to south. None of these rights-of-way are within a designated corridor. However, BLM's Las Vegas Resource Management Plan (RMP) designates several utility corridors for rights-of-way on public lands managed by BLM. BLM encourages future utility rights-of-way on public land to be located within those corridors whenever feasible. The MSHCP and Permit may cover those utility projects on non-Federal lands that do not have a Federal nexus.

- **Water and Sewage**: Water supplies in Clark County include the Virgin, Muddy, and Colorado rivers, groundwater, and wastewater reuse. Water from the Colorado River is highly regulated, and the net depletion of the mainstream for all of Nevada is limited to 300,000 acre-feet per year. The Las Vegas Valley relies on the Southern Nevada Water Authority and groundwater from wells; current forecasts indicate that at the current rates of use, existing supplies will be able to meet local needs until the year 2013. Sewage and wastewater treatment needs are currently handled at facilities managed by the County and individual cities.

Currently, three of the wastewater treatment plants in the Las Vegas Valley are being expanded. Clark County is also planning a central activated sludge treatment plant to process sewage from the unincorporated area. Water and sewer projects on non-Federal lands are Covered Activities.

According to Clark County Comprehensive Planning regional land use plans analyzed during development of the MSHCP, the Las Vegas Valley will continue to contain more than 90 percent of the county population over the term of the Permit. Major construction is expected to occur throughout the valley, with major increases expected in the existing master planned communities. Rural growth will keep pace with Las Vegas Valley's growth but on a smaller scale. In particular, the area around the city of Mesquite, in the northeast portion of the County will experience substantial growth, while the southern portion of the County will experience growth around the town of Primm, and, to some extent, in the Laughlin area. Small pockets of development may occur elsewhere in the County, but most of the developable private land is situated within Las Vegas Valley, and a few other low elevation locations. Land disturbance projections suggested that rate of development should be uniform or will decline over the life of the Permit.

To track the rate of land disturbance over the life of the permit, local government agencies included in the Permit and NDOT would keep accurate records regarding the location and amount of all land disturbed within the Permit Area. Summaries of monthly land disturbance records would be examined and discussed on a regular basis by the I&M Committee. The Permittee's adaptive management process (AMP) (described below) is designed to analyze land use trends to insure that take and habitat disturbance are balanced with conservation needs of the Covered Species.

The Applicants would also keep records of the fees collected or paid; the number and disposition of all desert tortoises collected, the expenditure of fees collected, and the status of actions funded or proposed through the MSHCP. The records would be maintained by the County and summarized in an annual report to the Service. Upon issuance of the Permit for the MSHCP, all of the DCP funds, including those currently held in trust, would remain in a Clark County desert conservation endowment fund which would be administered by Clark County and expended exclusively on measures to minimize and mitigate the effects of the incidental take under the MSHCP.

MSHCP Conservation Strategy

The overall goal of the MSHCP is to "conserve healthy functioning ecosystems and the species that are supported by them." In developing the MSHCP, Clark County and the other applicants developed a county-wide strategy and management program providing an alternative to single-species conservation efforts by formulating a regional plan that provides for multiple species and ecosystem conservation and management. The I&M Committee and its Biological Advisory Committee (BAC) identified a list of species to be addressed by the MSHCP, and analyzed species management needs using a geographic information system to map land ownership, conservation management categories, ecosystems, and species distribution information. The

BAC then identified stressors and threats, and existing management prescriptions for dealing with the various threats. The conservation strategy is briefly summarized below.

Conservation Management Categories

Approximately 90 percent of the lands in Clark County are under Federal management, while the remainder (about 10 percent) are private or other non-Federal lands. In the early 1990s, during development of the Desert Tortoise Recovery Plan and earlier HCPs for desert tortoise, the relative values of habitat on Federal and non-Federal lands were evaluated as part of the process of determining the conservation needs for the species in the County. With the exception of the lands owned by Boulder City in the Piute Valley, (the current Boulder City Conservation Easement), much of the non-Federal land in the County was found to have been fragmented and degraded by the historic pattern of intensive urban uses within the Las Vegas Valley. These uses and their effects on the "urban fringe" (lands adjacent to the outer edge of development) significantly limit the value of conserving biological resources on private lands within the valley and on much of the private land elsewhere in the County. Such limitations are in large part attributable to the fragility of arid lands ecosystems in that they are quickly degraded and slow to recover from disturbance.

In the context of the pattern of land management in Clark County, and based upon the analysis of the management designations and prescriptions, the landscape has been divided into four basic conservation management categories as shown in Figure 2: *Intensively Managed Areas* (IMAs), *Less Intensively Managed Areas* (LIMAs), *Multiple Use Managed Areas* (MUMAs), and *Unmanaged Areas* (UMAs). IMAs consist of lands in which management is oriented toward actions that reduce or eliminate potential threats to biological resources, such as wilderness areas, biodiversity hotspots, wilderness study areas, or the conserved/critical habitat areas established for the desert tortoise. IMAs would provide an adequate amount and quality of habitats to support viable populations of all Covered Species. LIMAs are lands on which management generally limits the range of uses to primarily low-impact recreational uses. LIMAs function to augment the habitat in IMAs for some species, as well as providing buffers from areas of more intensive uses and connectivity between IMAs. The IMAs and LIMAs represent the reserve system in Clark County.

MUMAs are lands on which human activities are not precluded and which may, at times, be intense but which, nevertheless, continue to support significant areas of undisturbed, natural vegetation. MUMAs provide connectivity between the populations of species in IMAs and LIMAs, additional habitat for these species, and buffer zones between the IMAs, LIMAs, and areas of more intensive use.

UMAs are lands on which human activities predominate and which may incidentally support populations of some Covered Species. It is likely that some portion of the 175,000 ac within Federal disposal areas outside IMAs and LIMAs, may become UMAs through Federal disposal actions subject to section 7 requirements. If so, these lands within UMAs may fall under purview of the MSHCP and Permit, unless specified otherwise. For the purposes of this consultation, *take* of Covered Species would occur on non-Federal lands entirely within UMAs,

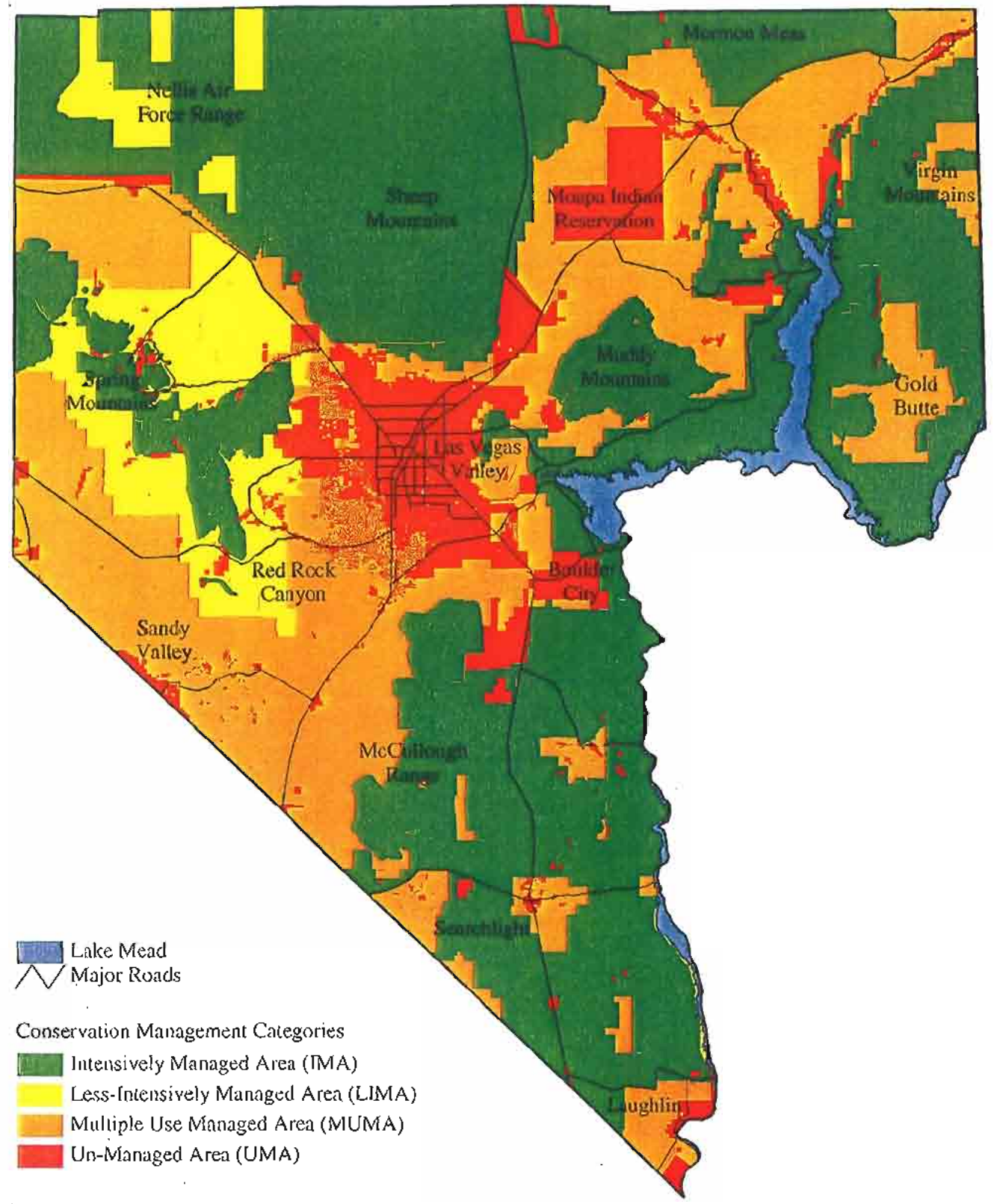

FIGURE 2

Conservation Management Categories

with the exception of NDOT activities proposed in section 2.4.1.4 of the MSHCP/EIS. A total of 91,500 of the 332,100 ac of UMAs occur on United States Air Force (USAF) or Tribal lands which are not Covered Activities (Table 2). Please refer to sections 2.4.2.2 and 2.4.2.7 of the MSHCP for details on the four types of management areas.

Table 2. Level of conservation management in each ecosystem in Clark County, Nevada.

Ecosystem	Total Habitat Acreage (# of springs)	IMA Acreage (# of springs)	Percent of Total	LIMA Acreage (# of springs)	Percent of Total	MUMA Acreage (# of springs)	Percent of Total	UMA Acreage (# of springs)	Percent of Total
Alpine	500	500	100	0	0	0	0	0	0
Bristlecone pine	15,800	14,400	91	400	3	0	0	1,000	6
Mixed conifer	56,400	46,100	82	8,800	15	0	0	1,500	3
Pinyon-juniper	278,200	173,800	63	81,500	29	18,700	7	4,200	1
Sagebrush	134,600	78,200	58	39,200	29	16,300	12	900	< 1
Blackbrush	824,700	425,000	52	111,500	13	279,600	34	8,700[1]	1
Salt desert scrub	190,700	112,300	59	19,000	10	39,600	21	19,800[2]	10
Mojave desert	3,273,000	1,770,600	54	105,600	3	1,111,800	34	285,000[3]	9
Mesquite/Catclaw	21,700	8,700	40	0	0	8,000	37	5,000[4]	23
Desert riparian	16,900	5,200	31	0	0	5,700	34	6,000[5]	35
Springs*	506	248	49	76	15	104	21	78[7]	15
Total Acres	4,812,600	2,634,800		366,000		1,479,700		332,100[6]	

[1]Includes 200 ac of USAF lands that are not covered under the MSHCP and Permit.
[2]Includes 1,300 ac of USAF lands that are not covered under the MSHCP and Permit.
[3]Includes 11,700 ac of USAF lands and 74,900 ac of Native American lands that are not covered under the MSHCP and Permit.
[4]Includes 100 ac of Tribal lands that are not covered under the MSHCP and Permit.
[5]Includes 3,300 ac of Tribal lands that are not covered under the MSHCP and Permit.
[6]Includes 91,500 ac of USAF and Tribal lands that are not covered under the MSHCP and Permit.
[7]Includes 4 springs on Tribal lands that are not covered under the MSHCP and Permit.
*Total Ac does not reflect ac of actual springs.

Ecosystems within the Permit Area

During development of the MSHCP, the lands within the County were divided into 12 habitat types, including: Alpine, bristlecone pine, mixed conifer, pinyon-juniper, sagebrush, blackbrush, salt desert scrub, Mojave desert scrub, mesquite/catclaw, desert riparian/aquatic, springs, and a category for specialized habitats such as sand dunes, rock outcrops, and dry lake beds. RECON (2000) compiled and analyzed species distribution information which provided a basis to associate each potentially Covered Species with the types of habitat within which it may be found as described in the *environmental baseline* section of this Opinion. The acreage of habitat by ecosystem, and number of springs that occur within each conservation management category, is identified above in Table 2.

Covered Species and Measurable Biological Goals

The list of species initially proposed to be covered by the MSHCP was evaluated by the BAC,

by compiling information on each species including status, distribution, habitat requirements, threats, current management, and conservation needs. Out of an initial list of more than 200 species, the BAC determined that 79 species could be covered under the MSHCP. Covered Species includes those for which: 1) Sufficient information is known and for which adequate existing management prescriptions exist, or can be easily defined and implemented sufficient to support an application for a section 10(a)(1)(B) permit; and 2) information is limited, but the species share habitat with other Covered Species whose management prescriptions would be of sufficient benefit to support inclusion under the MSHCP.

The BAC also identified evaluation species (those for which additional information is required or for which sufficient management prescriptions are unlikely to be able to be defined and implemented sufficiently to support the permit application); and watch species (adequate information is not available to assess population range, current status, or conservation potential, or those species not currently considered to be at risk). The current permit application does not request section 10(a)(1)(B) permits for these species. However, as additional information is accumulated and as management prescriptions are developed, the Applicants intend to submit amendments to add these species to the MSHCP permit.

The initial measurable biological goals for Covered Species include: 1) No net unmitigated loss or fragmentation of habitat within IMAs or LIMAs; and 2) maintain stable or increasing population numbers. An AMP (see below) would facilitate development of appropriate detailed and quantifiable population and/or habitat goals for each of the Covered Species. Initial species-specific goals are identified in MSHCP Appendix B; for mammals, refer to Table 1-1; for birds, refer to Table 2-1; for reptiles and amphibians, refer to Table 3-1; for Invertebrates, refer to Table 5-1; for vascular plants, refer to Table 6-1; and for non-vascular plants, refer to Table 7-1.

Adaptive Management

The MSHCP AMP is a flexible, iterative approach to long-term management of biological resources directed over time by the results of ongoing monitoring activities and other information. Biological management techniques and specific objectives would be regularly evaluated in light of monitoring results and new information on species needs, land use, and a variety of other factors. These periodic evaluations would be used over time to adapt both management objectives and techniques to better achieve overall management goals as defined by measurable biological objectives. Measurable biological objectives for the MSHCP broadly include (a) maintenance of the long-term net habitat value of the ecosystems in Clark County with a particular emphasis on Covered Species and (b) recovery of listed species and conservation of unlisted Covered Species. MSHCP Appendices A and B contain the current evaluation of habitat values within each ecosystem and for each species.

The MSHCP AMP is designed to provide an objective, quantitative evaluation of the effectiveness of management actions in attaining program goals through interpretation of inventory, monitoring, and research results. The AMP would provide resource managers with objective scientific data and analysis upon which to base management decisions, as well as a scientifically valid evaluation of management actions. The AMP would also provide objective

and scientifically valid evaluations of the need for various actions and assessment of the effectiveness of those actions, and accurately track habitat loss under the MSHCP by ecosystem. A critical element of the AMP is the database upon which management decisions are made. This database would provide the basis for evaluating species, ecosystem, and/or landscape status and trends, and would be used to evaluate management actions directed at conservation of biological resources. The AMP would entail an objective, and scientifically valid, program for collecting scientific data coupled with supervision of an accessible database by a competent scientific authority, and quantitative evaluation of the data.

Specifically, the AMP would (a) provide an analysis of all land-use trends in Clark County to ensure that take and habitat disturbance is balanced with solid conservation, (b) monitor population trends and ecosystem health, (c) evaluate effectiveness of management actions at meeting MSHCP goals of conservation and recovery, and (d) track habitat loss by ecosystem. It is quite likely that through the AMP, additional and different conservation measures, not contained within the MSHCP, would be suggested and be proven to be effective during the term of the MSHCP. Finally, it may be found that measures currently funded by the MSHCP, or undertaken by the land managers, may prove to be ineffective to conserve either species or the habitats in which they occur. The AMP would gauge the effectiveness of existing conservation measures and propose additional, or alternative conservation measures, as the need arises, and deal with changed or unforeseen circumstances.

Existing and Proposed Conservation Measures

After threats and stressors related to habitats and species were identified by the BAC, existing management policies and practices were compiled from management plans from the various Federal, State, and local agencies with jurisdiction over lands within the plan area, and evaluated for their effectiveness in dealing with threats and stressors identified for habitats and species. Gaps in management, changes to management, and additional conservation measures were identified for both habitats and species through this process.

The mitigation and conservation measures proposed below for the MSHCP include the continuation and augmentation of measures proposed and implemented during the DCP for the desert tortoise, as well as additional measures that provide conservation benefits for the other Covered Species. The following measures proposed by the Applicants are underway or are proposed to occur during the current biennium of the DCP which includes a multiple species component. Because the DCP and the MSHCP have been integrated into one plan, the measures proposed in the MSHCP/EIS are intended to supersede and replace those set forth in the DCP.

The County has committed to the following actions:

Impose and collect a $550-per-acre development fee and implement an endowment fund;

Administer the MSHCP through the I&M Committee and the MSHCP Plan Administrator;

Carry out a public education program;

Expend $4.1 million per biennial period for implementation of conservation measures and administration of the MSHCP;

Purchase grazing allotments and interest in real property and water, and maintain and manage allotments, land, and water rights which have been acquired;

Maintain the Boulder City Conservation Easement;

Construct desert tortoise barriers along roads and highways;

Provide a county-wide pick-up service, maintain a transfer/holding facility, and implement a translocation program for desert tortoises;

Participate in and funding of local rehabilitation and enhancement programs; and;

Develop and implement the AMP.

During the first biennium, funds collected through the development fee would be used to undertake the following specific conservation actions:

1. *Public Information and Involvement*

1.a. Public information and education: The Public Information and Education (PIE) subcommittee will 1) inform the public of the terms of the Section 10(a)(1)(B) permit; 2) encourage respect, protection, and enjoyment of natural ecosystems in Clark County; and 3) through education, increase the public understanding and awareness of the value of Clark County's ecosystems.

1.b. Operation of the Desert Tortoise Pick-Up Service and Holding Facility: This measure will provide a means to collect displaced, wandering, or unwanted pet tortoises throughout the County and humane treatment for tortoises held in captivity, thus minimizing effects that would result from unauthorized release of captive tortoises.

1.c. Agency public education projects: BLM, USFS, and the Muddy River Regional Environmental Impact Alleviation Committee (MRREIAC) will develop pamphlets, fact sheets, and other informational materials to inform the public about species and ecosystem conservation needs in Clark County.

1.d. Voluntary Search and Removal of Desert Tortoises from Construction Sites: Clark County's desert tortoise hotline and pick-up service combined with public education proposed in the MSHCP to discourage activities of individuals potentially resulting in introduction of displaced desert tortoises into wild

populations, should minimize the potential negative effects on wild tortoise populations.

2. *Research*

2.a. Desert Tortoise Translocation Program: The County will continue to implement the desert tortoise translocation program which was approved by the Service and NDOW. Although the translocation site is surrounded by a tortoise-proof fence or geophysical barrier, translocated tortoises may move out of designated release areas through fence breaches and negatively affect adjacent tortoise populations or be killed crossing roads and highways. The County has committed to regular fence inspections and prompt remedy of any situation that may allow tortoises to move out of the release area. All desert tortoise that are released have been evaluated by enzyme-linked immunosorbant assay (ELISA) methods and determined not to have been exposed to the causative agent for upper respiratory tract disease (URTD) with reasonable certainty. The research component of this program will provide information on the success of translocation methods, which will be valuable if relocation is required for recovery of the species.

2.b. Desert tortoise survivorship: Radio telemetered desert tortoises are being monitored at two study sites in Lake Mead NRA. Telemetry, biomass, and weather data will be collected to provide long-term information on desert tortoise movement, survivorship, and response to changes in precipitation and vegetation.

2.c. Palmer's chipmunk (*Tamias palmeri*) genetics: Genetic studies will be conducted to determine dispersal and gene flow in local populations of Palmer's chipmunks.

2.d. Chuckwalla ecology and genetics: NDOW will develop a relative abundance index, and a measurement of chuckwalla population repatriation, a predictive model for chuckwalla habitat relationships, and a regional chuckwalla genetic history, and its relevance to viability of local populations will be developed.

2.e. Desert pocket mouse (*Chaetodipus penicillatus*) genetics: Population surveys and genetic studies of the desert pocket mouse in southern Nevada will be conducted.

3. *Inventory*

3.a. Banded gecko (*Coleonyx variegatus*) and night lizard (*Xantusia vigilis*) surveys: Population parameters for gecko and night lizard populations will be measured.

3.b. Rare plant inventory: BLM and National Park Service (NPS) will conduct inventories of Covered and Evaluation Species on BLM, USFS, and NPS lands.

3.c. Neotropical breeding bird surveys: BLM will continue neo-tropical breeding bird surveys in key habitat areas in conjunction with Nevada's Breeding Bird Atlas

Survey and Partners in Flight, conduct phainopepla (*Phainopepla nitens*) breeding surveys in sites which may support key breeding populations, and identify other key breeding habitat for neotropical migrant birds. University of Nevada Las Vegas (UNLV), in coordination with NDOW, will survey riparian ecosystems within Clark County to determine occurrence and distribution of sensitive migratory bird nesting territories.

3.d. Bat inventory: NPS will determine important habitat areas, improve the data base on bats, and develop a monitoring program on Lake Mead NRA.

3.e. Relict frog (*Rana onca*) inventory: NPS will conduct amphibian inventories at Lake Mead NRA to identify, monitor and protect populations of sensitive amphibians, including the relict frog.

3.f. Springsnail (*Pyrgulopsis deaconi* and *P. turbatrix*) surveys: Springs in the northern Spring Mountains and Gold Butte area will be surveyed to determine habitat quality and locate springsnail populations.

3.g. Desert pocket mouse inventory: The Las Vegas Valley Water District (LVVWD) and UNLV will work cooperatively to conduct population inventories of the desert pocket mouse in southern Nevada.

4. *Monitoring*

4.a. Line distance sampling: UNR will conduct line distance sampling and other desert tortoise monitoring programs at specific sites in Clark County.

4.b. Springsnail monitoring: Monitoring protocol for springsnail populations and habitat will be developed based on the result of springsnail surveys.

4.c. Palmer's chipmunk monitoring: Palmer's chipmunk monitoring protocol will be developed using data collected from U.S. Geological Survey (USGS), UNLV, and NDOW.

4.d. Monitoring Avian Productivity and Survivorship (MAPS): NPS will establish a MAPS station at Lake Mead NRA to provide long-term data on the productivity, survivorship, and population sizes of avian species.

5. *Protective Measures*

5.a. Area of Critical Environmental Concern (ACEC) protection and management: BLM will conduct road maintenance, installation of barriers and boundary signs, and fence as necessary to keep livestock and wild horses and burros from adjacent allotments or Herd Management Areas from entering desert tortoise ACECs.

5.b. Bearpoppy (*Arctomecon*) fencing: BLM will construct a 6-foot chain-link fence around vulnerable populations adjacent to the Apex land sale area.

5.c. Construction of desert tortoise fencing along roads and highways: Fencing will continue to be installed along prioritized roads and highways under the direction of the Fencing Subcommittee of the I&M Committee to minimize mortality, injury, and illegal collection of desert tortoises. As the areas along these roads and highways are fenced, tortoises may repopulate areas previously affected by vehicular traffic.

5.d. Enhanced law enforcement and ranger capabilities on Federal lands: The agencies will increase law enforcement and ranger capabilities on BLM, NPS, and USFS lands. The BLM will hire four full-time law enforcement officers, NPS will hire one full-time LE officer, and the USFS will hire one permanent full-time Law Enforcement Officer, one permanent full-time Patrol/Unit Manager, and one permanent seasonal Wilderness Ranger.

5.e. Predator control program: U.S. Department of Agriculture (USDA) Nevada Animal Damage Control Program will provide a full time wildlife damage specialist in Clark County to monitor and aid in control of feral cats and dogs, brown-headed cowbirds, ravens, and other predator species that may affect the Covered Species.

5.f. Mesquite Management Program. BLM will implement the Mesquite Woodland Habitat Management Plan, including road/trail designations, road signing, garbage clean-up, installation of protective fences where necessary, installation of interpretive signs, and will take other management actions to protect mesquite woodlands in southern Nevada.

5.g. Bat gates on mines and caves: BLM and NPS will design and install bat-friendly gates on mines and caves that prevent access by people, while allowing access by bat species.

5.h. Maintain Boulder City Conservation Easement: A law enforcement officer will maintain and protect the Boulder City Conservation Easement.

6. *Restoration and Enhancement Measures*

6.a. MRREIAC restoration program on the Muddy River: MRREIAC will remove salt cedar (*Tamarix* spp.) and replant with native plants within the Muddy River riparian zone.

6.b. Riparian restoration and rehabilitation: NPS, BLM and USFS will utilize the Southern Nevada Restoration Team (SNRT) to implement on-the-ground

restoration for disturbed riparian systems on public lands, concentrating on removal of salt cedar and other noxious weeds from these areas.

6.c. Upland habitat restoration and rehabilitation: NPS and BLM will utilize the SNRT to implement on the ground restoration for disturbed upland areas on public lands, concentrating on removal of noxious weeds from these areas.

6.d. Las Vegas Wash Wetlands Park habitat restoration: Clark County Parks and Recreation Department will focus on wetland and riparian enhancement, restoration, and creation within the Wetlands Park, to increase habitat value by establishing native riparian and wetland vegetation.

6.e. Mesquite Management Program: BLM will implement the Mesquite Woodland Habitat Management Plan to enhance mesquite woodlands in southern Nevada.

6.f. Springsnail habitat restoration and reintroduction: A set of guidelines will be developed describing techniques necessary to restore disturbed habitats and reintroduce Covered springsnail species.

7. *Land Use Policies and Actions*

7.a. Management plans for state-listed covered plants: Management plans and conservation strategies for Las Vegas bearpoppy (*Arctomecon californica*), Blue Diamond cholla (*Opuntia whipplei* var. *multigeniculata*), sticky buckwheat (*Eriogonum viscidulum*), and threecorner milkvetch (*Astragalus geyeri* var. *clokeyanus*) will be developed.

7.b. Acquisition of grazing allotments: Clark County will continue to make funds available to purchase and exchange grazing allotments from willing sellers where such purchase or exchange meets specific habitat or species conservation goals.

7.c. Muddy River Land Acquisition Program: The County will assist in acquisition of land and habitat within along upper Muddy River. The Nature Conservancy (TNC) will work with willing sellers to explore the use of a variety of real estate options to focus on implementing conservation actions for priority parcels of riparian lands.

In addition, adaptive management activities funded in the first biennium include development of the spatial analysis/database/geographic information system (GIS), evaluation of indicator species, evaluation of the effects of rural roads, and development of a management efficacy monitoring program for the Muddy River.

As part of the MSHCP process, Federal and State land and resource managers may ultimately implement a total of approximately 650 specific conservation actions (refer to section 2.8 and Appendix A of the MSHCP for details on proposed conservation measures proposed by the

participating agencies including the USFS, the Service's Division of Refuges (Refuges), BLM, NPS, and State of Nevada). These actions would be accomplished through implementation of existing conservation plans and agreements within the Permit Area, which include the Mesquite Woodland Habitat Management Plan (MSHCP Appendix D), Upper Muddy River Site Conservation Plan (MSHCP Appendix E), MOA for the Las Vegas Bearpoppy (MSHCP Appendix F), Spring Mountains NRA CA (MSHCP Appendix G), and Blue Diamond Cholla CA, (MSHCP Appendix H).

The Service and Applicants recognize that it would neither be necessary nor feasible to carry out all proposed conservation actions in the initial years of the Permit period. Immediate conservation needs of the Covered Species would be identified and initially funded through the first biennial budget of the Permit. These measures, in conjunction with conservation actions carried out under existing resource management agency budgets and conservation programs, would minimize and mitigate the adverse effects of the proposed action during the initial years of the Permit. The appropriateness of these measures in future years, and the need to identify and fund additional conservation actions to replace or augment the initial measures, would be evaluated through the AMP. Funding under the MSHCP would be provided to agencies to *enhance* or implement *additional* programs to conserve and protect Covered Species and not to meet the agency obligations to accomplish their land management responsibilities.

In addition to activities directly funded through the MSHCP, the Applicants would coordinate and facilitate other conservation programs ongoing in Clark County, many of which would significantly augment, compliment, and enhance conservation activities funded through the MSHCP. These programs and activities have sources of funding external to those collected under the MSHCP. Among those external activities that significantly benefit the MSHCP are: (1) Federal and State agency resource management programs that benefit the species covered under the MSHCP; (2) remuneration fees collected by the Federal agencies for land disturbance within desert tortoise habitat; (3) development of the Las Vegas Wash Wetlands Park, which includes specific measures to create, restore, and enhance habitat for the benefit of species; and (4) participation in the PLMA land acquisition nomination process which is expected to generate an estimated $420 million, of which approximately half would directly complement the goals of the MSHCP. Under the PLMA, some lands currently classified as UMAs would become IMAs or LIMAs. These programs and their relation to the MSHCP are described in the *Environmental Baseline* section of this opinion.

Proposed Special Permit Terms and Conditions

The Service would condition the permit to elucidate several aspects of the MSHCP that were uncertain at the time the Applicants submitted their permit application, to assure that the effects of the proposed action are adequately minimized and mitigated. In addition to reiterating specific, key components of the MSHCP, these conditions specify the following additional requirements:

(1) Develop a Memorandum of Agreement within 9 months of permit issuance among the signatories of the Implementing Agreement (IA) conducting conservation actions funded under

the MSHCP, to ensure that any management or conservation actions that may potentially affect the Covered Species are reviewed by AMP for their effectiveness in the conservation of the species and their habitats,

(2) Develop or revise conservation management plans that identify the management and monitoring actions needed for the following areas or Covered Species: Low elevation uplands (Piute Eldorado Desert Wildlife Management Area [DWMA], Coyote Springs Valley DWMA, Mormon Mesa DWMA, Gold Butte DWMA, and catclaw habitats); desert riparian habitats (Muddy River, Virgin River, and Meadow Valley Wash); low elevation springs (including amphibian and aquatic snail species and bats); and low elevation plant species.

(3) Prohibition of take of desert riparian birds conditioned upon the acquisition of private lands in desert riparian habitats along the Muddy and Virgin rivers, and Meadow Valley Wash. The total number and location of acres to be acquired within each watershed will be identified in the conservation management plans described above through the AMP, the Permittees, the land management agencies, and the Service.

(4) No lethal take of birds or take of active nests is authorized.

(5) Schedules and conditions for completion of barrier fencing along roads and highways and at the translocation site.

(6) Only those conditions carried forward from the DCP for the take of desert tortoise would apply to properties identified in the DCP and MSHCP as Aerojet, which is located in Coyote Springs Valley.

(7) Future development or use of the Boulder City Conservation Easement must be consistent with the goals outlined in the DCP to protect and manage desert tortoise and its habitat, and measures would be taken to ensure maintenance in perpetuity, of connectivity for desert tortoise and other Covered Species.

The MSHCP, with the special permit terms and conditions imposed by the Service, is designed to minimize and mitigate the indirect, adverse effects of county-wide population growth on these conserved lands resulting from development, through coordination and funding of conservation activities that enhance, conserve, and protect the Covered Species and their habitats by removing primary ecosystem threats and stressors.

STATUS OF THE SPECIES/CRITICAL HABITAT (Rangewide)

Species of Greatest Concern/Critical Habitat

The Service has the greatest level of concern for seven Covered Species, including the desert tortoise, southwestern willow flycatcher, yellow-billed cuckoo, Blue Diamond cholla, Las Vegas bearpoppy, sticky buckwheat, and threecorner milkvetch. These species are State or federally listed, petitioned for listing, candidates for listing, or exhibit low population numbers, extremely limited distribution, or are subject to substantial threats which may result in declining status of the species.

Desert tortoise

The desert tortoise (*Gopherus agassizii*) is a large, herbivorous reptile found in portions of California, Arizona, Nevada, and Utah. It also occurs in Sonora and Sinaloa, Mexico. The Mojave population of the desert tortoise includes those animals living north and west of the Colorado River in the Mojave Desert of California, Nevada, Arizona, southwestern Utah, and in the Colorado Desert in California. Desert tortoises reach 20 to 36 cm (8 to 15 inches [in]) in carapace length. Adults have a domed carapace and relatively flat, unhinged plastron. Shell color is brownish, with yellow to tan scute centers. The forelimbs are flattened and adapted for digging and burrowing. Optimal habitat has been characterized as creosote bush scrub in which precipitation ranges from 5 to 20 cm (2 to 8 in), where a diversity of perennial plants is relatively high, and production of ephemerals is high (Luckenbach 1982, Turner and Brown 1982, Turner 1982). Soils must be friable enough for digging of burrows, but firm enough so that burrows do not collapse. Desert tortoises occur from below sea level to an elevation of 2,225 m (7,300 ft), but the most favorable habitat occurs at elevations of approximately 300 to 900 m (1,000 to 3,000 ft) (Luckenbach 1982).

Desert tortoises are most active during the spring and early summer when annual plants are most common. Additional activity occurs during warmer fall months and occasionally after summer rain storms. Desert tortoises spend the remainder of the year in burrows, escaping the extreme conditions of the desert. The size of desert tortoise home ranges vary with respect to location and year. Females have long-term home ranges that are approximately half that of the average male, which range from 10 to 80 ha (25 to 200 ac) (Berry 1986). Over its lifetime, each desert tortoise may require more than 4 square km (1.5 square miles [mi]) of habitat and make forays of more than 11 km (7 mi) at a time (Berry 1986). In drought years, the ability of tortoises to drink while surface water is available following rains may be crucial for tortoise survival. During droughts, tortoises forage over larger areas, increasing the likelihood of encounters with sources of injury or mortality including humans and other predators. Desert tortoises possess a combination of life history and reproductive characteristics which affect the ability of populations to survive external threats. Tortoises may require 20 years to reach sexual maturity (Turner et al. 1984; Bury 1987).

The desert tortoise is most commonly found within the desert scrub vegetation type, primarily in creosote bush scrub. In addition, it is found in succulent scrub, cheesebush scrub, blackbrush

scrub, hopsage scrub, shadscale scrub, microphyll woodland, Mojave saltbush-allscale scrub, and scrub-steppe vegetation types of the desert and semidesert grassland complex (Service 1994). Within these vegetation types, desert tortoises potentially can survive and reproduce where their basic habitat requirements are met. These requirements include a sufficient amount and quality of forage species; shelter sites for protection from predators and environmental extremes; suitable substrates for burrowing, nesting, and overwintering; various plants for shelter; and adequate area for movement, dispersal, and gene flow. Throughout most of the Mojave Region, tortoises occur most commonly on gently sloping terrain with soils ranging from sand to sandy-gravel and with scattered shrubs, and where there is abundant inter-shrub space for growth of herbaceous plants. Throughout their range, however, tortoises can be found in steeper, rockier areas. Further information on the range, biology, and ecology of the desert tortoise can be found in Berry (1984); Berry and Burge (1984); Burge (1978); Burge and Bradley (1976); Hovik and Hardenbrook (1989); Karl (1981, 1983a, 1983b); Luckenbach (1982); Service 1994; and Weinstein et al. (1987).

On August 4, 1989, the Service published an emergency rule listing the Mojave population of the desert tortoise as endangered (54 FR 42270). On April 2, 1990, the Service determined the Mojave population of the desert tortoise to be threatened (55 FR 12178). Reasons for the determination included loss of habitat from construction projects such as roads, housing and energy developments, and conversion of native habitat to agriculture. Grazing and OHVs have degraded additional habitat. Also cited as threatening the desert tortoise's continuing existence were illegal collection by humans for pets or consumption, URTD, predation on juvenile desert tortoises by common ravens (*Corvus corax*) and kit foxes (*Vulpes macrotis*), and collisions with vehicles on paved and unpaved roads. Fire is an increasingly important threat to desert tortoise habitat. Over 200,000 ha (500,000 ac) of desert lands burned in the Mojave Desert in the 1980s. Fires in Mojave desert scrub degrade or eliminate habitat for desert tortoises (Appendix D of Service 1994).

On February 8, 1994, the Service designated approximately 2.6 million ha (6.4 million ac) of critical habitat for the Mojave population of the desert tortoise in portions of California, Nevada, Arizona, and Utah (59 FR 5820), which became effective on March 10, 1994. Critical habitat is designated by the Service to identify the key biological and physical needs of the species and key areas for recovery, and focuses conservation actions on those areas. Critical habitat is composed of specific geographic areas that contain the primary constituent elements of critical habitat, consisting of the biological and physical attributes essential to the species' conservation within those areas, such as space, food, water, nutrition, cover, shelter, reproductive sites, and special habitats. The specific primary constituent elements of desert tortoise critical habitat are: Sufficient space to support viable populations within each of the six recovery units, and to provide for movement, dispersal, and gene flow; sufficient quality and quantity of forage species and the proper soil conditions to provide for the growth of these species; suitable substrates for burrowing, nesting, and overwintering; burrows, caliche caves, and other shelter sites; sufficient vegetation for shelter from temperature extremes and predators; and habitat protected from disturbance and human-caused mortality.

Approximately 500,000 ha (1.2 million ac) were designated as critical habitat in Nevada. Critical habitat units (CHUs) were based on recommendations for Desert Wildlife Management Areas (DWMA) outlined in the *Draft Recovery Plan for the Desert Tortoise (Mojave Population)* (Service 1993a). These DWMAs are also identified as "desert tortoise ACECs" by the BLM. Because the CHU boundaries were drawn to optimize reserve design, the CHU may contain both "suitable" and "unsuitable" habitat. Suitable habitat can be generally defined as areas that provide the primary constituent elements. The Northeastern Mojave Recovery Unit (RU) includes approximately 600,000 ha (1.5 million ac), and the Eastern Mojave RU includes approximately 500,000 ha (1.2 million ac) of critical habitat. The Service may issue an adverse modification opinion if it is determined that a proposed action is likely to preclude recovery of the tortoise in a particular CHU.

On June 28, 1994, the Service approved the final Desert Tortoise Recovery Plan (Service 1994). The Desert Tortoise Recovery Plan divides the range of the desert tortoise into 6 distinct population segments or RUs and recommends establishment of 14 DWMAs or ACECs throughout the recovery units. Within each DWMA/ACEC, the Desert Tortoise Recovery Plan recommends implementation of reserve-level protection of desert tortoise populations and habitat, while maintaining and protecting other sensitive species and ecosystem functions. The design of DWMAs/ACECs should follow accepted concepts of reserve design. As part of the actions needed to accomplish recovery, the Desert Tortoise Recovery Plan recommends that land management within all DWMAs/ACECs should restrict human activities that negatively impact desert tortoises (Service 1994). DWMAs/ACECs have been designated by the BLM through development or modification of their RMPs in Nevada, Arizona, and Utah. Land-use planning activities are underway in California to designate DWMAs/ACECs. The regulation of activities within critical habitat through section 7 consultation is based on recommendations in the Desert Tortoise Recovery Plan. DWMAs/ACECs have been designated in Utah, Arizona, and Nevada (Table 3). Similar designations are in progress in California for the Western Mojave RU, and Northern and Eastern Colorado RUs.

Recovery of the desert tortoise may occur at the recovery unit level which allows populations within each of the six recovery units to be recovered and delisted individually. Similarly, the jeopardy and adverse modification standards may be applied within or across recovery units (Service 1993b). Thus, proposals to implement the Desert Tortoise Recovery Plan in portions of a recovery unit cannot be evaluated with regard to jeopardy or adverse modification in a section 7 consultation without an understanding of proposed or existing management prescriptions occurring elsewhere in the recovery unit.

Table 3: Designated DWMAs/ACECs within the Northeastern and Eastern Mojave RUs.

DWMA or ACEC	Primary Land Manager	Acres DWMA or ACEC[1]	Critical Habitat Unit
Piute-Eldorado (NV)	Las Vegas Field Office (BLM) Needles Field Office (BLM) Lake Mead NRA (NPS)	464,100 453,800 53,400	Piute-Eldorado- NV
Beaver Dam Slope (NV, UT, AZ)	Dixie Field Office (BLM) Ely Field Office (BLM) AZ Strip Field Office (BLM)	41,100 36,900 48,400	Beaver Dam Slope- NV Beaver Dam Slope- UT Beaver Dam Slope- AZ
Gold Butte-Pakoon (NV, AZ)	Las Vegas Field Office (BLM) AZ Strip Field Office (BLM) Lake Mead NRA (NPS)	187,400 81,900 51,800	Gold Butte-Pakoon- NV Gold Butte-Pakoon- AZ
Mormon Mesa (NV)	Las Vegas Field Office (BLM) Ely Field Office (BLM)	151,400 109,700	Mormon Mesa
Coyote Spring (NV)	Las Vegas Field Office (BLM)	75,500	Mormon Mesa
Kane Springs (NV)	Ely Field Office (BLM)	65,900	Mormon Mesa
Virgin Slope (AZ)	AZ Strip Field Office (BLM)	45,900	Gold Butte-Pakoon- AZ
Ivanpah-Shadow Valley (CA)	Needles Field Office (BLM) and Mojave Nat. Preserve (NPS)[2]	1,513,200[2]	Ivanpah
Upper Virgin River (UT)	Dixie Field Office (BLM)	61,000	Upper Virgin River- UT
Total Acreage, DWMA/ACEC[2]		**4,073,800**	

[1] Area in acres rounded to the nearest 100 acres.
[2] Acreage figures are combined for the BLM and NPS and represents the acreage of critical habitat; DWMA/ACEC acreage in California is undetermined at this time.

Long-term monitoring of desert tortoise populations is a high priority recovery task as identified in the Desert Tortoise Recovery Plan. From 1995 to 1998, pilot field studies and workshops were conducted to develop a monitoring program for desert tortoise. In 1998, the Desert Tortoise Management Oversight Group chose line distance sampling as the appropriate method to determine rangewide desert tortoise population densities and trends. Monitoring of populations using this method is underway across the range of the desert tortoise and baseline

population data will be forthcoming within the next year. Successful rangewide monitoring will enable managers to evaluate the overall effectiveness of recovery actions and population responses to these actions, thus guiding recovery of the Mojave desert tortoise.

Southwestern willow flycatcher

The southwestern willow flycatcher (*Empidonax traillii extimus*) is a small neotropical migratory bird, with a grayish-green back and wings, whitish throat, light grey-olive breast, and pale yellowish belly. Two wingbars are visible and the eye ring is faint or absent. The upper mandible is dark; the lower is yellowish. It breeds in relatively dense growths of trees and shrubs in riparian ecosystems in the arid southwestern United States and possibly extreme northwestern Mexico. Surface water or saturated soil are typically present year-round or seasonally, and ground water is generally at a depth of less than 2 to 3 m (6.5 to 9 ft) within or adjacent to nesting habitat. Migration routes used by the flycatcher are not well documented. Migrant flycatchers may use non-riparian habitats or riparian habitats unsuitable for breeding. The flycatcher winters in Mexico, Central America, and northern South America (Phillips 1948, Gorski 1969, McCabe 1991, Koronkiewicz et al. 1998, Unitt 1999). Wintering habitat consists of partially open areas such as woodland borders, second-growth forests, brushy savanna edges, and scrubby fields with hedges in a humid to semi-arid climate (Stiles and Skutch 1989, Howell and Webb 1995, Ridgely and Tudor 1994). The vegetation is generally dense and shrubby, bordering and extending into wet areas.

The willow flycatcher is one of 11 flycatchers in the genus *Empidonax* that breeds in North America. The southwestern willow flycatcher is one of four subspecies of the willow flycatcher currently recognized (Hubbard 1987, Unitt 1987). *Empidonax* flycatchers are notoriously difficult to distinguish in the field, and separation of the four willow flycatcher subspecies is even more problematic. The willow flycatcher subspecies are distinguished primarily by subtle differences in color and morphology, including wing formula, bill length, and wing tail ratio (Unitt 1987 and 1997, Browning 1993), and habitat use.

The historical breeding range of the southwestern willow flycatcher included southern California, southern Nevada, southern Utah, Arizona, New Mexico, western Texas, southwestern Colorado, and extreme northwestern Mexico (Hubbard 1987, Unitt 1987, Browning 1993). The flycatcher's current range is similar to its historical range, but the quantity and quality of suitable habitat within this range has been reduced from historical levels. The flycatcher occurs from near sea level to over 2,600 m (8,500 ft), but is primarily found in lower elevation riparian habitats. Throughout its range, the flycatcher's distribution coincides with the occurrence of its riparian habitat, which forms a widely dispersed pattern of small, isolated areas within a vast arid region.

The flycatcher breeds in patchy to dense riparian habitats along streams or other wetlands, near or adjacent to surface water or underlain by saturated soil. Common tree and shrub species used as nesting habitat include willows (*Salix* spp.) seepwillow (*Baccharis* spp.), boxelder (*Acer negundo*), stinging nettle (*Urtica* spp.), blackberry (*Rubus* spp.), cottonwood (*Populus* spp.), arrow weed (*Pluchea sericea*), salt cedar, and Russian olive (*Eleagnus angustifolia*) (Grinnell

and Miller 1944; Phillips et al. 1964; Hubbard 1987; Whitfield 1990; Brown and Trosset 1989; Brown 1991; Sogge et al. 1993; Muiznieks et al. 1994; Maynard 1995; Cooper 1996; Skaggs 1996; Cooper 1997; McKernan and Braden 1998; Stoleson and Finch 1999; Paradzick et al. 1999). Habitat characteristics such as plant species composition, size and shape of habitat patch, canopy structure, vegetation height, and vegetation density all vary throughout the species' range. However, vegetation in the interior of the patch is generally dense, particularly within the first 3 to 4 m (10 to13 ft) above the ground, and in almost all cases, slow-moving or still surface water and/or saturated soil is present at or near breeding sites.

Historically, the southwestern willow flycatcher nested in native vegetation such as willows, boxelder, buttonbush, seepwillow, and cottonwoods (Grinnell and Miller 1944, Phillips 1948, Whitmore 1977, Unitt 1987). Following conversion of most riparian vegetation in the southwestern United States from native to non-native species, the southwestern willow flycatcher still nests in native vegetation where available, but also nests in thickets of non-native salt cedar and Russian olive, and in habitats with a mixture of native and non-native species (Hubbard 1987; Brown 1988; Sogge, 1993; Muiznieks et al. 1994; Maynard 1995; Sferra et al. 1997; Sogge et al. 1997; Paradzick et al. 1999).

Southwestern willow flycatchers typically arrive on breeding grounds between early May and early June, although some may establish territories as early as late April. Flycatchers lay 3 to 4 eggs, and incubation lasts 12 to 13 days. Nestlings fledge 12 to 15 days after hatching, and stay in the general vicinity of the nest area for 14 to15 days after fledging. Dispersal after the nesting cycle is poorly understood. Second clutches within a single breeding season are uncommon if the first nest is successful. Renesting may occur if the young from the first nest fledge by late June or if the first nest is lost or abandoned. Migration south to wintering grounds generally begins between mid August and mid September.

As of 1999, the current flycatcher population was estimated at approximately 1,000 pairs. The rangewide population is distributed in a large number of small breeding groups and a small number of large breeding groups. Marshall (2000) found that 53 percent of known flycatcher territories were in 10 sites rangewide, while the other 47 percent were distributed among 99 smaller sites comprising 10 or fewer territories.

Historically, southwestern willow flycatchers were most likely rare rangewide, but were known to be locally common in parts of their range where suitable habitat existed. Flycatcher populations have declined rangewide. The historic range of the flycatcher in California apparently included all lowland riparian areas of the southern third of the State, and the species once was considered common in the Los Angeles basin, the San Bernardino/Riverside area, San Diego County, coastal southern California, and along the lower Colorado River near Yuma. The flycatcher now exists only in small, disjunct nesting groups in California. The flycatcher has also declined in Arizona. Records indicate that the former range of the flycatcher in Arizona included portions of all major watersheds, but the species now only persists in several small, widely scattered locations. Whitmore (1977) noted that Behle (1943) listed the species as a common breeder in the streamside willows throughout the Virgin River valley in Utah, but is

now uncommon to rare. In portions of the Rio Grande Valley in New Mexico, suitable habitat and flycatchers no longer persist where they once may have been fairly common and widespread.

The primary cause of the flycatcher's decline has been identified as loss and modification of habitat. Flycatcher breeding populations are susceptible to local extirpation due to the stochastic nature of the processes that create, maintain, and regulate its habitat. Typical flycatcher habitat is frequently subjected to natural disturbances such as scouring flash floods, stream channel movement, periodic inundation, sediment deposition, and groundwater fluctuation that may destroy a habitat patch at one locale but create it in another. The dynamic nature of southwestern riparian ecosystems has now been altered by agricultural, urban, and industrial developments, and many of the processes needed to establish and perpetuate native riparian vegetation have been eliminated. Instream flows of rivers have been depleted, hydrological cycles have been altered, streambeds have been physically modified, and riparian vegetation has been removed. The major mechanisms resulting in loss and modification of habitat include the operation and maintenance of dams and reservoirs, diversions and groundwater pumping, channelization and bank stabilization, phreatophyte control, agricultural and urban development, livestock grazing, recreational activities, and fire. Non-native plant species such as salt cedar and Russian olive have replaced native riparian species, resulting in a decrease in habitat quality. Increased abundance of the brown-headed cowbird (*Molothrus ater*) has most likely resulted in increased incidence of brood parasitism within the flycatcher's range.

The Service included the flycatcher on its Animal Notice of Review as a category 2 candidate species on January 6, 1989 (54 FR 554). In 1991, the Service performed a status review of the southwestern willow flycatcher, and subsequently elevated the flycatcher from category 2 to category 1 candidate status on November 21, 1991 (56 FR 58804). This designation indicated that the Service had sufficient information to support a proposal to list the species under the Act. On January 30, 1992, the Service received a petition to list the southwestern willow flycatcher as an endangered species. The Service evaluated information in the petition and in its files, and on September 1, 1992 (57 FR 39664), published a finding that the petitioned action may be warranted. After an extension of the status review, the Service published a notice of its 12-month petition finding on July 23, 1993, in the form of a proposal to list the southwestern willow flycatcher as endangered, and to designate critical habitat for 1,038 km (643 mi) of riparian habitat (58 FR 39495).

A final rule listing the southwestern willow flycatcher as endangered was published on February 27, 1995 (60 FR 10694), and became effective on March 29, 1995. Following the review of comments received during the public comment period, the Service deferred the designation of critical habitat, invoking an extension on this decision until July 23, 1995. A moratorium on listing actions under the Act passed by Congress in April 1995 required the Service to cease work on the designation of critical habitat until the moratorium was lifted on April 26, 1996.

As a result of a March 20, 1997, U.S. District Court of Arizona decision in response to a lawsuit, the Service was directed to designate critical habitat for the southwestern willow flycatcher

within 120 days. The Service finalized critical habitat designation for 964 km (599 mi) of riparian habitat on July 22, 1997 (62 FR 39129), with a correction made August 20, 1997 (62 FR 44228). Critical habitat was designated in 18 units within the states of California, Arizona, and New Mexico. Designated critical habitat for the southwestern willow flycatcher does not occur within the Permit Area.

Yellow-billed cuckoo

The yellow-billed cuckoo (*Coccyzus americanus*) is one of two species belonging to the family *Cuculidae* that breeds in the United States. Both the yellow-billed cuckoo and the black-billed cuckoo (*C. erythropthalmus*) are widely distributed throughout the United States, but only the yellow-billed cuckoo extends its range into the western and southwestern regions. The yellow-billed cuckoo is a neotropical migratory bird that nests in extensive woodlands and riparian areas with dense, brushy undergrowth. It is a slender long-tailed bird, with grayish brown upper parts glossed with olive, dull white underparts shaded with pale bluish gray or buff, and large rufous wing patches. A pattern of six large white spots is apparent on the underside of the long graduated tail. Yellow-billed cuckoos have a black upper mandible and a yellow to orange yellow lower mandible with a black tip. Females are slightly larger than males, but are otherwise sexually monomorphic.

In the western United States, cuckoos are restricted to riparian areas that commonly support a mixture of mature cottonwood and willow. Cuckoos generally build nests in the dense willow understory and use the cottonwood overstory for foraging. Birds most often occupy habitat patches greater than 40 ha (100 ac) in size and are greater than 200 m (650 ft) in width (Laymon and Halterman 1989). Occupied habitat is usually in the vicinity of slow-flowing or standing water. Its diet consists mainly of large insects such as caterpillars, katydids, cicadas, grasshoppers, and crickets (Nolan and Thompson 1975, Laymon 1980). It is a relatively late breeder, with nesting activity occurring from June through August. Clutch size varies from one to five eggs with typical clutches of two or three eggs. Incubation lasts 9 to 11 days, and chicks fledge 7 to 9 days after hatching. The nesting cycle is among the shortest for any species of bird.

The species is common in eastern regions of the United States but declining in the west. Based on historical accounts, the yellow-billed cuckoo was widespread and locally common in California and Arizona; locally common in a few river reaches in New Mexico; common very locally in Oregon and Washington; generally local and uncommon in scattered drainages of the arid and semiarid portions of western Colorado, western Wyoming, Idaho, Nevada, and Utah; and, probably uncommon and very local in British Columbia. The last confirmed breeding records from the Pacific Northwest were in the 1930s in Washington and in the 1940s in Oregon. Arizona may support the largest remaining cuckoo population for states west of the Rocky Mountains, but the cuckoo may now be absent from many areas where it once occurred along the lower and middle Gila, the lower Salt, and the lower Colorado rivers. In California, where the yellow-billed cuckoo was once considered a common breeder in riparian forests (Cooper 1870, Belding 1890, Jay 1911, Shelton 1911, Willett 1912, Hanna 1937), populations declined to an estimated 122 to 163 pairs in 1977 (Gaines 1977). By 1987, the state's population was estimated at 31 to 42 pairs (Laymon and Halterman 1987), representing a 66 to 81 percent decline since

1977. Results from the latest state-wide survey estimate the California population at 41 to 45 pairs (Halterman et al. 2000). The species is rare in Colorado, Idaho, and Nevada, and the remaining breeding populations in Nevada may have been extirpated (Hughes 1999), although individuals are frequently observed.

Decline of the species has been attributed to loss, degradation, and fragmentation of riparian habitat in the western United States. Factors contributing to this loss include urban expansion, agricultural and flood control practices, livestock overgrazing, salt cedar invasion, operation and maintenance of dams and reservoirs, logging, and pesticide use.

The taxonomy of the western subspecies is currently under review. The yellow-billed cuckoo was separated into eastern (*Coccyzus americanus americanus*) and western (*Coccyzus americanus occidentalis*) subspecies by Ridgeway (1887), who cited a larger average size for birds from the western versus eastern United States. Several ornithologists who have questioned the validity of these subspecies since that time noted the small magnitude and inconsistency of differences between eastern and western cuckoos and the broad overlap in the size of eastern and western individuals (Todd and Carriker 1922, Swarth 1929, Van Tyne and Sutton 1937, Bent 1940, Monson and Phillips 1981). Two taxonomic studies have been conducted on the yellow-billed cuckoo since 1980. Banks (1988, 1990) concluded that the division of yellow-billed cuckoos into two subspecies was not supported by the morphological data and that all yellow-billed cuckoos should be classified as *C. americanus*. Franzreb and Laymon (1993) found small but statistically significant size differences between western and eastern cuckoos, but stated that the recognition of subspecies based on these differences was of uncertain significance, and recommended that the subspecies described by Ridgway (1887) be retained, pending further studies. The American Ornithological Union does not currently hold a position on the validity of yellow-billed cuckoo subspecies and has stated the need to evaluate the taxonomic standing of the subspecies of North American birds (American Ornithologists' Union 1998).

In 1986, the Service received a petition to list the western yellow-billed cuckoo as endangered in the States of California, Washington, Oregon, Idaho, and Nevada (Manolis et al. 1986). A 90-day finding was published on January 21, 1987 (52 FR 2239) stating that the petition presented substantial information indicating that the requested action may be warranted. The Service acknowledged in that finding the difficulties of defining a distinct, biologically defensible population segment of the western yellow-billed cuckoo for possible listing, and gaps in available information on its status in certain parts of its range. A 12-month finding was published on December 29, 1988 (53 FR 52746) stating that the petitioned action was not warranted, and that the petitioned area did not encompass either a distinct subspecies or a distinct population segment.

The Service received another petition on February 9, 1998, to list the yellow-billed cuckoo as an endangered species. The petitioners stated they believed the yellow-billed cuckoo to be endangered in a significant portion of its range (the western United States). The petitioners also stated that they believed this portion of the United States coincided with a valid subspecies of the yellow-billed cuckoo and that they would concur with a decision to list only the subspecies. The petitioners also requested that critical habitat be designated. A 90-day finding was published on

February 17, 2000 (65 FR 8104), stating that the petition presented substantial information indicating that the requested action may be warranted. A 12-month review of the status of the yellow-billed cuckoo is currently underway.

Blue Diamond cholla

Blue Diamond cholla (*Opuntia whipplei* var. *multigeniculata*) is a member of the cactus family (*Cactaceae*), endemic to Blue Diamond Hills, Clark County, Nevada. This cactus is a low, cholla-type prickly pear generally less than 0.5 m (20 in) tall. The arms of the cholla are closely spaced together. The greenish yellow flowers generally open in May and are followed by the somewhat fleshy, spineless yellow fruits in July.

The Blue Diamond Hills lie at the southeastern margin of the Spring Mountains Range, west of Las Vegas in the northern Mojave Desert. The cholla occurs from 1,050 to 1,325 m (3,450 to 4,350 ft) elevation where annual precipitation averages about 18 to 23 cm (7 to 9 in). It is restricted to dry limestone hills, underlain by gypsum, occurring mostly on west- to southwest-facing slopes and exposed ridges. This species forms part of a distinctive, unusual, and rare Nevada plant community, succulent scrub, which is characterized and dominated by a wide diversity of cactus, yucca, and agave species. Despite their formidable armor, many cacti serve as sources of forage and/or pollen to native wildlife. Because of their high drought and temperature tolerances, cacti and other succulents function as primary sources of productivity, biomass, and soil stabilization where most other plants are unable to survive. Because this species is restricted to such a small geographic area, it is inherently susceptible to catastrophic events such as fire and perhaps climatic changes, such as prolonged warming trends. The invasion of non-native annual grasses has promoted fire in the Mojave Desert where it was not known to occur at the present frequency and severity.

Overall, the population status of the Blue Diamond cholla is stable. Although the species is subject to threats, the area where it occurs is being actively managed for conservation of this species. Mining and associated activities, including scraping, clearing, and road construction for mine access have destroyed Blue Diamond cholla individuals as well as portions of habitat in the past. However, the threat of the mining has been significantly reduced in recent years and there are no existing mining claims within the habitat that will affect the Blue Diamond cholla in the future.

Blue Diamond cholla, as with other members of the cactus family, is subject to illegal collection. The rarity of this taxon, and its occurrence within an area particularly rich in cactus diversity, may make it particularly susceptible to collection. However, illegal collection has not occurred to a noticeable extent, perhaps because of the limited access into the remote canyons where this species is most abundant. This situation could change in the future with the increase of human populations adjacent to this area.

Future activities on the Blue Diamond cholla habitat found on private land could impact the species. The short-term effects of a future hydroelectric power generation project, or other developments on private land could directly and indirectly impact Blue Diamond cholla habitat.

The Blue Diamond cholla is a candidate for listing under the Act. This species was initially added to the candidate list in 1987 because of low numbers, very limited distribution, multiple threats and disturbances to the habitat, including potential mine expansion and development in the Blue Diamond Hills. In addition, the species was subject to limited on-the-ground management, leaving the species highly susceptible to disturbance.

The Blue Diamond cholla was listed as critically endangered in 1992 by the State of Nevada, NDF under NRS 527.260 *et. seq.*, and is also protected under the State's cactus, yucca, and Christmas tree law (NRS 527.060 *et. seq*). These statutes require permits for removal, destruction, or possession.

Las Vegas bearpoppy

The Las Vegas bearpoppy (*Arctomecon californica*), a member of the poppy family (*Papaveraceae*), is one of three species of a small genus of poppy endemic to the northeastern Mojave Desert. The Las Vegas bearpoppy is one of the most beautiful plants in the Mojave Desert. It is a low growing, broad, perennial that generally attains a height of 10 cm (4 in). It has large golden-yellow blooms and a cluster of silvery-green fuzzy, bear paw-shaped leaves at the base. The Las Vegas bearpoppy flowers in April and May. It is known from Clark County, Nevada, and Mohave County, Arizona. The species has never been known from California (the specific epithet *californica* was based on the original Mexican territory overlaying southern Nevada).

In Nevada, the Las Vegas bearpoppy is restricted to Clark County from the Las Vegas Valley eastward to the area north of Lake Mead. The majority of the bearpoppy habitat occurs on lands managed by NPS, BLM, State of Nevada, and Nellis Air Force Base. Habitat also occurs on private lands.

In Arizona, populations have been documented at a few remote, primarily undisturbed areas on public lands managed by BLM and NPS, on the Lake Mead NRA and the Grand Canyon National Park. It also occurs on the Hualapai Indian Reservation. There are also documented occurrences at Pierce's Ferry and on private lands. In the Grand Canyon, the bearpoppy is locally common and thought to be taxonomically discrete. Most of the Arizona sites are believed to be secure because of their remote locations, however some threats do exist.

Las Vegas bearpoppy habitat is characterized by barren, gravelly desert flats, hummocks, and slopes from 323 to 960 m (1,060 to 3,150 ft) elevation. The soils contain very pure gypsum derived from the Muddy Creek geologic formation. This species is found on edaphic islands in Mojave desert scrub dominated by creosote bush (*Larrea tridentata*), and shadscale (*Atriplex confertifolia*), and blackbrush (*Coleogyne ramosissima*) associations. The bearpoppy often occurs with other gypsophiles including silver-leaf daisy (*Enceliopsis argophylla*), Parry sandpaper plant (*Petalonyx parryi*), and Palmer phacelia (*Phacelia palmeri*). Sticky ringstem (*Anulocaulis leiosolenus*), a species also proposed for coverage under the MSHCP, is a common associate of the bearpoppy on these soils.

The rangewide status of the Las Vegas bearpoppy is thought to be stable because of the nature of Federal land management in the areas where it occurs. However, the Las Vegas Valley populations on non-Federal lands have been and continue to be subject to local extirpations as a result of urbanization and associated activities. Recreational activities such as OHV use pose threats to this species and its habitat. Dispersed recreation causes the loss of individuals, fragmentation of habitat, disturbance of the soil surface, and increased erosion over a potentially vast area. This species is also subject to collection pressures, particularly in years with sufficient precipitation, when this perennial herb can be seen in showy displays during April and May. Other impacts include burro and livestock grazing, water impoundment and development, and utility and highway corridor construction and maintenance.

A seven-year demographic study conducted by S.E. Meyer (1979) from 1978 to 1984 showed that the Las Vegas bearpoppy exhibits a "high fecundity" life history, typically with high fruit per flower and seed per ovule ratios. The plants were found to be short-lived (life-span of four to five years) and to exhibit large year-to-year fluctuations in population density for unknown reasons. Precipitation is likely to affect both germination and seedling establishment and mortality, but adult mortality appears insensitive to annual variability in the weather.

Nelson (1989) found that the mortality of seedlings was approximately 50 percent and 35 percent of the plants were expected to survive to reproduce, with 10 percent of those flowering a second time. Nelson also found that the Las Vegas bearpoppy is reproductively self-incompatible and individuals are often associated with a sizable seed bank, with greater than 2,000 seeds in a 60 cm (24 in) radius of an adult plant. These results suggest that population stability is closely associated with the fitness of the seed bank.

The Las Vegas bearpoppy is listed as critically endangered in the State of Nevada under NRS 527.270, which prohibits the removal or destruction of individual plants or their habitat except by permit. Recent losses of habitat suggest that the law, as currently enforced, is ineffective in preventing the destruction of the species on private lands or degradation on lands administered by BLM along the urban interface of public lands in the Las Vegas Valley.

Sticky buckwheat

Sticky buckwheat (*Eriogonum viscidulum*), a member of the buckwheat family (*Polygonaceae*), is a winter annual producing seeds which germinate following the occurrence of sufficient precipitation during winter months. The presence, number, and size of individual plants are correlated with moisture and probably temperature, so that these features vary from one year to another. Sticky buckwheat generally reaches a height of 4 dm (16 in). The leaves are all basal, and the stems and branches are finely glandular to such an extent that sand and debris commonly adhere to them (hence the common name). This species has small, yellowish flowers that generally open in April and May. Sticky buckwheat is endemic to the southeastern Mojave Desert, restricted to the Muddy Creek Formation of southern Nevada in Clark and Lincoln counties and adjacent extreme northwestern Arizona in Mohave County.

In Clark County, sticky buckwheat is distributed within the Muddy River drainage from Weiser Wash to the confluence with the Virgin River and on the Virgin River from Sand Hollow Wash to the confluence of the Colorado River at Middle Point. In Arizona, the species is known from occurrences within the Lake Mead NRA, and on BLM lands. Its range overlaps with that of threecorner milkvetch, a species also proposed for coverage under the MSHCP. Sticky buckwheat is typically found in Mojave desert scrub in fine-grained soil habitats (sand or sand-clay mixtures), such as low dunes, washes, beaches, and areas of aeolian accumulation between 427 and 762 m (1,400 and 2,500 ft) elevation. Common associates include white bursage, shadscale, big galleta grass (*Hilaria rigida*), croton (*Croton californica*), winterfat (*Krascheninnikovia lanata*), desert thorn (*Lycium andersonii*), bladder sage (*Salazaria mexicana*), and spiny hopsage (*Grayia spinosa*). Annual precipitation in these areas is generally 6.35 to 19.05 cm (2.5 to 7.5 in), most of which falls during the winter months.

Rangewide information on the population status of sticky buckwheat is unavailable. In addition, due to the ephemeral nature of the species, extreme year-to-year variability is not uncommon, complicating the formulation of status and trend data. The species and its habitat are threatened by recreation, burro and livestock grazing, sand and gravel mining activity between Mesquite and the Muddy River, utility corridor construction and maintenance, flooding, and displacement by salt cedar and arrow weed in shoreline habitat.

Threecorner milkvetch

The distribution of threecorner milkvetch (*Astragalus geyeri* var. *triquetrus*), a member of the pea family (*Fabaceae*) overlaps that of sticky buckwheat. It is also endemic to the southeastern Mojave Desert, limited to the eastern portion of Lincoln and Clark counties, Nevada, and the extreme northwestern portion of Mohave County, Arizona.

Like sticky buckwheat, threecorner milkvetch is also a winter annual, producing seeds that germinate following the occurrence of sufficient precipitation during winter months. The species is believed to be an ephemeral annual, thus presence, number, and size are correlated with moisture and probably temperature. Varying annually in some instances, individuals may persist for years at a time. Generally threecorner milkvetch stems are 1 to 2 dm (4 to 8 in) long, and are usually covered with fine ash-colored hairs. Usually appearing in April, the flowers are small and white while the pods are oblong, curved, and triangular in cross section.

Threecorner milkvetch is found near 730 m (2,395 ft) elevation in typical Mojave Desert plant communities such as Mojave desert scrub, saltbush scrub, and blackbrush scrub. It occupies sandy soils derived from sedimentary formations adjacent to Lake Mead and its tributary valleys, mostly on stabilized dune sands as well as in washes and gullies. It is also associated with Aztec sandstone outcrops. The surface of these stabilized sands is usually sparsely vegetated and cemented or hardened with cryptogamic crusts. Common associated perennial species include creosote bush, white bursage, ratany (*Krameria parviflora*), indigo bush (*Psorothamnus fremontii*), croton (*croton* spp.), Mormon tea (*Ephedra* spp.), and beaver tail cactus (*Opuntia basilaris*) (Niles et al. 1995).

The Clark County populations of threecorner milkvetch occur in the vicinities of Dry Lake Valley, Glendale, Riverside, Overton Arm, and Sandy Cove. It is known from one occurrence in Arizona in the Sand Hollow Wash area, about 16 km (10 mi) northeast of Mesquite, Nevada. Approximately 20 occurrences are known rangewide within about 18,000 ha (43,000 ac) of habitat.

Rangewide information on the population status of threecorner milkvetch is unavailable. In addition, due to the ephemeral nature of the species, extreme year-to-year variability is not uncommon, complicating the formulation of status and trend data. This species has been extirpated from some sites as a result of grazing and/or trampling by domestic and feral animals in high use areas. Therefore, they are often absent from intershrub areas and restricted to the shelter of established perennial shrubs. It is also affected by roads and trails that bisect and fragment the habitat. While plants continue to persist along the roadside, it is likely that individuals have been lost due to the establishment of the roads (Niles et al. 1995). The species and its habitat are also threatened by sand and gravel mining, expansion of rural communities and associated activities, and utility development.

Other Covered Species Not Listed as Threatened or Endangered

Silver-haired bat

The silver-haired bat (*Lasionycteris noctivagans*) is a medium-sized black bat with some of the hairs on the upper and under surface tipped with white. It is mostly a solitary bat generally found in forested areas. The distribution of the silver-haired bat includes most of the United States and the southern half of Canada, north into southeastern Alaska, and south of Texas into Mexico. Southern Nevada is the southern limit of its distribution in the western United States (Kunz 1982). Many silver-haired bats observed in Nevada may be transient spring migrants (O'Farrell and Rahn 2000). It is most often found in forested habitats, adjacent to streams, ponds, or other bodies of water (Kunz 1982).

The silver-haired bat is generally regarded as a tree-roosting species (Hall 1946, O'Farrell and Rahn 2000). Recent studies indicate that silver-haired bats roost almost exclusively in trees in summer, and generally use woodpecker hollows for maternity roosts (O'Farrell and Rahn 2000). It is known to use multiple roosts, switching roost sites frequently. It roosts singly or in small groups under exfoliating bark. In winter, it roosts in mines, caves, houses, crevices and hollow trees.

Reproductive information is described in Kunz (1982) and summarized here. Gestation period is 50 to 60 days and occurs in May and June. Females give birth to one or two young, with birth occurring most commonly in June and July. A lactation period of approximately 36 days was observed in Iowa. Females form maternity colonies of about 75 individuals (O'Farrell and Rahn 2000). Diet consists mostly of moths, but a variety of other insects are consumed. Threats to the species include timber harvesting, degradation and loss of riparian vegetation, and pesticide spraying.

Abundance, population dynamics, and survivorship of the silver-haired bat are not well known. Barbour and Davis (1969) state that it is erratic in abundance throughout its range. O'Farrell and Rahn (2000) state that it is locally common, at least seasonally, in Nevada.

Long-eared myotis

The long-eared myotis (*Myotis evotis*) is a medium-sized bat of cinnamon-buff color easily distinguished from other Nevada species of the genus *Myotis* by its long ears, which, when laid forward, extend about 6 mm (0.25 in) beyond the nose (Hall 1946). The species ranges from southwestern Canada south throughout the western United States and into Mexico. Two subspecies are recognized, both occurring in the United States. One subspecies, *M. e. evotis*, occurs in Nevada (see Manning and Jones 1989).

The long-eared myotis is primarily a forest-associated species. In Nevada, it is found throughout the state, primarily at higher elevations associated with coniferous forest. In northern Nevada, it is found in pinyon-juniper and above, and in southern Nevada it is only found in ponderosa pine and above. It is a year-round resident, and presumed to be non-migratory, hibernating locally (O'Farrell and Rahn 2000). It day-roosts in hollow trees, under loose bark, crevices in small rock outcrops, and occasionally mines, caves, and buildings. Caves, mines, and undersides of bridges are used as night roosts. It generally roosts singly or in small groups.

Females give birth to one young per year, usually in June or July. Females may form maternity colonies of usually less than 40 individuals. Diet consists of mostly moths, small beetles, and flies. This bat has been described as a hovering gleaner (Findley 1987). It forages near vegetation or close to the ground, picking its prey from the surface of leaves, rocks, tree trunks, and sometimes the ground. It also uses aerial pursuit as a foraging strategy. It prefers to forage near water along rivers and streams or over ponds (O'Farrell and Rahn 2000).

The status of the species is not well understood. It is more widespread and common in the northern portion of the state (Hall 1946). O'Farrell and Rahn (2000) regard it as widespread but uncommon almost everywhere within its range. Timber harvesting, recreational caving, mine reclamation and renewed mining, water impoundments, highway projects, bridge replacement, building demolition, and pest control are considered threats to the species (O'Farrell and Rahn 2000).

Long-legged myotis

The long-legged myotis (*Myotis volans*) is a medium-sized *Myotis* that is distinguishable from other North American *Myotis* by a combination of its short rounded ears that barely reach the tip of the nose when laid forward, small hind feet, distinctly keeled calcar, and fur on the underside of the wing membrane extending from the body out to a line joining the elbow and knee. Pelage color varies, and ranges from brownish buff to dark, reddish or blackish brown and cinnamon, with lighter brown to buff below. Its distribution includes western North America from extreme southeastern Alaska and western Canada to central Mexico. It occupies an elevational range from about 60 to 3,770 m (197 to 12,369 ft), but is most commonly found at elevations between

2,000 and 3,000 m (6,562 to 9,843 ft). Four subspecies are recognized, three of which occur in the United States. One subspecies, *M. v. interior*, is found in Nevada (see Warner and Czaplewski 1984).

The long-legged myotis is primarily a forest dwelling bat, but may also be found in association with riparian and desert habitats in some areas (Barbour and Davis 1969). Roost sites vary, and include abandoned buildings, cracks in the ground, cliff crevices, and beneath exfoliating bark. Day roosts are primarily in hollow trees. Caves and mine tunnels are used as night roosts and hibernacula.

Females give birth to one young per year, mostly in June and July, but the timing of the reproductive cycle has been observed to vary from mid-April to mid-August (Warner and Czaplewski 1984). Small maternity colonies from several dozen to as many as 500 are formed. Diet consists mainly of moths and other soft-bodied insects. Foraging occurs in open areas over ponds, streams, meadows, and forest clearings, primarily at canopy height. Their foraging pathways follow a direct, repetitive route throughout the night.

This bat was generally considered common throughout its range (Hall and Kelson 1959), but may now be experiencing declines due to its sensitivity to disturbance at roost sites. Threats to the species include timber harvest, aerial pesticide spraying, recreational caving, mine reclamation and renewed mining, water impoundments, building demolition, and pest control (O'Farrell and Rahn 2000).

Palmer's chipmunk

Palmer's chipmunk (*Tamias palmeri*) is endemic to the Spring Mountains in southern Nevada. It occupies the fir-pine and bristlecone pine communities from 2,100 to 3,700 m (7,000 to 12,000 ft) (Deacon et al. 1964). Bradley and Deacon (1967), Burt (1934), Hall (1946), and Hall and Kelson (1959) provide information on physical description and distribution. Males are approximately 214 mm (8.5 in) in length, and weigh approximately 65 g (2.3 oz). Females are slightly larger, with a length of 218 mm (8.6 in) and weighing approximately 75 g (2.6 oz). Few studies have been conducted on life history and specific habitat requirements of Palmer's chipmunk. Information from Deacon et al. (1964) and Westec Services, Inc. (1980) on Palmer's chipmunk distribution, life history, and habitat use is summarized below.

Palmer's chipmunk abundance is greatest primarily on the eastern side of the Spring Mountains, but chipmunks also occur on the western side on southeast facing slopes, in deep, cool, mesic drainages. Water, fallen logs, large rocks, and caves and crevices associated with cliff faces are common components of its habitat. Its diet consists mainly of seeds, including ponderosa pine (*Pinus ponderosa* var. *scopulorum*) and currant, but also includes up to 30 percent insects, most often in late summer. Vegetation is a minor, but consistent, component of its diet. Chipmunks become inactive during the coldest months of the winter, which typically includes December through April, with a small amount of activity observed February through April. Males are reproductively active from March through May, with reproductive activity declining rapidly in June. Females enter estrus in April, and gestation takes about 33 days. Young begin leaving the

nest in 5 weeks. Ground nests are used for hibernation, gestation, and early lactation. When young are approximately three-fourths grown, the family moves to a nest in a tree.

Overall, the population status of Palmer's chipmunk appears to be stable in those areas of the Spring Mountains with good chipmunk habitat; however, long-term trend data is not available. Highest densities of Palmer's chipmunks observed to date occur in the Deer Creek area, and range from seven to over eight animals per ha (Ambos and Tomlinson 1996). In general, chipmunk abundance appears to be depressed in areas of the Spring Mountains which receive heavy human use from recreational activities. Most human activities tend to concentrate in cooler canyon bottoms close to riparian areas, which is preferred chipmunk habitat. Factors that may adversely affect Palmer's chipmunk include wood-cutting activities, clearing of dead and downed woody material at campgrounds, loss of ground cover from trampling, water diversion, urban development, and predation by feral or domestic animals.

American peregrine falcon

The American peregrine falcon (*Falco peregrinus anatum)* is one of three subspecies of peregrine falcon recognized in North America. It is a medium-sized raptor with a dark gray back and crown, dark bars or streaks on a pale chest and abdomen, and heavy malar stripes on the face. Peregrines prey almost exclusively on other birds, and occasionally on bats, caught in mid-air (Hickey and Anderson 1969). It nests on tall cliffs or urban skyscrapers, and hunts for its food by diving after its prey at speeds reaching 320 km (200 mi) an hour. The American peregrine nests in southern Alaska, Canada, the United States, and northern Mexico. It typically lays three or four eggs in a scrape on a ledge, high on cliff walls or tall buildings. Incubation takes approximately 33 days, and 2 or 3 chicks usually hatch and fledge approximately 42 days later.

The American peregrine was probably never common, but the widespread use of organochlorine pesticides, mainly DDT, during the 1940s, 1950s, and 1960s contaminated the prey of the peregrine, resulting in reproductive failure and a drastic decline in peregrine populations throughout North America. Prior to the 1940s, the peregrine population in North America was estimated at 3,875 nesting pairs. By 1975, the population had dropped to 324 nesting pairs (for reviews, see Hickey and Anderson 1969, Kiff 1988, Peakall and Kiff 1988, Risebrough and Peakall 1988).

The American peregrine was listed as endangered in 1970 (35 FR 8491 and 35 FR 16047). The use of DDT was banned in Canada in 1970 and in the United States in 1972 (37 FR 13369). Since then, peregrine populations have increased to an estimated 1,650 breeding pairs in the United States and Canada (64 FR 46542). The ban of DDT, protection under the Act, and augmentation of the population through captive-breeding programs all contributed to the recovery of the peregrine. The American peregrine was subsequently removed from the Federal list of threatened and endangered species on August 25, 1999 (64 FR 46542). Section 4(g)(1) of the Act requires the Service to monitor a species for at least 5 years after delisting. A 13-year monitoring program will be implemented for the American peregrine which should be sufficient to detect an inability of the population to be self-sustaining. All information gathered during the

monitoring program will be reviewed to determine if relisting, continuation of monitoring, or termination of monitoring is appropriate.

Blue grosbeak

The blue grosbeak (*Guiraca caerulea*) is a large finch-like bird. The male is almost entirely a deep, rich blue color with two rusty or tan wingbars and a thick, conical bill (Terres 1995). The female is a warm brown color with two tan wingbars and occasional blue feathers on its upper parts (Pyle et al. 1987). Seven subspecies are described, with three occurring in the United States (Storer and Zimmerman 1959). Blue grosbeaks are opportunistic feeders, and will consume a wide variety of insects, snails, and seeds of wild and cultivated grasses (Martin et al. 1951; Bent 1968). Current breeding range encompasses approximately the southern half of the United States, and extends from northern New Jersey west to central South Dakota, southern Colorado, Utah, southern Nevada, to central interior California and south through Mexico and Central America (Ingold 1993; Terres 1995). Available information indicates that the breeding range has expanded northward since the early twentieth century into northern New Jersey, southern Ohio, and southern North Dakota (American Ornithologists' Union 1931; Stone 1937; Stewart and Kantrud 1972; Robbins et al. 1986; Andrle and Carroll 1988; Peterjohn 1989).

The blue grosbeak breeds in forest edges, old fields, hedgerows, stream edges, mesquite (*Prosopis* spp.), salt cedar, and multi-age southern pine forests. James (1971) determined habitat requirements to include low tree density, reduced canopy cover, more medium-sized trees than small trees, and low shrub density. Whitmore (1975, 1977) determined habitat requirements in the Virgin River Valley of southwestern Utah and northern Arizona to consist of heavy ground cover, few trees, low shrub density, and a low canopy. In southern California, it requires dense, low vegetation near water and open grassy areas (Unitt 1984), but in Arkansas near the Mississippi River it favors upland areas (James and Neal 1986). It nests from April or May through July or August, laying an average of three to five eggs. Incubation lasts 11 to 12 days, and chicks fledge 9 to 10 days after fledging (Stabler 1959). Nests are heavily parasitized by brown-headed cowbirds, but blue grosbeaks can successfully raise both cowbirds and their own chicks (Sutton 1967). Little information is available on the success of parasitized nests range wide.

Population size has probably always been small, with greatest densities occurring in the southeast. Breeding Bird Survey data indicate populations increased over the whole continent between 1965 and 1979, and along the northern edge of its range between 1982 and 1991. The data indicate a slight decline in the Basin and Range and Mojave regions over the 30-year period from 1966 to 1996. Drastic declines have been detected in Florida, Missouri, and Pennsylvania. In the arid regions of the United States, where blue grosbeaks most commonly occur within riparian areas, concern for the species exists due to the rapid loss and degradation of riparian habitats in the southwest.

Phainopepla

The phainopepla (*Phainopepla nitens*) is a frugivorous songbird that inhabits arid deserts and woodlands of the southwestern United States and Mexico. It is the only member of the Silky Flycatcher family (*Ptilogonatidae*) found in the United States. The male is a glossy black color with bright white wing patches, long tail, prominent crest, and red irises. The female is gray with off-white wing patches. Two subspecies are recognized (Van Tyne 1925, American Ornithologists' Union 1957, Phillips 1991), differentiated by wing and tail length. One subspecies, *P. n. lepida*, breeds in Nevada. The phainopepla ranges from California east to southern Nevada, northern Arizona, extreme southwestern Utah, southern New Mexico, and western Texas south to the highlands of southwestern Tamaulipas, northwestern Durango, southern Chihuahua, southern Hidalgo, and northwestern Oaxaca in Mexico.

The following habitat description is summarized from Chu and Walsberg (1999). Phainopeplas exhibit a unique seasonal shift in breeding distribution within its range that include both winter and summer breeding habitats. In the United States they occupy desert habitats of the Sonoran and Mojave deserts in the winter from September or October until May, breeding from February through late April. In the summer phainopeplas shift their breeding distribution into the cooler oak and sycamore riparian woodlands and chaparral habitats of California and Arizona. Breeding in summer habitats occurs from about mid May through August. There is considerable difference between winter and summer breeding habitats. In the winter phainopeplas breed in desert washes and riparian areas dominated by woody leguminous shrubs and trees such as acacia (*Acacia* spp.), mesquite, palo verde (*Cercidium* spp.), smoke tree (*Psorothamnus spinosa*), and ironwood (*Olneya tesota*). Selection for this type of vegetation is linked to the parasitic desert mistletoe (*Phoradendron californicum*) that uses many arborescent legumes as its host. Phainopeplas rely almost exclusively on the berries of mistletoe as its main diet during its winter residency in desert environments. Its summer habitats include semiarid woodlands consisting of oak (*Quercus* spp.), Joshua tree (*Yucca brevifolia*), and sycamore (*Platanus racemosa*) dominated ravines and rolling hillsides with scattered fruiting bushes occurring in open areas or woodland edges.

Clutch size is typically two, sometimes three, eggs. Incubation period is 14 days, and chicks fledge an average of 18 to 20 days after hatching (Krueger 1998). Adults initially feed nestlings mostly insects, but soon switch to a diet of regurgitated berries (Crouch 1939, Rand and Rand 1943, Walsberg 1977). Nest parasitism by cowbirds is rare.

Overall, the species is considered relatively common throughout its range, but densities can vary greatly, from absent in areas of apparently suitable habitat to 1.8 birds per ha (Walsberg 1977, Rosenberg et al. 1991). Local fluctuations in population size may be associated with low temperature or precipitation, and subsequent depletion of food sources. Populations in desert environments are most likely affected by annual variation in the success of the mistletoe berry crop. Mistletoes are not tolerant of low temperatures, and a cold winter that freezes mistletoes may preclude occupation of the area by phainopeplas until mistletoes recover several years later (Anderson and Ohmart 1978, Rosenberg et al. 1991). Breeding Bird Survey data for the period

1966 through 1999 indicate an increasing population trend in California, New Mexico, and Texas, and a decreasing trend in Arizona (Sauer et al. 2000).

Threats to phainopepla include the rapid loss of mesquite woodlands to urbanization, and continued loss and degradation of remaining mesquite and catclaw habitats from declining water tables, firewood cutting, increase in wildfires, sand and gravel operations, salt cedar invasion, and degradation of riparian areas from agricultural and urban development, modified stream flows, and increased human use (Grinnell 1914, Anderson and Ohmart 1978, Rosenberg et al. 1991, Krueger 1998).

Summer tanager

The summer tanager (*Piranga rubra*) is a large neotropical migratory songbird with red to red-orange plumage. Female plumage is brownish to orange-yellow. The summer tanager is noted for its consumption of bees and wasps, but it also eats a variety of insects and fruits. The summer tanager breeds throughout the eastern United States, primarily south of 40 degrees north latitude, and also in the southwestern United States and northern Mexico. It winters from central Mexico south through Central America and northern South America. Two subspecies are recognized (American Ornithologists' Union 1957), differentiated by plumage color, size, and wing shape. One subspecies, *P. r. cooperi*, breeds in Nevada.

Summer tanagers breed in deciduous forest in the eastern portions of its range, consisting of open deciduous woods near gaps or along edges (Robinson 1996). Western populations occupy riparian woodlands consisting of cottonwood, willow, mesquite, and salt cedar (Grinnell 1914, Bent 1958, Rosenberg et al. 1982, 1991, Robinson 1996). The breeding season runs from May through August. Tanagers typically lay three to four eggs. Incubation period is about 12 days, and chicks fledge 8 to10 days after hatching. Nests are known to be susceptible to parasitism by brown-headed cowbirds, but parasitism rates and host success rates of parasitized nests vary geographically (Robinson 1996).

Population status and trend varies geographically. Breeding Bird Survey data indicate that long-term (1966 to 1991) continent-wide trends are stable, but short-term (1982 to 1991) trends show a significant decline (Robinson 1996). In California, populations have declined severely in response to loss and degradation of riparian woodlands. Populations have declined particularly in the Lower Colorado River Valley due to conversion of riparian woodlands to agricultural lands (Rosenberg et al. 1991).

Vermilion flycatcher

The vermilion flycatcher (*Pyrocephalus rubinus*) is an insectivorous bird that breeds from southern California, southern Nevada, central Arizona, central New Mexico, and western Oklahoma south to South America. It winters from southern California and southern Nevada to the Gulf Coast, east to south-central Florida, and throughout Mexico south to Nicaragua, and from Colombia east across Venezuela to Guyana and south to northern Chile and central Argentina. The male's plumage is dark dusky to black on upper parts and tail, and brilliant

vermilion on underparts and crown. The female is dusky on upper parts, white on breast with dusky streaks, and washed with salmon or pink on belly and undertail coverts.

In the southwestern United States the vermilion flycatcher breeds in mesquite, cottonwood, willow, sycamore, oak, hackberry, and other trees and bushes bordering rivers or near water, especially associated with areas of open, brushy, or grassy vegetation or agricultural fields (DeGraaf and Rappole 1995). The nesting period occurs approximately from March or April through July, with fall migration beginning in September. An average of 2 to 4, usually 3, eggs are laid, incubation lasts 14 to 15 days, and chicks fledge 14 to 16 days after hatching (Bent 1942, Taylor and Hanson 1970). Terres (1995) states that nest parasitism by brown-headed cowbirds is rare; however, nest parasitism at a southern Nevada site has been observed to be common (Kathy Longshore, USGS BRD, pers. comm. 2000).

The vermilion flycatcher is considered a common bird throughout its range, but has experienced declines in the eastern portions of its distribution (DeGraaf and Rappole 1995). Threats to the vermilion flycatcher include those activities that result in loss and alteration of riparian habitats in the southwest.

Arizona Bell's vireo

The Arizona Bell's vireo (*Vireo bellii arizonae*) is one of four subspecies of Bell's vireo recognized in North America (American Ornithologists' Union 1957). It is a small insectivorous neotropical migrant with nondescript plumage, generally drab gray to green above, white to yellow below, and a clear breast. It has a faint white eye ring and two pale wingbars, the lower bar more prominent. Bell's vireo is distributed throughout the central and southwestern United States and northern Mexico. Arizona Bell's vireo breeds from southern Nevada, southwestern Utah, and northwestern and central Arizona south to southeastern California in the Lower Colorado River Valley and Sonora. Only the California subspecies, Least Bell's vireo (*V. b. pusillus*) is federally listed as endangered.

Breeding habitat consists of dense, low, shrubby vegetation, often near water in arid regions. Nest substrate plants are variable, and include willow, cottonwood, mesquite, rose (*Rosa* spp.), oak, arrow weed, seepwillow, and salt cedar. Bell's vireo is known as a habitat generalist in riparian scrubland dominated by salt cedar along the Colorado River in Grand Canyon, Arizona (Brown and Trosset 1989), and a specialist in native seepwillow and mesquite habitats of the Lower Colorado River Valley, Arizona, where salt cedar is rarely used (Rosenberg et al. 1991). It nests from April through July, laying an average of three to five eggs. Incubation lasts 14 days, and chicks fledge 10 to 12 days after hatching. Bell's vireo nests are parasitized by the brown-headed cowbird throughout the species' range at variable rates. Some recorded parasitism rates include: 54 percent in Indiana (Mumford 1952), 69 percent in Kansas (Barlow 1962), 13 percent in Indiana (Nolan 1960), 30 percent in Oklahoma (Overmire 1962), 56 percent along the Lower Colorado River (Serena 1986), 47 percent near San Diego, California (Salata 1981), and 6 percent along the Colorado River in Grand Canyon, Arizona (Brown 1993).

According to Breeding Bird Survey records, highest populations of Bell's vireos occur in Texas and Oklahoma. Populations in the eastern United States appear to be stable, while sharp recent declines of up to 40 percent have been indicated for the central United States (Robbins et al. 1986). In California, Least Bell's vireo numbers are low, although aggressive brown-headed cowbird trapping programs have reduced parasitism rates in this area. Arizona Bell's vireos in the Lower Colorado River Valley have severely declined since 1950, and may be nearly extirpated (Rosenberg et al. 1991). Factors attributed to declines in vireo populations include those activities that destroy, degrade, or modify riparian systems such as agricultural practices, urbanization, firewood cutting, grazing, flood control projects, operation and maintenance of dams and reservoirs, and invasion of riparian areas by non-native plant species.

Glossy snake

Two subspecies of glossy snake occur within Clark County. The Mojave glossy snake (*Arizona elegans candida*) occurs in the Mojave Desert region of California, approximately north of Ridgecrest, and a small portion of southwestern Nevada. The desert glossy snake (*A. e. eburnata*) occurs in the Mojave Desert region of California south of the distribution of the Mojave glossy snake in Clark County, Nevada, extreme southwestern Utah, and a small area of northwestern Arizona. Glossy snakes reach 66 to 178 cm (26 to 70 in) in total length, and are light brown, cream, pinkish, or yellowish gray above, with tan, brown, or gray blotches edged with black, and white or pale buff below. The Mojave and desert subspecies that occur within Nevada appear "washed out" or faded. Glossy snakes are most common in arid desert habitats dominated by creosote bush but also occur in chaparral, sagebrush, valley-foothill hardwood, pinyon-juniper, and annual grass below 1,830 m (6,000 ft). This species prefers open sandy areas with scattered brush, but also occurs in rocky areas.

Glossy snakes feed on a variety of desert lizards including juvenile desert iguanas (*Dipsosaurus dorsalis*) and zebra-tailed lizards (*Callisaurus draconoides*). They are listed as probable predators of side-blotched lizards (*Uta stansburiana*) by Ferguson et al. (1982). Captive individuals have been observed to eat young mice and small birds (Stebbins 1954). Primarily nocturnal, glossy snakes spend periods of inactivity during the day and during winter in mammal burrows and rock outcrops, and to a lesser extent under surface objects such as flat rocks and vegetation residue. Individuals occasionally burrow in loose soil.

Glossy snakes are expected to breed in the spring soon after the end of the period of winter inactivity. Eggs are probably laid in early July, a few centimeters below the surface in loose soil, under surface objects or near the base of vegetation, or in abandoned mammal burrows. Clutch sizes range from 3 to 23 eggs. Hatching occurs from late August to mid-September (Stebbins 1954, Aldridge 1979).

Glossy snake predators include mammals, owls, and other snakes. Glossy snakes are impacted by casual and commercial collection, roads and vehicles including OHVs, intentional killing when encountered by humans, and habitat disturbance. However, the glossy snake (both subspecies) is considered secure based on the occurrence of extensive habitat across most of its range, its secretive nature that reduces its visibility to humans and vulnerability to collection and

predation; wide distribution across a variety of habitat types; and absence of major threats or reports of mortality or population declines. Roads are most likely the greatest source of impact and mortality.

Western banded gecko

Two subspecies of the western banded gecko occur within the Permit Area, the desert banded gecko (*Coleonyx v. variegatus*) and the Utah banded gecko (*C. v. utahensis*). Both subspecies of banded geckos reach 5 to 7 cm (2 to 3 in) snout-vent length (SVL) and have soft, pliable skin, vertical pupils, and moveable eyelids. Their scalation is finely granular, toes slender, and tail is constricted at the base. The desert banded gecko occurs in southern Clark County, southern and eastern California, and western Arizona to the tip of the Baja California Peninsula and along the coast of Sonora, Mexico. The Utah banded gecko occurs in a relatively small area including extreme southwestern Utah and northwestern Arizona, and southeastern Nevada (Stebbins 1985, Degenhardt et al. 1996). An area of intergradation between these two subspecies occurs within most of the Clark and southern Nye, County, Nevada (Stebbins 1985).

The banded gecko is largely a desert habitat generalist, occurring in microhabitats ranging from creosote bush and other desert scrub to sotol-desert grassland to sagebrush and pinyon-juniper. This species occurs within desert vegetation on a wide variety of soil types, from sandy areas to bedrock, up to 1,500 m (5,000 ft) in elevation. The banded gecko may be found in all desert habitats up to pinyon-juniper, but is most abundant in sandy flats and desert washes. Parker (1972) reported densities of 12 to 25 geckos per ha (5 to10 per ac) in southern Arizona. Klauber (1945) found 19.4 geckos per 160 km (100 mi) in the Borrego area in San Diego County, California. On the best trips Klauber encountered one gecko on the road every 3.2 km (2 mi), or 24 specimens in 78.4 km (49 mi).

The peak activity period for the banded gecko is 2 hours after sunset (Klauber 1945, Miller and Stebbins 1964). They are active April through October with a peak in May. Juveniles may be intermittently active November through March (Klauber 1945, Parker 1972). During the day, geckos stay under rocks, rock caps, boards, fallen yucca stems, cow dung and other litter, or may seek refuge in mammal burrows (Klauber 1945, Miller and Stebbins 1964). Individual geckos do not move much; movement of linear distances beyond 50 m (164 ft) are exceptional. Banded geckos hibernate in burrows (Parker 1972).

Mating occurs from April to May, eggs are laid from May through September, and hatchlings appear July through November (Stebbins 1954, Fitch 1970, Parker 1972, Miller and Stebbins 1964). The highest frequency of gravid females was in May and June (Parker 1972). A typical egg clutch consists of two eggs. Two to three clutches per season are produced. Males and females reach maturity within one year at 52 mm (2.0 in) and 56 mm (2.2 in) SVL, respectively (Fitch 1970, Parker 1972).

Predators include leaf-nosed snakes (*Phyllorhynchus* spp.), western patch-nosed snakes (*Salvadora hexalepis*), night snakes (*Hypsiglena torquata*), sidewinders (*Crotalus cerastes*), western diamondback rattlesnakes (*Crotalus atrox*), coachwhips (*Masticophis flagellum*), and

zebra-tailed lizards (Klauber 1945, Parker 1972). Other possible predators are tarantulas, large centipedes, solpugids, other rattlesnake species, coyotes (*Canis latrans*), and kit foxes (Parker 1972). The banded gecko can have considerable dietary overlap with sympatric diurnal lizards. Therefore, time of activity may be of limited importance in reducing dietary overlap and competition (Huey and Pianka 1983).

Banded geckos are threatened by habitat destruction including removal of shelter sites, casual and commercial collection, and roads and vehicles including OHVs. However, the banded gecko (both subspecies) is considered secure throughout most of its range because of its wide distribution across a variety of habitat types; apparent adaptability to human disturbances that create cover (e.g., dumping of certain forms of trash or building materials); and absence of major threats or reports of mortality or population declines.

Sidewinder

The sidewinder is widely distributed and locally abundant in the Colorado and Mojave deserts and north just into the southern Great Basin. This species of the rattlesnake is considered to consist of the Mojave desert (*Crotalus cerastes cerastes*), Sonoran (*C. c. cercobombus*), and Colorado desert (*C. c. laterorepens*) subspecies. The range of the Mojave desert sidewinder includes southwestern Utah, southern Nevada and adjacent California. The Sonoran subspecies occurs in southern and central Arizona and northwestern Sonora, Mexico. The Colorado desert subspecies occurs in southern California, southwestern Arizona and northeastern Baja California del Norte. Only the Mojave desert subspecies occurs in the Permit Area. The sidewinder occurs in low-lying areas in a wide variety of desert habitats below 1,800 m (5,900 ft) in elevation. It is most abundant in areas with sand hummocks topped with creosote bushes or similar scrub species and areas with wind-blown sand in the vicinity of rodent burrows, especially at the bases of bushes. Rarely, this rattlesnake occurs in rocky or non-sandy habitats. Sidewinders are active from mid-spring to early fall, but activity may be restricted during the hottest part of the summer (Klauber 1972, Lowe and Norris 1950, Stebbins 1954). Sidewinders hibernate in rodent and desert tortoise burrows.

Sidewinders are 42 to 82 cm (17 to 33 in) in total length and generally pale in color, with cream, tan, pink, or gray dorsal colors, patterned with grayish, yellowish-brown, or tan blotches down the back. They have a dark eyestripe. The sidewinder's most distinctive feature is the hornlike supraocular scale that is pointed and upturned.

Secor (1994) calculated the mean home range of 14.7 ha (6 ac) for 14 sidewinders in the Kelso Dunes in San Bernardino County, California with a density of approximately 1 snake per ha. Brown (1970) reported that sidewinders can travel over 1 km (0.6 mi) in a single evening. Sidewinders typically exhibit sit-and-wait foraging behavior by cratering in the sand and waiting for a rodent or lizard to pass. This snake eats small mammals, lizards, and occasionally birds (Stebbins 1954, Klauber 1972). This snake has a set of behavioral and morphological specializations for living in sand. It normally buries itself in a coil in fine sand at the base of a bush, if available, or in the open. It may occasionally use mammal burrows or surface objects as cover. Sidewinders typically hibernate in rodent burrows (Ernst 1992).

Sidewinders typically breed in the spring and fall with young born beginning in the latter half of August. Sidewinders breed shortly after emergence in April and May and again in the fall. Young are born from mid-August to late November and litters range from 7 to 13 individuals (Stebbins 1954, Klauber 1972). Sidewinders are live-born and neonates probably require a safe and secure place for birth such as rodent burrows. This snake is primarily nocturnal, but in the early spring it is active at dusk and even occasionally during the day. It is active from early to mid-spring until late summer or early fall.

Sidewinder predators include American kestrels (*Falco sparvarius*), roadrunners (*Geococcyx californicus*), loggerhead shrikes (*Lanius ludovicianus*), red-tailed hawks (*Buteo jamaicensis)*, great horned owls (*Bubo viginianus*), ravens, coyotes (*Canis latrans*), kit foxes, leopard lizards, and ophiophagous snakes. Sidewinders are adversely affected by humans that intentionally kill rattlesnakes on sight, roads and vehicles including OHVs, habitat destruction, and casual and commercial collection. From 1986 through August 1998, 288 sidewinders were commercially collected under NDOW permits. Most of these sidewinders were collected in Clark and southern Nye counties. Although collected commercially in Nevada and by the public in other areas of its range, sidewinders are considered secure based on the occurrence of extensive habitat across most of its range and its wide distribution. Population declines of this species have not been reported. This rattlesnake is mostly impacted by roads and OHV activity.

Speckled rattlesnake

The speckled rattlesnake (*Crotalus mitchelli*) is widely distributed throughout the Colorado and Mojave deserts and north just into the Great Basin Desert. Five subspecies of speckled rattlesnake are recognized, but only two occur within the United States and Permit Area, both of which are Covered Species. The southwestern speckled rattlesnake (*Crotalus mitchelli pyrrhus*) occurs in southwestern Nevada and eastern California. The dorsal color of this rattlesnake varies widely across its range, and often matches the substrate in which it is found. The ground color of the southwestern speckled rattlesnake ranges from white to dark gray or varying shades of pink or orange with dark bands often split by a lighter color. The Panamint rattlesnake (*C. m. stephansi*), ranges from southwestern Utah through western Arizona to northwestern Sonora, Mexico, and through southern California and Baja California del Norte. The Panamint rattlesnake is tan or gray above with light brown blotches or bands that are more regular in outline and more distinctly edged with a light color than the southwestern speckled rattlesnake. Speckled rattlesnakes are 57 to 132 cm (23 to 52 in) in total length.

Speckled rattlesnakes occur from 300 to 2,200 m (1,000 to 7,300 ft) in elevation. This snake is primarily a desert dweller and prefers rocky areas and slopes. It is found in a wide variety of habitats, including Mojave desert scrub, black brush, and sagebrush, and occasionally in pinyon-juniper, valley-foothill woodland, and conifer habitats. It is most frequently encountered in hilly or mountainous areas that are dominated by scattered rocks or larger rock formations that provide shelter (Klauber 1972, Stebbins 1954). This snake is rarely encountered in large numbers and is probably uncommon in most habitats.

This rattlesnake feeds on rodents and other small mammals, lizards, and birds. It waits for prey to come within striking distance and also searches actively in rocky areas (Klauber 1972, Stebbins 1954). Speckled rattlesnakes are often found in association with rocky areas, canyons, steep hillsides and other areas offering rocky cover as well as dense vegetation. Rock formations, vegetation, and mammal burrows are used for cover (Klauber 1972, Stebbins 1954).

The speckled rattlesnake is primarily nocturnal but basks in the morning hours. It is most active from April into early October (Ernst 1992, Klauber 1972, Stebbins 1954). This rattlesnake typically hibernates communally in rock crevices, animal burrows, caves, and abandoned mines (Ernst 1992, Klauber 1972). It breeds in mid-spring, shortly after becoming active, and the young are born from July through September. Litters range from 3 to 11 young (Ernst 1992, Klauber 1972). Young are live-born and require a quiet, safe place for birth, such as under or within rock formations, thick vegetation or in burrows.

Speckled rattlesnakes are taken by mammalian predators, roadrunners and other avian predators, and kingsnakes. This species is adversely affected by habitat destruction, humans that intentionally kill rattlesnakes on sight, roads and vehicles including OHVs, and casual and commercial collection. From 1986 through August 1998, 314 speckled rattlesnakes were commercially collected under NDOW permits. These rattlesnakes were mostly collected in Clark, southern Nye, and Mineral counties. Although collected commercially in Nevada and by the public in other areas of its range, speckled rattlesnakes (both subspecies) are considered secure based on the occurrence of extensive, undisturbed habitat across most of its range and its wide distribution. Population declines of this species have not been reported. This rattlesnake is mostly impacted by roads.

Mojave green rattlesnake

The Mojave green rattlesnake (*Crotalus scutulatus scutulatus*) is widely distributed throughout the Mojave and extreme northern Colorado deserts, from extreme southwestern Utah and southern Nevada, into southern California, and southeast through southern Arizona and New Mexico. Mojave green rattlesnakes are 60 to 129 cm (24 to 51 in) in total length and have well-defined, light-edged diamond blotches on their back that are dark gray to brown in color. The ground color of the rattlesnake is greenish gray, olive green, brownish, or yellowish. A white to yellowish stripe extends from behind the eye to a point behind the corner of the mouth. The tail has contrasting light and narrower dark bands.

The Mojave green rattlesnake is found from near sea level to 2,000 m (6,560 ft) in elevation and prefers Mojave desert scrub habitat dominated by creosote bush with desert flats or rocky hillsides. This species is primarily nocturnal, but occasionally is crepuscular and active from April until September. In hot years, it may become inactive in mid-summer and may, or may not, re-emerge in fall (Stebbins 1954, Klauber 1972). Mojave green rattlesnakes are probably the common ground snake around Wickenburg, Arizona (Ernst 1992).

This rattlesnake feeds primarily on rodents and occasionally rabbits as adults; however, juvenile diets include lizards. It forages actively in the open and under bushes, and takes cover in burrows, under rocks, in rodent burrows, and beneath shrubs (Woodin 1953, Klauber 1972).

It uses burrows, presumably rodent burrows, for giving live birth to 2 to13 young in July and August (Klauber 1972). This species is probably taken by kingsnakes, roadrunners, and other avian and mammalian predators.

Mojave green rattlesnakes are adversely affected by habitat destruction, humans that intentionally kill rattlesnakes on sight, roads and vehicles including OHVs, and casual and commercial collection. Although collected commercially in Nevada and by the public in other areas of its range, Mojave green rattlesnakes are considered secure based on the occurrence of extensive habitat across most of its range and its wide distribution throughout the desert southwest and most of northern Mexico. No data are available on the relative density or population dynamics of this rattlesnake species but it is locally common in some areas of Arizona (Ernst 1992). Population declines of this species have not been reported. The Mojave green rattlesnake is probably the most dangerous snake in North America.

Great Basin collared lizard

The Great Basin subspecies of the desert collared lizard (*Crotaphytus insularis bicintores*) ranges from southwestern Arizona into eastern California, southern and western Nevada, extreme northeastern California , southeastern Oregon, and southwestern Idaho, to 2,290 m (7,500 ft) in elevation. Individuals of this subspecies reach 7 to 11 cm (2.7 to 4.5 in) SVL and have two dark collars at the base of the neck. This is a robust lizard with a relatively large, broad head and tail flattened from side to side. Many anecdotal reports on the natural history of this species have appeared, although no general treatment on the ecology of the species has been published (McGuire 1996). This subspecies is found in creosote bush, saltbush, and sagebrush communities. It is generally restricted to rocky habitats with scant vegetation. These are diurnal lizards often seen perched atop dark volcanic rocks at temperatures above 37 degrees Celsius (98 degrees Fahrenheit). Collared lizards become active in the spring as early as mid-March. The collared lizard is considered a long-lived lizard, probably reaching 9 to 10 years of age. These lizards reach sexual maturity by two years of age. Collared lizards breed in April, producing a single clutch of three to eight eggs in good years.

The diet of this lizard appears to consist primarily of arthropods and small lizards but it may also consume some plant matter (McGuire 1996). Collared lizards are threatened by habitat destruction including removal of shelter sites, roads and vehicles, including OHVs, and casual and commercial collection. From 1986 through August 1998, a total of 45,466 Great Basin collared lizards were reported as commercially collected under NDOW permits. These lizards were mostly collected in southern and western Nevada. Although collected commercially in Nevada and by the public in other areas of its range, Great Basin collared lizards are considered secure based on the occurrence of extensive habitat across most of its range and its wide distribution across a variety of habitat types. Population declines of this species have not been reported.

Desert iguana

The desert iguana (*Dipsosaurus dorsalis*) is primarily herbivorous, feeding on leaves, buds, and flowers of desert plants including creosote bush. Desert iguanas reach 10 to 14 cm (4 to 6 in) SVL. This is a pale, round-bodied lizard with a long, slender tail and a relatively small round head. Its diet also includes insects and carrion. Desert iguanas appear to reach the greatest densities in habitats that support the greatest productivity of plant species (e.g., sandy desert flats and washes).

The desert iguana occurs from southern Nevada southward throughout Baja California and northern Sinaloa, Mexico, and southern California to central Arizona below 1,000 m (3,300 ft) elevation. In the northern portion of its range, which includes the United States, the desert iguana occurs in close association with creosote bush which provides shelter and a large portion of the lizard's spring diet. Desert iguanas occur in subtropical thornscrub in the southern portion of its range which includes Mexico. Desert iguanas are most common in Mojave desert scrub, sand dune, and Joshua tree woodland habitat, though it can be found in salt desert scrub. Although most common in sandy creosote flats, desert iguanas may also be found in rocky hillsides and streambeds. These lizards most often occupy rodent burrows in the hummocks of sand at the base of desert shrubs, though desert iguanas will dig their own burrows. Like other desert reptiles, desert iguana occur within a relatively small segment of the entire available habitat (Norris 1953).

Female desert iguanas reach sexual maturity between 33 and 45 months of age, and males at approximately 45 months (Howland 1988). The breeding season for desert iguanas occurs during April and May, with oviposition (egg laying) occurring in June and July, and hatching in August. During the period of courtship pairs of lizards (presumably male and female) have been reported foraging together, suggesting pair-bonds (Norris 1953). There is strong evidence that only one clutch of eggs is laid each year (Norris 1953, Mayhew 1971). Clutches typically consist of two to six eggs.

This species is more heat-tolerant than any other North American reptile. It emerges later in the year and later in the day than other lizards and remains active longer into the hottest part of the day than other lizards. Krekorian (1976) determined male home ranges of 0.15 ha (0.36 ac) and female ranges of 0.16 ha (0.38 acre). Krekorian (1983, 1984) reported population densities as high as 300 to700 individuals per ha in Coachella Valley, California. Adult desert iguanas generally become active between the end of March and early April, and enter hibernacula in the early fall, from late September to early October. Juvenile desert iguanas enter hibernacula a month or so later than adults (Norris 1953).

Howland (1988) reported a relatively high survivorship of desert iguanas. Twenty-four percent of adult iguanas captured in 1984 were recaptured in 1987, indicating a survival rate of 62 percent during this 3-year period. Predators of the desert iguana include the long-nosed leopard lizard, coachwhip snake, loggerhead shrike, sidewinder, glossy snake, and long-nosed snake (*Rhinocheilus lecontei*). Desert iguanas are adversely affected by habitat destruction, casual and commercial collection, and roads and vehicles including OHVs. From 1986 through

August 1998, a total of 11,671 desert iguanas were commercially collected in Nevada under NDOW permits. Although collected commercially in Nevada and by the public in other areas of its range, desert iguana populations are considered secure based on the occurrence of extensive habitat across most of its range, much of which is desert tortoise critical habitat, and its wide distribution across the desert southwest and into Mexico. Population declines have not been reported for this lizard.

Western red-tailed skink

The range of the western red-tailed skink (*Eumeces gilberti rubricaudatus*) is disjunct through southern California, southern Nevada, and northwestern and west-central Arizona. The western red-tailed skink reaches 6 to 11 cm (2 to 3 in) SVL. Adults are plain olive or brown with varied amounts of dark mottling. Young skinks have a red tail and dark lateral stripe that ends at the base of the tail. This subspecies of the Gilbert's skink (*E. gilberti*) has been found in Mojave desert scrub (Boone and Sowell 1999, Buus 1983); desert grassland (Jones et al. 1981); sagebrush, mixed conifer, pinyon-juniper, and chaparral woodland (Buus 1983), above 1,200 m (3,900 ft). This skink is most often found in rocky areas in the vicinity of intermittent or permanent streams and springs. In southwestern California, the skink occurs in areas with scattered brush, leaf litter, rock cover, and oak woodland, and has been found in association with night lizards in Joshua forests (Rodgers and Fitch 1947).

Little is known about the natural history of the western red-tailed skink. This species is believed to lay three to nine eggs during the summer and feed on insects and spiders (Stebbins 1985). This skink is believed to be secure throughout most of its range. This determination is based on its secretive nature that reduces its vulnerability to collection and predation; wide distribution across a variety of habitat types; and absence of major threats or reports of mortality or population declines. Potential threats to western red-tailed skinks in certain portions of their range include habitat loss and degradation, roads and vehicles, and reduced spring water flow and quality.

Large-spotted leopard lizard

The range of the large-spotted leopard lizard (*Gambelia wislizenii wislizenii*) includes the Great Basin, Mojave, Chihuahuan, and Sonoran deserts, southward from southeastern Oregon and southern Idaho to northern Sonora, Mexico, and the Baja California Peninsula except for the southern tip. It ranges eastward into the Chihuahuan Desert of northern Chihuahua, Mexico, into the Big Bend region of west Texas and into adjacent Coahuila, Mexico (Degenhardt et al. 1996). This is a large lizard that reaches 8 to 14 cm (3.2 to 5.7 in) SVL with many dark spots, a round body and long tail, and a large head. Ground color of this lizard is gray, pinkish, brown, or yellowish brown above. During the breeding season, females develop a reddish-orange color on the underside of the tail and on the sides. The large-spotted leopard lizard occurs in desert flats and foothills with sparse vegetation. This lizard can be found in Mojave desert scrub, salt desert scrub, and sagebrush habitats. This species is apparently not territorial. The diet of this lizard includes mostly insects and lizards but may also contain blossoms, seeds, fruits, and other plant material (Stebbins 1954).

Female leopard lizards do not attain sexual maturity until their third activity season at an age of 22 months. Leopard lizards produce two to seven eggs per clutch with young emerging in August and September (Stebbins 1954) and produce multiple clutches in favorable years. Individual females may live to be 8 years old, but most reproduction in a population is accomplished by females 3 and 4 years old. (McCoy 1967). Juvenile male leopard lizards may disperse 1 to 2 km (0.6 to 1.2 mi) (Parker and Pianka 1976).

Leopard lizards are threatened by habitat destruction including removal of shelter sites, roads and vehicles including OHVs, and casual and commercial collection. From 1986 through August 1998, a total of 18,006 leopard lizards were commercially collected in Nevada under NDOW permits. These lizards were mostly collected in southern and western Nevada. Although collected commercially in Nevada and by the public in other areas of its range, large-spotted leopard lizards are considered secure based on the occurrence of extensive habitat across most of its range and its wide distribution across a variety of habitat types. Population declines of this species have not been reported.

California kingsnake

The range of the California kingsnake (*Lampropeltis getula californica*), a subspecies of the common kingsnake, includes southwestern Oregon, California, central and southern Nevada, southwestern Utah, and western and central Arizona. The California kingsnake reaches 75 to 208 cm (30 to 82 in) in total length and, over most of its range, its pattern consists of alternating bands of black or dark brown with white or yellow background color. A black form without bands occurs in southern Arizona and a striped phase occurs in southern California and Baja California with a pale yellow or whitish mid-dorsal stripe.

This snake species is widely distributed, occurring in nearly all habitats below 2,130 m (7,000 ft) elevation. Kingsnakes are most abundant in valley-foothill riparian situations and in other habitats occurring in the vicinity of irrigated agriculture and cultivated areas. They are often found in the vicinity of rock outcrops and clumps of vegetation. This species is largely active during daytime or at dusk, but in desert areas it may be nocturnal (Stebbins 1954). California kingsnakes feed on lizards and snakes, small rodents, birds, and bird eggs. Some kingsnakes are known to eat rattlesnakes, but do not prefer these to other snakes. When inactive, kingsnakes seek cover in rodent burrows and under surface objects such as flat rocks, logs, and boards. At montane localities with cold winters, individuals hibernate in rodent burrows and in deep fissures in rock accumulations.

California kingsnakes breed from March to June, with egg-laying in June and July. Clutch sizes range from 2 to 12 eggs. Because of their activity patterns and local abundance, common kingsnakes are taken by a wide variety of predators including mammals, predatory birds, especially hawks, and other snakes. California kingsnakes are threatened by habitat destruction including removal of shelter sites, roads and vehicles including OHVs, casual and commercial collection, and humans that intentionally kill snakes on sight. However, the California kingsnake is considered secure throughout most of its range based on its wide distribution across a variety

of habitat types, its apparent adaptability to human disturbances that provide cover and prey; and an absence of major threats or reports of mortality or population declines.

Western leaf-nosed snake

The western leaf-nosed snake (*Phyllorhynchus decurtatus perkinsi*), a subspecies of the spotted leaf-nosed snake (*P. decurtatus*), is found throughout the Colorado and Mojave deserts in a wide variety of habitats. Leaf-nosed snakes are 30 to 50 cm (12 to 20 in) in total length, and pink, tan, yellowish, or pale gray above with no more than 17 mid-dorsal brown blotches between the back of the head and the region of the vent. These snakes are white below and have vertical pupils. This species is named for its much enlarged rostral scale that forms a leaf-like shield on its snout. It is a sand-burrowing snake that preys mostly on banded geckos and other lizards. It occurs in rocky and sandy flats and slopes but seldom in areas of uniformly sandy soil. This snake occurs in arid areas quite distant from water. It is most abundant in areas of mixed sandy soil and rocky or firm soil with some brush cover. In the southern parts of the range, this species can be active any time of year that temperatures are mild to warm, but the peak of activity is from April to July. Little is known about this secretive snake (Brattstrom 1953, Stebbins 1954).

Leaf-nosed snakes occasionally use surface cover, but typically burrow in loose soil or sand. Presumably, this species lays eggs in rodent burrows or loose soil (Stebbins 1954). This snake is nocturnal and is active in the early evening during mild to warm weather. Greatest activity occurs from April to July (Stebbins 1954). It may aestivate during extreme temperatures and likely hibernates. This snake lays two to four large eggs in June and July (Stebbins 1954). Predators include avian predators such as owls and roadrunners, mammalian predators, and kingsnakes. This species is adversely affected by habitat destruction, roads and vehicles including OHVs, casual and commercial collection, and humans that intentionally kill snakes on sight. However, the western leaf-nosed snake is considered secure based on the occurrence of extensive, undisturbed habitat across most of its range, its secretive nature that reduces its visibility to humans and vulnerability to collection and predation; wide distribution across the desert southwest, and absence of major threats or reports of mortality or population declines. Roads are most likely the greatest source of impact and mortality of this snake.

Relict leopard frog

Cope (1875) described *Rana onca* from an adult female collected in Washington County, Utah. The taxonomy of leopard frogs of southern Nevada and the Virgin River Valley have been involved in a regional controversy during much of the twentieth century. Until its rediscovery in 1991, the relict leopard frog was assumed extinct since the last specimen was collected in 1950. Following its rediscovery, the identity of the relict leopard frog was confused by the lowland leopard frog, *Rana yavapaiensis*, which was described by Platz and Frost (1984). The range of *R. yavapaiensis* extends north from Sonora, Mexico into southern and central Arizona, and southwestern New Mexico. Populations of the lowland leopard frog have been documented in the Imperial Valley of southern California, and the Virgin River Valley (Platz 1988). All the sites where the relict leopard frog has been collected occur within a narrow, low corridor of the Mojave Desert, extending from Las Vegas, northwest 140 km (85 mi) to just north of St. George,

Utah (Platz 1984) and along the Virgin River Valley into the Overton area of what is now Lake Mead. Currently, this frog is known from six sites, five of which are in Nevada and one in Arizona, from 370 to 760 m (1,200 to 2,500 ft) in elevation. Studies to define the taxonomic relationship among populations of leopard frogs in the southwestern United States are underway.

Relict leopard frogs are 4 to 9 cm (1.7 to 3.5 in) SVL and have indistinct dorsolateral folds that end well before the groin. These frogs are brown, gray, or greenish above, with greenish brown spots that are often reduced or obscure on the front of the body. Relict leopard frogs are whitish below, sometimes with gray or brown mottling, especially on the throat. The undersides of the hindlimbs are yellow or yellow-orange.

The relict leopard frog requires permanent water deep enough to escape predators (i.e., 30 to 40 cm [12 to16 in]) (Platz 1984). This frog breeds from March through May (Stebbins 1985). Remaining relict leopard frog populations occur in desert riparian or spring outflow systems and not in stream or river systems. These systems are characterized by cottonwood, salt cedar, willow, and mesquite.

As with most native leopard frog species, the relict leopard frog has been adversely affected by extensive alteration of habitats and the introduction of non-native fish and amphibian species (Hayes and Jennings 1986). Existing populations are small and quite isolated from each other, consisting of 50 to several hundred individuals (Heinrich 2000). Such small numbers, added to the fact that current habitats are marginal and restricted, are management concerns for the persistence of relict frog populations in the wild. NDOW and Arizona Game and Fish Department require a permit for collection and research on this species.

Western long-nosed snake

The western long-nosed snake (*Phyllorhynchus decurtatus*) occurs in desert regions east of the Sierra and Cascade ranges of California, north to the Oregon border, throughout Nevada, east through western Utah, southern and western Arizona, and into Mexico including extreme northern Sonora and northern Baja California. A snake primarily of deserts, plains, grasslands, arid brush lands, and coastal chaparral, the long-nosed snake is not expected in forested types. The long-nosed snake reaches 50 to 104 cm (20 to 41 in) and has black saddles that are flecked with whitish specks on the sides. Spaces between the saddles are cream, yellow, pink, or red, except for a whitish border next to the saddles. The belly is whitish or yellow, with a few dark spots towards the sides. The snout is long and pointed, and the head is only slightly wider than the neck. The lower jaw is inset.

Long-nosed snakes occur from sea level to 1,620 m (5,400 ft). This is a snake seldom encountered near stream courses. Although the long-nosed snake is primarily nocturnal and crepuscular, occasional diurnal activity has been reported. Individuals are most commonly encountered from April through June (Klauber 1941). A period of winter inactivity occurs at all localities.

Long-nosed snakes prey heavily on lizards but also take rodents and other small prey. Stebbins (1954) listed mammals, lizards and lizard eggs, and insects as among the food items taken. Captive individuals have also eaten small snakes. This snake is seldom found under surface objects; however, they are good burrowers. Nussbaum et al. (1983) report that disturbed individuals burrow rapidly into loose soil, and that they often lie covered with sand with only their head exposed. They may also seek cover in rock crevices (Stebbins 1954). Females are thought to deposit egg clutches in loose, moist, well-aerated soil or abandoned mammal burrows. Five to eight eggs are laid in July. Hatchlings emerge in late August or September. Predators of long-nosed snakes include hawks (Nussbaum et al. 1983) and other snakes (Cunningham 1959).

This snake species is threatened by habitat destruction, roads and vehicles including OHVs, casual and commercial collection, and humans that intentionally kill snakes on sight. From 1986 through August 1998, 271 long-nosed snakes were commercially collected under NDOW permits. Most of these snakes were collected in Clark and southern Nye counties. However, the long-nosed snake is considered secure based on the occurrence of extensive habitat across most of its range; wide distribution across a variety of habitat types; and absence of major threats or reports of mortality or population declines. Roads are most likely the greatest source of impact and mortality.

Sonoran lyre snake

The lyre snake (*Trimorphodon biscutatus*) is found on rocky slopes, in canyons, on mesas and in boulder piles up to elevations of 910 m (3,000 ft). Lyre snakes reach 45 to 121 cm (18 to 48 in) in total length. The lyre snake has cat-like vertical pupils, a broad head, and slender neck. This snake is named for the lyre- or V-shaped mark on the top of the head. Lyre snakes are light brown to pale gray above, with brown hexagonally-shaped blotches split by a pale crossbar, and cream or pale yellow below. It occurs in mountains and canyons and adjacent desert flats and plains. It is a secretive animal and may have a wider and more extensive range in the desert than is presently known (Stebbins 1954). Because it occurs in mostly rocky areas and is secretive, little information is available on its abundance. It is never found in great numbers (Stebbins 1954).

These snakes are mildly venomous but presumably not dangerous to man. This species inhabits hilly, mountainous and canyon areas dominated by rocks. It can be found under granite flakes and slabs but seems to prefer more secure cover. Lyre snakes forage in rocky areas on small vertebrates also living among the rocks. They eat bats, small rodents, lizards, and probably ground-nesting birds (Cowles and Bogert 1935, Krutzsch 1944). Eggs are probably laid deep under rock cover, and thus extensive rock cover may be a requirement. There is little information available on timing of hatching, however, Cowles and Bogert (1935) observed hatchlings that recently hatched on October 1.

This species is nocturnal, foraging at night and occasionally in the early morning (Stebbins 1954). It has been observed active every month of the year but November, with a peak of activity in April and May (Stebbins 1954). Lyre snakes are probably eaten by kingsnakes and other ophiophagous snakes, avian predators including roadrunners and perhaps owls, and

mammalian predators. The lyre snake may be an important predator on crevice-nesting bats (Krutzsch 1944).

Lyre snakes are threatened by habitat destruction including removal of shelter sites, roads and vehicles including OHVs, casual and commercial collection, and humans that intentionally kill snakes on sight. The widely used practice of prying up granite flakes by amateur and professional collectors for the pet industry has destroyed a great deal of habitat and represents a threat to this species (Stebbins 1954). However, the lyre snake is considered secure based on the occurrence of extensive, undisturbed habitat across most of its range, its secretive nature that reduces its visibility to humans and vulnerability to collection and predation; wide distribution across a variety of habitat types; and absence of major threats or reports of mortality or population declines. Roads are most likely the greatest source of impact and mortality.

Spring Mountains acastus checkerspot

The Spring Mountains acastus checkerspot (*Chlosyne acastus robustus*) is a brush-footed butterfly, typically 28 to 42 mm (1.10 to 1.65 in) from wingtip to wingtip. Both the male and female are dark in color. The distribution of this checkerspot encompasses the entire length of the Spring Mountains from Potosi Mountain to Mount Stirling, on both the east and west slopes. The most abundant populations are found in Kyle Canyon and Deer Creek, in riparian areas, mixed conifer forests, and pinyon-juniper woodlands (Boyd and Austin 1998).

The overall flight season of the Spring Mountains acastus checkerspot ranges from mid-May to late June, with the peak in late June. The peak is usually very short, often lasting only one to two weeks. The larval host plant has been assumed to be rabbitbrush (*Chrysothamnus* spp.) but this is undocumented. Attempts to rear a female Spring Mountains acastus checkerspot taken from Kyle Canyon on rubber rabbitbrush (*Chrysothamnus nauseosus*), resulted in 30 hatched ova, but all refused to feed on the plant. They were also offered sticky-leaf rabbit brush (*Chrysothamnus viscidiflorus*) which was consumed, however, none of these larvae fully developed or survived (Boyd and Austin 1998). Due to the many variables in this study, no inferences could be made regarding the larval host plant. The nectar host plant is Nevada sunflower (*Viguera multiflora* var. *nevadensis*).

The population status of the Spring Mountains acastus checkerspot is presumed stable throughout its range. Development, mainly in Kyle Canyon, has resulted in some impacts to the habitat, but overall, the majority of the known populations have persisted over time. There has been no documentation of recent decline, los or extensive degradation of habitat, or loss of populations. Further research needs to be conducted to determine the habitat and spatial requirements of the species, as well as the larval host plant.

Dark blue butterfly

The dark blue butterfly (*Euphilotes enoptes purpurea*) is also endemic to the Spring Mountains. It is a gossamer-winged butterfly, generally 19 to 28 mm (0.75 to 1.10 in) from wingtip to wingtip. The males are blue in color with checkered wing fringes, and the females are typically

brown, and may be spotted. The taxon is known to range from 1,500 to 2,500 m (4,920 to 8,200 ft) in elevation. This butterfly is not common in the Spring Mountains with the exception of the Willow and Cold Creek areas on the northeast end of the range. Their overall flight season spans from early June to early August, with no apparent peak in activity. They have a tendency to congregate on stream banks and seeps early in the flight season. Their habitat preferences include riparian areas, mixed conifer forests and pinyon-juniper woodlands.

Males appear approximately 1 month before the females. They can be found near water sources with standing mud, which they utilize for minerals and nutrients. The females emerge when their larval host plant, sulphur buckwheat (*Eriogonum umbellatum* var. *subaridum*), is in full bloom. This plant is also the main source of nectar for the adult butterflies and is widespread, but not abundant, in the pinyon-juniper and mixed conifer plant communities of the Spring Mountains. With the exception of the males visiting mud puddles, the adult butterflies have a vagility of 10 m (33 ft).

The population status of the dark blue butterfly is presumed stable throughout its range. Disturbance of riparian areas has resulted in some impacts to the habitat, but overall, the majority of the known populations have persisted over time. There has been no documentation of recent decline, loss or extensive degradation of habitat, or loss of populations. The large number of males converging on mud puddles early in the flight season indicates that the butterfly is dependent upon these sites to attain minerals and nutrition before the host plant is in bloom. Disturbance of these sites, or a lowering of the water table, could adversely affect the population.

Morand's checkerspot butterfly

The first documented occurrence of the endemic Morand's checkerspot butterfly (*Euphydryas anicia morandi*) was in the late 1920s. Collections range in elevation from 2,100 m to more than 3,200 m (6,890 to 10,500 ft). This species is a brush-footed butterfly. Both males and females are generally a medium shade of orange in color and have wings with dark "checkerspots." They are typically 31 to 44 mm (1.22 to 1.74 in) from wingtip to wingtip. The most abundant populations occur in the Lee Canyon Ski and Snowboard Resort area and in Kyle Canyon. However, neither supports a large population. There are three distinct phenotypic expressions of Morand's checkerspot in the Spring Mountains, ranging from very dark to light.

The Morand's checkerspot prefers habitats in the alpine zone, bristlecone woodlands, mixed conifer forests, and pinyon-juniper woodlands. Their overall flight season ranges from early May to early September with a peak in late June. This butterfly uses Indian paintbrush (*Castilleja linarifolia*) and Clokey's wavyleaf paintbrush (*Castilleja martinii*) as larval host plants, and desert wallflower (*Erysimum asperum*) as its nectar host plant. This species of checkerspot has a vagility of 10 to 100 m (33 to 328 ft).

A unique characteristic of Morand's checkerspot is that the larvae of the species can extend diapause, for up to several years, to enable them to better survive in years when the weather is less than ideal. Post diapause larvae can reenter diapause many times if their preferred nutrition source is not available.

The population status of Morand's checkerspot is presumed stable throughout its range. Recreational development has resulted in some impacts to the habitat, but overall, the majority of the known populations have persisted over time. There has been no documentation of recent decline, loss or extensive degradation of habitat, or loss of populations. The largest populations of Morand's checkerspot are found in the avalanche chutes above the ski area in Lee Canyon. Further recreational development into the upper slopes could result in loss of habitat and may adversely affect the population.

Spring Mountains comma skipper

The earliest known record of the Spring Mountains comma skipper (*Hesperia comma mojavensis*) was by O.C. Poling in the late 1920s. This endemic butterfly has since been found to be common and abundant range wide. This species of comma skipper is classified as a true skipper. Generally, the male is a dark tawny color with a dark wing border. The females are brownish with a darker border. Individuals are typically 28 to 31 mm (1.1 to 1.2 in) from wingtip to wingtip. It is distributed between 1,500 and 3,000 m (4,929 and 9,845 ft) in elevation. Colonies or individual butterflies have been observed at 48 sites in the Spring Mountains.

The overall flight season of the Spring Mountains comma skipper ranges from mid-May to mid-November, with peak activity occurring in late June to early July. The preferred larval host plant of this sub-species is unknown, however, other members of the species use grass and sedge species. The preferred nectar host plant for adult comma skippers are species of thistle. Other nectar host plants include rabbitbrush, common dandelion, and Palmer's penstemon (*Penstemon palmeri*).

The comma skipper prefers riparian habitat in mixed conifer forests and pinyon-juniper woodlands. Males of the species tend to congregate at sites with surface water or standing mud several weeks before the females appear. This suggests that they are dependent upon such sites for nutrients and minerals not available from their host plants at the time. Disturbance of these sites could adversely affect the comma skipper population. The population status of the Spring Mountains comma skipper is presumed stable throughout its range. Disturbance of riparian areas has resulted in some impacts to the habitat, but overall, the majority of the known populations have persisted over time. There has been no documentation of recent decline, loss or extensive degradation of habitat, or loss of populations.

Spring Mountains icarioides blue butterfly

The Spring Mountains icarioides blue (*Icaricia icariodes austinorum*) is both abundant in, and endemic to, the Spring Mountains. This butterfly is gossamer-winged and generally 28 to 34 mm (1.10 to 1.34 in) from wingtip to wingtip. Males are light blue in color with lilac reflections, and the females are variable, ranging from dark blue to brown. Their overall flight season is long and ranges from early May to late October, peaking in late June or early July. The largest concentration of this taxon is located in the central portion of the range, particularly in the Kyle Canyon area, 1,800 to 3,000 m (5,900 to 9,850 ft) in elevation. Habitat preferences include bristlecone pine woodlands and mixed conifer forests.

The Spring Mountains icarioides blue uses silver lupine (*Lupinus argenteus*) as its larval host plant, preferring the most pubescent plants for oviposition sites. Known nectar host plants include sulphur flower buckwheat (*Eriogonum umbellatum* var. *subaridum*), Douglas pincushion (*Chaenactis douglasii*), cinquefoil (*Potentilla* ssp.), and silver lupine (*Lupinus argenteus*). These butterflies have a vagility of 10 to 100 m (33 to 328 ft).

The population status of the Spring Mountains icarioides blue butterfly is presumed stable throughout its range. Disturbance of riparian areas has resulted in some impacts to the habitat, but overall, the majority of the known populations have persisted over time. There has been no documentation of recent decline, loss or extensive degradation of habitat, or loss of populations. This butterfly is dependent upon sites with surface water or standing mud to attain minerals and nutrition before the desired host plant is in bloom. Disturbance of these sites, by water diversion, or a lowering of the water table, could adversely affect populations.

Mount Charleston blue butterfly

The endemic Mount Charleston blue butterfly (*Icaricia shasta charlestonensis*) was first documented in the Spring Mountains from material collected in Lee Canyon in 1980. It is a gossamer-winged butterfly that is typically 22 to 28 mm (0.86 to 1.10 in) from wingtip to wingtip. The males are lilac blue with a brownish border and the females are similar but darker in color. Its distribution in the Spring Mountains is widespread at sites greater than 2,000 m (6,560 ft) elevation. Many large populations occur on sites that have been disturbed, but studies have shown that colonies can disappear when the disturbed areas become overgrown in the process of recovery (Boyd and Austin 1998).

The Mount Charleston blue requires open habitat such as ridge lines, ski runs, or avalanche paths in bristlecone woodlands or mixed conifer forests that will support its larval host plant, Torrey milkvetch (*Astragalus calycosus* var. *mancus*), which also serves as a nectar source. These sites occur primarily above 2,500 m (8,203 ft). The butterflies have a vagility of 10 to 100 m (33 to 328 ft). Torrey milkvetch is the only known nectar host plant. Their overall flight season ranges from mid-June to late September with an apparent peak of activity in late July.

The population status of the Mount Charleston blue butterfly is presumed stable throughout its range. There has been no documentation of recent decline, loss or extensive degradation of habitat, or loss of populations. There is a large population of its larval host plant in the Lee Canyon Ski and Snowboard Resort area. The major threat in this area is the long-term growth of trees and shrubs in the understory, which would crowd out the *Astragalus* and may adversely affect the butterfly.

Nevada admiral

O.C. Poling was the first to collect the Nevada admiral (*Limenitus weidemeyerii nevadae*) in the late 1920s. This butterfly is known from the Spring Mountains and the Sheep Range. It has been observed at elevations ranging from 1,500 to 2,800 m (4,920 to 9,200 ft) throughout virtually the entire length of the range. The Nevada admiral is a brush-footed butterfly and

generally both male and female are black in color with white-yellow bands. Typically they measure 56 to 78 mm (2.5 to 3.5 in) from wingtip to wingtip.

The Nevada admiral occurs in riparian habitats, bristlecone woodlands, mixed conifer forests and pinyon-juniper woodlands. The overall flight season ranges from mid-May through early October with peak activity in late June to early July.

The main larval host plant for the Nevada admiral is the aspen (*Populus tremuloides*), but this butterfly also uses willows and serviceberry. The species may be dependent upon willows at lower elevations as demonstrated in 1993 when fire in the Willow Creek area burned much of the willow vegetation and the species nearly disappeared from that area. The butterfly utilizes several nectar host plants including mountain balm (*Eriodictyon angustifolium*), thistles, and common horehound (*Marrubium vulgare*). The Nevada admiral has a vagility of 10 to 1,000 m (33 to 3280 ft).

The population status of the Nevada admiral is presumed stable throughout its range. A 1993 fire in Willow Creek resulted in some impacts to the habitat, but overall, populations are stable or increasing. There has been no documentation of recent decline, loss or extensive degradation of habitat, or loss of populations.

Carole's silverspot butterfly

Carole's silverspot (*Speyeria zerene carolae*) is endemic to the Spring Mountains and was one of the first butterflies to have been collected there. It was collected by O.C. Poling in the very early 1920s, but was not recognized as a distinct phenotype until Grey and dos Passos described it as *Speyeria coronis carolae* in 1942. In 1961 dos Passos placed the taxon as a subspecies of *Speyeria zerenne*. Carole's silverspot is a brush-footed butterfly and generally both male and female are a tawny-red to brown color. They typically measure 53 to 69 mm (2.5 to 2.3 in) from wingtip to wingtip.

Carole's silverspot is locally common on the east slope of the Spring Mountains, at elevations ranging from 2,000 to 2,700 m (6,560 to 8,860 ft). The largest populations are located in Kyle Canyon, and are associated with mixed conifer woodlands. Its flight season ranges from mid-June to early November, with the peak of activity in mid-late July. It is believed that its only larval host plant is Charleston limestone violet (*Viola purpurea* var. *charlestonensis*), the sole species of violet occurring in the Spring Mountains. Several nectar host plants are important to the silverspot including Arizona thistle, desert wallflower, and wood rose. Carole's silverspot has a vagility of 10 to 100 m (33 to 328 ft).

The population status of Carole's silverspot is presumed stable throughout its range. There has been no documentation of recent decline, loss or extensive degradation of habitat, or loss of populations. The presumed larval host plant, Charleston limestone violet, is also endemic to the Spring Mountains. The loss of this plant or its habitat may adversely affect the Carole's silverspot.

Spring Mountains springsnail

The Spring Mountains springsnail (*Pyrgulopsis deaconi*) was first collected in 1992, from Red Spring in the Red Rock Canyon NCA. The species is currently known from one other site in the Spring Mountains, Kiup Spring. A population in Willow Spring, located in Red Rock Canyon NCA, disappeared in the late 1980s or early 1990s, and a population in Manse Spring in southern Nye County, Nevada, was extirpated after the spring dried up in 1975 as a result of groundwater pumping.

The Spring Mountains springsnail averages 1.5 to 1.9 mm (less than 0.07 in) in length, and 1.3 to 1.7 mm (less than 0.06 in) in width, with a sub-globose shell, medium length filament, and a short lobe. The penial ornament is a small terminal gland with a large penial gland. The ventral gland is also large. They inhabit artesian spring ecosystems with permanent flowing, highly oxygenated waters. The waters must be highly mineralized, but relatively unpolluted. These springsnails feed on algae and complete their life cycle in one year.

The remaining populations of the Spring Mountains springsnail are apparently stable, although recreational use of spring sites has resulted in some impacts to the habitat. The greatest threat is recreational use of the springs. Large areas of bare ground bordering the springbrooks at several sites, could accelerate erosion and alter the physical condition of the spring including water quality and temperature. Most of the springsnail habitat is found within the Red Rock Wild Horse and Burro Management Area, and soils around some of the springs in this area are compacted, which may eventually affect water quality. Spring habitat degradation has also encouraged weed growth, further degrading water quality and the site in general. Spring Mountains springsnail is naturally rare and thus, vulnerable to stochastic events.

Southeast Nevada springsnail

The Southeast Nevada springsnail (*Pyrgulopsis turbatrix*) was first collected July 1995, from Horseshutem Springs on the northwest side of the Spring Mountains in Nye County, Nevada. It has since been collected in six other springs in the Spring Mountains. They are also found in several isolated basins in Nye County, Nevada.

The Southeast Nevada springsnail is a medium-sized snail with an average height of 2.1 to 3.6 mm (less than 0.14 in), and an average width of 1.5 to 2.2 mm (less than 0.09 in), with a narrow-conic to turriform shell, and a medium length filament and lobe. The penial ornament is a small terminal gland with a very small (sometimes absent) penial gland. They inhabit spring ecosystems with permanent flowing, highly oxygenated waters. The water must have a high mineral content, but it must be comparatively unpolluted. These springsnails feed on algae and complete their life cycle in one year.

The population status of the Southeast Nevada springsnail is presumed stable throughout its range. Recreational and ungulate use of spring sites has resulted in some impacts to the habitat and loss of individuals, but overall, populations have persisted over time. There has been no documentation of recent decline, loss or extensive degradation of habitat, or loss of populations.

The greatest threat to the Southeast Nevada springsnail is ground disturbance from recreational and ungulate use of the springs. Misuse and overuse of the areas have created large areas of bare ground that border the springbrooks. This condition could accelerate erosion and alter the physical condition of the spring including water quality and temperature. Spring habitat degradation has also facilitated weed growth resulting in further degradation of the water quality and the site in general. Southeast Nevada springsnail is naturally rare and thus is vulnerable to stochastic events.

Rough angelica

Rough angelica (*Angelica scabrida*) is one of 15 plant taxa endemic to the Spring Mountains Range, one of the higher continental concentrations of endemic plant species in North America (Nachlinger and Sheldon 1995). Rough angelica is a tall, alternate-leaved perennial, in the carrot family (*Apiaceae*), that attains a height up to 15 dm (60 in). Parts of the plant are scabrous or rough to the touch, giving rise to the common name. The large white umbellate flowers are succeeded by indistinctly ribbed, flattened fruits. Rough angelica flowers in July and August. It is known from 18 sites in two general areas on about 80 ha (200 ac) of habitat. The Kyle Canyon area supports 11 sites where it occurs at about 2,075 to 2,750 m (6,808 to 9,023 ft) in elevation. In contrast, it is also known from sandstone canyons in the Red Rock Canyon NCA where it occurs from 1,220 to 1,585 m (4,003 to 5,200 ft) in elevation (Nachlinger 1994).

Rough angelica grows in moist gravelly soils of washes, ephemeral streams, and montane slopes. At low elevations, it is found at the margins of washes in riparian woodlands and shrub lands on Quaternary alluvium derived from adjacent sandstone and limestone formations. At the higher elevations in Kyle Canyon, it is found either along stream courses and on adjacent moist, gentle slopes within montane riparian and mixed conifer forests, or on steeper slopes within successional aspen avalanche chute communities between 2,072 to 2,408 m (6,800 to 7,900 ft) in elevation (Nachlinger 1994). The most common plant associates of rough angelica include ponderosa pine, quaking aspen (*Populus tremuloides*), white fir (*Abies concolor*), mountain maple (*Acer glabrum*), and mountain mahogany (*Cercocarpus ledifolius*).

Based on monitoring surveys conducted annually for this species, the population status of rough angelica is presumed stable or increasing throughout its range. Recreational climbing in Red Rock Canyon has resulted in some impacts to the habitat, but overall, the population here is persisting. There has been no other documentation of recent declines, loss or extensive degradation of habitat, or loss of populations.

The greatest threats to rough angelica include destruction and modification of habitat through development of mountain homes and recreational facilities, road construction and maintenance, and spring diversion and modification. Both concentrated and dispersed recreation threaten populations in Kyle Canyon and Red Rock Canyon. Concentrated recreation including campground and back country camping, picnicking, trail head and close popular trail use, and

visitation to spring and seep sites have altered and degraded habitat. Dispersed recreation including hiking and equestrian use on and off trails have also altered and fragmented habitat. Grazing and trampling by wild horses and burros also pose a threat to populations (Nachlinger 1994).

Natural factors that may threaten survival include disturbances to populations from flooding and avalanche events, however, these types of disturbances may be important for maintaining the habitat. Rough angelica is naturally rare with limited distribution, and as such, may be vulnerable to natural or human-induced disasters and stochastic events (Nachlinger 1994).

Charleston pussytoes

Charleston pussytoes (*Antennaria soliceps*) is a Spring Mountains endemic known from 22 populations within about 75 ha (185 ac) of habitat, generally on rocky and gravelly substrates. Charleston pussytoes is a tufted perennial, in the sunflower family (*Asteraceae*), forming mats to 45 cm (18 in) across. The plant has white flowers surrounded by bracts, the outermost of which have a conspicuous blackish-brown spot on them. Charleston pussytoes flowers in July and August.

Charleston pussytoes occurs in bristlecone pine woodland and mixed conifer woodland in Upper Kyle and Lee canyons, and in the alpine and subalpine zones (fell-field, talus, and scree) around Charleston Peak and Mummy Mountain. At the alpine and subalpine sites, the associated plant community consists mainly of a low-growing perennial herbaceous layer with a few krummholz bristlecone pine trees occurring at the lower limits. In bristlecone and mixed conifer woodland sites, a shrub and herbaceous layer is prevalent and total plant cover ranges from 3 to 35 percent. In the talus areas near Charleston Peak, plant cover is usually less than 5 percent (Smith 1995). The most common tree species associated with Charleston pussytoes is bristlecone pine (*Pinus longaeva*). Other associated species include mountain currant (*Ribes montigenum*), Clokey fleabane (*Erigeron clokeyi*), snowberry (*Symphoricarpus* sp.), and rockspirea (*Holodiscus dumosa*) (Knight 1992). Charleston pussytoes co-occurs with several other plant species proposed for coverage under the MSHCP including Charleston tansy (*Sphaeromeria compacta*), Charleston kittentails (*Synthyris ranunculina*), Clokey catchfly (*Silene clokeyi*), and Charleston draba (*Draba paucifructa*).

The population status of Charleston pussytoes is presumed stable, as there has been no documentation of recent declines, loss or extensive degradation of habitat, or loss of populations. The greatest apparent threat to Charleston pussytoes is human activity including hiking, camping, and equestrian use. Several existing trails bisect populations and users often travel off the established trails.

Sticky ringstem

Sticky ringstem (*Anulocaulis leiosolenus*), a member of the four o'clock family (*Nyctaginaceae*), is a perennial herb endemic to the southwestern United States. It generally reaches a height of 6 to 10 dm (24 to 40 in). Sticky ringstem has thick, roughened, opposite basal leaves, rings of

sticky exudate at periodic intervals along the flowering stem, and flowers that are greenish-yellow in color and generally open May to October. It is known from western Texas, New Mexico on the Texas border, Arizona, and southern Nevada. It is typically associated with Mojave desert scrub from 530 to 1,035 m (1,750 to 3,400 ft) elevation. The soils on which it occurs are often alkaline on or near gypsum, limestone, and calcareous outcrops in open shrubby areas.

Rangewide information on the population status of the species is unavailable. However, based on recent occurrence records and the species' distribution on public lands managed by NPS, USFS, and BLM, the population status is presumed stable. Threats to this species and its habitat include dispersed recreation including OHV activities, and highway development and road proliferation in back-country areas. This species is also threatened by gypsum mining which results in direct loss of habitat and fragmentation. Grazing may degrade its habitat, resulting in soil erosion, disturbance of the cryptogamic crusts, and trampling of individual plants. Urban development may also pose a serious threat to the species through the loss and fragmentation of habitat (ANHP 2000).

White bearpoppy

White bearpoppy (*Arctomecon merriamii*) is a low growing, broad perennial herb in the poppy family, endemic to the Mojave Desert in California and Nevada. It generally attains a height of 3.5 dm (14 in). It has large white blooms and a cluster of hairy, bear paw-shaped leaves at the base. The white bearpoppy flowers from April to early June. Across its range the species is known from about 355 locations scattered within an area of approximately 25,000 square km (9,650 square mi) (EG&G 1995). The California populations include several sites in Death Valley National Park in Inyo County and BLM lands in the Clark Mountains of San Bernardino County.

Nevada populations have been documented in Clark County, the southern portion of Lincoln County on and off DNWR, and the southern tip of Nye County. This species is widely, but sparsely, distributed. In Nye County, white bearpoppy is known from the southwest portion of the Nevada Test Site (NTS). It has also been documented at approximately 135 sites on the Nellis Air Force Range, east of NTS, and on Ash Meadows National Wildlife Refuge, in Nye County, Nevada.

The species occurs predominantly within Mojave mixed scrub and saltbush scrub on edaphic islands with a strong gypsum or limestone component on alluvial slopes or flats ranging from approximately 500 to 2,000 m (1,600 to 6,500 ft) elevation. Common associated species include creosote bush, white bursage, shadscale, indigo bush, various buckwheat species (*Eriogonum* spp.), Mojave yucca (*Yucca schidigera*), green ephedra, goldenhead (*Acamptopappus shockleyi*), and galleta grass (*Hilaria jamesii*) (California Natural Diversity Data Base [CNDDB 2000]). Soil analyses indicate higher concentrations of sodium and sulfur on sites supporting white bearpoppy than sites where the species is absent. This species also occurs on limestone outcrops, so its distribution appears to be less restricted by soil composition than previously thought (Sheldon 1994).

Data collected on life history and reproductive biology found that the white bearpoppy is most susceptible to mortality during the seedling stage and the loss of reproductive potential (the number of buds, flowers, and capsules that ultimately produce seed) is highest at the bud and capsule stages. This species is capable of self-pollination as well as outcrossing, whereas the Las Vegas bearpoppy is apparently unable to self-pollinate (Sheldon 1994).

The rangewide status of the white bearpoppy is thought to be stable with the exception of populations in the Las Vegas Valley which have been subject to extirpations as a result of urbanization and associated activities. The populations within Death Valley National Park are relatively remote and, therefore, relatively secure (CNDDB 2000). Sites located on NTS are also mostly secure because of access restrictions. The most substantial threats to the species in other portions of its range include urbanization, gypsum mining, and dispersed OHV activity. These types of disturbances often result in the direct loss of individuals as well as severe degradation and fragmentation of habitat (CNDDB 2000). Degradation of soil and associated cryptogamic crusts from livestock, wild horse and burro trampling, collection of wild flowers, highway development and road proliferation in back-country areas, and habitat modification from construction and maintenance of military facilities are also threats to the species.

Rosy King sandwort

The species, *A. kingii*, is a polymorphic taxon distributed across the Great Basin, but the subspecies, rosy King sandwort (*A. k.* ssp. *rosea*) is endemic to the east side of the Spring Mountains. Rosy King sandwort is a perennial herb, in the pink family (*Caryophyllaceae*), that typically reaches a height of 1 to 2 dm (4 to 8 in) and flowers between early June and August. It is easily separated from other species of the genus by its pink petals. It is known primarily on open slopes in upper Lee Canyon, but also occurs on the slopes between Lee and Kyle canyons and Deer Creek.

Rosy King sandwort has been documented from 18 sites on about 50 ha (120 ac) in a variety of vegetation types within the high conifer forest and woodland zone ranging from 2,440 to 3,025 m (8,000 to 9,925 ft) elevation. At the lower elevation sites it occurs in white fir, ponderosa pine, and curlleaf mountain mahogany plant communities on moist to dry slopes. At the middle elevation sites it occurs in limber pine (*Pinus flexilis*) and white fir communities dominated by a mix of conifers including *Juniperus scopulorum* and ponderosa and bristlecone pine. At the higher elevation sites, bristlecone pine is the dominant tree species on open slopes. It is typically found on dry to moist, shallow, gravelly soils of limestone and dolomite derived parent materials (Nachlinger and Sheldon 1999). Five other plant species proposed for coverage under the MSHCP have been documented at sites occupied by rosy King sandwort, including Clokey thistle (*Cirsium clokeyi*), Charleston beardtongue (*Penstemon leiophyllus* var. *keckii*), Clokey eggvetch (*Astragalus oophorus* var. *clokeyanus*), Clokey mountain sage (*Salvia dorrii* var. *clokeyi*), and Charleston grounddaisy (*Townsendia jonesii* var. *tumulosa*).

The population status of rosy King sandwort is presumed stable, as there has been no documentation of recent declines, loss or extensive degradation of habitat, or loss of populations. Threats to this species and its habitat include habitat modification due to fire suppression and

fuels management, direct and indirect effects of dispersed recreational activities, trail construction and maintenance, concentrated recreation near Dolomite and McWilliams campgrounds in Lee Canyon, and habitat degradation from highway and road construction and maintenance.

Clokey milkvetch

Clokey milkvetch (*Astragalus aequalis*) is a perennial herb, in the pea family, endemic to the Spring Mountains but limited to a moderate elevational band encircling the Spring Mountains. It occurs from 1,830 to 2,530 m (6,004 to 8,300 ft) in elevation, usually below 2,200 m (7,218 ft), and is found at highest elevations in the Deer Creek and Lee Canyon area on the east side of the range (Nachlinger 1994). Plants may attain a height of 7 dm (28 in), and have yellow flowers maturing into considerably inflated fruiting pods. The mature pods are straw-colored and may be speckled with purplish-brown spots on the side exposed to the sun. The plant flowers from May to late June, and sets fruit from June through July. It is known from about 20 sites in pinyon-juniper woodland, mixed conifer forest, and sagebrush habitats on about 60 ha (140 ac). This species is found on flat to gently sloping sites with dry, gravelly soils of alluvial fans.

The most common plant associates of Clokey milkvetch include Utah juniper (*Juniperus osteosperma*), pinyon pine, sagebrush (*Artemisia tridentata*), Gambel oak (*Quercus gambelii*), and point-leaf manzanita (*Arctostaphylos pungens*). It occurs with four other plant species proposed for coverage under the MSHCP including Clokey thistle, Charleston pinewood lousewort (*Pedicularis semibarbata* var. *charlestonensis*), Jaeger beardtongue (*Penstemon thompsoneae* var. *jaegeri*), and limestone (Charleston) violet.

The population status of Clokey milkvetch is presumed stable, as there has been no documentation of recent declines, loss or extensive degradation of habitat, or loss of populations. Threats to the Clokey milkvetch and its habitat include adverse habitat modification from concentrated and dispersed recreational activities, trail construction and maintenance, highway and road construction and maintenance in the Deer Creek, Willow Spring, Harris Springs, and Cold Creek areas, wild horse and burro trampling, and residential development in the aforementioned areas. Human caused fire and fire management practices, such as brush clearing and limb removal, have altered and destroyed habitats on the north, east, and west sides of the range. The species appears to be naturally rare and, therefore, may be vulnerable to natural or human-induced disasters and stochastic events (Nachlinger 1994).

Clokey eggvetch

Clokey eggvetch (*Astragalus oophorus* var. *clokeyanus*) is a slender perennial, in the pea family, with stems to 1 dm (4 in) in length. It has small purplish flowers that typically open in June and July, followed by inflated fruit pods in late August to September. Prior to 1995 it was known only from the Spring Mountains (Nachlinger and Sheldon 1995). In 1995, the species was discovered on NTS at Indian Springs in the Belted Range of Nye County, Nevada, which represents a range extension of about 80 mi to the north of the Spring Mountains. It has been found at several sites in Kawich Canyon, near the northern boundary of NTS, in the Southern

Belted Range. It has also been confirmed at Cedar Pass in the Kawich Range, just off of NTS, which represents the northern-most limits of its distribution. The species has also been discovered at other locations on NTS that are significant in that they are well south of the other collections of the species in the Belted Range and represent a more clearly defined link to the populations of Clokey eggvetch in the Spring Mountains (Bechtel 1998).

The Spring Mountains represent the southern-most distribution of the species, where it is known from 13 sites on about 8.5 ha (21 ac) of habitat within two general areas centered around upper Lee Canyon and Wheeler Pass. It is typically found above 1,830 m (6,000 ft) in sagebrush scrub, pinyon-juniper woodlands, and mixed conifer forests. Soils are often sandy loams or derived of limestone. The plant occurs in the shade of shrubs and trees or along open, exposed washes or hillsides.

According to monitoring efforts conducted by Bechtel (1998), the population status of Clokey eggvetch is stable or increasing throughout its range. Surveys showed no evidence of recent declines, loss or extensive degradation of habitat, or loss of populations. The NTS populations of Clokey eggvetch are mostly secure because of access restrictions. Populations of this species in the Spring Mountains are subject to greater threats due to their proximity to the Las Vegas Valley. Development of recreational facilities, and road and trail construction and maintenance are threats to populations in Lee Canyon, especially the largest population located adjacent to the Bristlecone Trail. Concentrated and dispersed recreation and grazing by wild horses and burros also degrade habitat. Other threats include weed encroachment from erosion control activities on ski slopes and fire suppression.

Spring Mountains milkvetch

Spring Mountains milkvetch (*Astragalus remotus*) is another Spring Mountains endemic that is locally abundant from the southeastern slopes of the range from Rocky Gap to Goodsprings in the Red Rock Canyon area. It is a perennial herb, in the pea family, that occurs in pinyon-juniper woodlands, sagebrush, blackbrush, and Mojave desert scrub in gravelly sandstone or limestone soils on rocky hillsides and canyon banks. It is often associated with serviceberry, velvet ash (*Fraxinus velutina*), and wild grape (*Vitis arizonica*). This species has stems to 5 dm (19 in) and flowers that are white with purplish tips. Flowers open in April through early June and the plant is distinguishable from other milkvetch species in the Spring Mountains by its white flowers and triangular, compressed fruits.

The population status of Spring Mountains milkvetch is presumed stable, as there has been no documentation of recent declines, loss or extensive degradation of habitat, or loss of populations. Threats to this species include habitat conversion through invasion of the non-native red brome (*Bromus madritensis* ssp. *rubens*), resulting in an altered fire regime, dispersed recreational use, and wild horse and burro trampling. Dispersed recreational activities such as hunting, hiking, mountain biking, camping, and OHV use causes habitat degradation and fragmentation across vast areas. Littering and traveling off designated routes has also been documented as causing impacts to this species and its habitat.

Clokey paintbrush

Clokey paintbrush (*Castilleja martinii* var. *clokeyi*) is a perennial herb, in the figwort family (*Scrophulariaceae*), known from the mountain ranges of southern Nevada, from the Quinn Canyon Range in Nye County, south to the Spring Mountains and Sheep Range in Clark County; and in California, in the Panamint Range and Inyo Mountains of Inyo County. The plant has stems to 5 dm (19 in) in height and showy flowering stalks. The bracts are a bright orange-red and the petals of the flowers are greenish. The flowers open May to August and fruit capsules follow in September to October. In the Spring Mountains, it is locally common at high elevations at Cathedral Rock, Deer Creek, Peak Spring, and Lee and Kyle canyons. It occurs in bristlecone pine woodlands and mixed conifer forest on dry gravelly slopes from 2,000 to 3,125 m (6,500 to 10,250 ft) elevation. It also occurs in dry meadows and on talus in pinyon-juniper woodlands and aspen forest from low elevations (about 900 m [3,000 ft]) to timberline. Clokey paintbrush co-occurs with several other plant species proposed for coverage under the MSHCP including Clokey thistle and Jaeger ivesia.

The population status of Clokey paintbrush is presumed stable, as there has been no documentation of recent declines, loss or extensive degradation of habitat, or loss of populations. Threats to the species include habitat modification and other effects from fire suppression and fuels management, and concentrated and dispersed recreational activities, particularly in the Spring Mountains. Degradation and loss of habitat result from recreational activities such as hunting, hiking, equestrian use, camping, mountain biking, and OHV use, which may cause direct loss of individuals as well as fragmentation of habitat and soil disturbance. There may also be impacts associated with the management of existing recreation facilities and their maintenance and use (i.e., camping, ski area, and parking).

Clokey thistle

Clokey thistle (*Cirsium clokeyi*) is an annual to biennial herb in the sunflower family, endemic to the Spring Mountains. This thistle is very spiny, with long linear leaves. The flowers are pale rosy-purple, opening in late July and August, and followed by achenes in September to October. It is fairly widespread with occurrences in four main areas: Charleston Peak, Deer Creek, upper Lee Canyon and Kyle Canyon. It occurs in the alpine zone, bristlecone pine woodlands, and mixed conifer forest on gravelly slopes and dry ridges and around springs from1,830 to 3,350 m (6,000 to 11,000 ft) elevation. Collections have been documented from as low as 2,134 m (7,000 ft), but Clokey attributed this to seed displacement by snow slides originating from the alpine zone (Knight 1992). Associated species include limber pine, white fir, snowberry (*Symphoricarpos longiflorus*), and curlleaf mountain mahogany (Knight 1992).

The population status of Clokey thistle is presumed stable, as there has been no documentation of recent declines, loss or extensive degradation of habitat, or loss of populations. Threats include adverse habitat modification and the indirect effects of dispersed and concentrated recreational activities and trail construction and maintenance in Macks, Lee, and Kyle canyons and along high elevation trails, physical alteration of spring and spring outflow habitats. These activities have resulted in changes to the natural flow, temperature, and sediment regimes of springs, and

habitat degradation and population decreases from introduction, competition, and encroachment of non-native, invasive species.

Alkali mariposa lily

Alkali mariposa lily (*Calochortus striatus*) is an herbaceous, perennial member of the lily family (*Liliaceae*), that is endemic to the hot deserts of California and Nevada. Stems of the plant reach 3 dm (12 in) in height. The flower petals are light purple streaked with dark purple lines. The plant flowers from April to June (Mozingo and Williams 1980). The West Mojave Desert of California comprises the majority of the range of this species and contains some very significant populations supporting large numbers of individuals, as well as smaller, scattered populations. The species has been documented in Los Angeles, San Bernardino, Kern, and Tulare counties, with large populations known from Edwards AFB and vicinity and Paradise Spring near Fort Irwin, California. The species occurs on lands under various ownership and management including BLM, Edwards AFB, USFS, TNC, National Audubon Society, and private ownership. In Nevada, there are eight known populations in Clark County and one in Nye County.

Alkali mariposa lily is restricted to alkaline meadows and mesic areas ranging from 640 to1,128 m (2,100 to 3,700 ft) elevation. It is most often found in flood plains with alkali soils and at alkali seeps and springs. Common associates include saltgrass (*Distichlis spicata*), alkali sacaton (*Sporobolus airoides*), wildrye (*Elymus triticoides*), and spiny saltbush (*Atriplex spinifera*). Alkali mariposa lily flowers from April to June (Mozingo and Williams 1980).

Rangewide information on the population status of the alkali mariposa lily is unavailable. However, based on recent occurrence records, the overall population status is presumed stable throughout its range. Exclosures constructed at Red and Willow springs in Red Rock Canyon have aided in the stabilization of populations in Clark County. Threats to the alkali mariposa lily include competition from non-native, invasive plant species, livestock grazing and trampling, urban development, water development and groundwater pumping, maintenance of highways and road rights-of-way (i.e., scraping, herbicide use), some OHV use (although the habitat is generally undesirable for this type of activity), and some trash accumulation along access routes.

Long-term conservation management for this species in California is limited to the Cronese ACEC and Red Rock Canyon State Park. Some protection of known populations is provided through the Multiple-use Class L (Limited Use) on BLM lands. The Edwards AFB Integrated Resource Management Plan is compatible with conservation of this species, and populations are preserved at Cushenbury Springs by the Mitsubishi Cement Corporation (BLM 2000).

Jaeger whitlowgrass

Jaeger whitlowgrass (*Draba jaegeri*), a member of the mustard family (*Brassicaceae*), is endemic to the Spring Mountains where it is known from Charleston Peak, Mummy Mountain, and Lee Canyon. It reaches a height of 2 to 6 cm (0.75 to 2.3 in). The flowers are white with light purple underneath and open from June to August. It occurs in alpine and bristlecone pine communities ranging from about 3,000 to 3,400 m (9,650 to 11,200 ft) in alpine fell fields and

talus rubble, at or near timberline, although it has been observed in montane situations with ponderosa pine and white fir. It is typically found in rock crevices among broken limestone rocks and on gravelly slopes. Jaeger whitlowgrass is similar to high elevation drabas found in California, Utah, and the Rocky Mountains, although its relationship to these other species is unknown.

Associated plant species include mountain currant, blue columbine (*Aquilegia scopulorum*), and mountain fescue (*Festuca saximontana*). Other plant species proposed for coverage under the MSHCP that occur with Jaeger whitlowgrass include hidden ivesia and Charleston tansy.

The population status of Jaeger whitlowgrass is presumed stable, as there has been no documentation of recent declines, loss or extensive degradation of habitat, or loss of populations. Threats to this species include adverse habitat modification and indirect effects due to dispersed recreational activities in the alpine zone. Additionally, because this plant is a narrow endemic with a limited distribution, it is susceptible to stochastic events.

Charleston draba

Charleston draba (*Draba paucifructa*) is a perennial member of the mustard family endemic to the Spring Mountains. It is characterized by several crowns of basal leaves from which emerge one to four stems with hairy leaves. Flowers open in June and July and are characteristically light yellow as the flower opens, fading to white after the flower is completely open. The plant can be found at elevations ranging from about 2,500 to 3,500 m (8,250 to 11,400 ft), primarily in north and northeast-facing side canyons of upper Kyle and Lee canyons on the east side of the range and at a few west side occurrences along the ridge line of Charleston Peak. The global distribution roughly follows the higher elevation canyons from east of Mummy Mountain (North Fork of Deer Creek), along the north-facing slopes of upper Lee Canyon, along both the east and west upper slopes of the Charleston Peak ridge line, to the north and north-east facing upper slopes of Kyle Canyon. The known range comprises about 28 ha (70 ac) (Nachlinger and Sheldon 1999).

Charleston draba occurs on limestones and dolomites, in moist to wet substrates, such as seeps, springs, and late lying snowdrifts, in montane to alpine zones within open mixed forest stands, avalanche chutes devoid of trees, and alpine fell-fields. At the lower elevation sites, it occupies habitat in mixed conifer forests on moist slopes and adjacent to avalanche paths. This vegetation type is dominated by bristlecone pine, white fir, and quaking aspen, with occasional ponderosa pine and limber pine (*P. flexilis*). At higher elevations, Charleston draba occurs either with bristlecone pine and quaking aspen adjacent to avalanche paths or with mountain currant on open slopes. Within the alpine zone above tree line, it occurs in a herbaceous community dominated by hidden ivesia (*Ivesia cryptocaulis*) (Nachlinger and Reese 1996). Other endemic taxa of the higher elevations in the Spring Mountains that are proposed for coverage under the MSHCP include rough angelica, Charleston pussytoes, Clokey thistle, Jaeger whitlowgrass, and Charleston tansy (Nachlinger and Sheldon 1999).

The population status of Charleston draba is presumed stable, as there has been no documentation of recent declines, loss or extensive degradation of habitat, or loss of populations. Threats to this species include adverse habitat modification and indirect effects on species resulting from dispersed recreational activities, and trail construction and maintenance. Physical alteration of spring and spring outflow habitats (e.g., piping diversions) resulting in alterations in natural flow, temperature, and sediment regimes is another significant threat to this species. Habitat degradation from wild horse trampling and population decreases resulting from exotic species encroachment and competition threatens the habitat of Charleston draba as well as susceptibility to stochastic events due to its narrow distribution.

Pahrump Valley (forked) buckwheat

Pahrump Valley buckwheat (*Eriogonum bifurcatum*) is a low-growing, herbaceous, annual plant endemic to the Mojave Desert occurring along the border of Nevada and California. It is known from four occurrences in southern Inyo and northeastern San Bernardino counties, California, where the populations are adjacent to those in Clark and Nye counties, Nevada. It is a member of the buckwheat family, generally reaching 4 dm (16 in) in height. The flowers are small and white with greenish to reddish bases. This species typically flowers from late April to late June.

Characteristics of its habitat include sandy areas within saltbush scrub on the edges of saline playas, dunes, and associated mesquite woodlands at approximately 760 m (2,500 ft) elevation. Associated species include four-wing saltbush (*Atriplex canescens*), shadscale, saltbush (*A. hymenelytra*), inkweed (*Suaeda torreyana*), and saltgrass. Pahrump Valley buckwheat is a winter annual that responds to precipitation events. This factor is responsible for sporadic occurrences and fluctuations in the abundance of the taxon (Niles et al. 1998).

Based on recent occurrence records, the population status of Pahrump Valley buckwheat is declining throughout its range. Losses of habitat and population extirpations have been documented on private lands in the community of Sandy from urban and agricultural development. This development has resulted in added pressures on adjacent public lands, such as illegal dumping and road proliferation (Niles et al. 1998). Major threats to Pahrump Valley buckwheat include conversion and expansion of agricultural activities, habitat modification and degradation from competitive OHV races, and habitat modification resulting from casual (non-competitive non-commercial) OHV activities.

Inch high fleabane

Inch high fleabane (*Erigeron uncialis* ssp. *conjugans*) is a perennial herb endemic to southern and east central Nevada documented in Clark, Nye, and White Pine counties. It is a diminutive member of the sunflower family, attaining a height of only 1 to 5 cm (0.25 to 2 in). The flowers are light rose in color and open in June or July. Only a few sites are known from the northeast portion of Nye County and the extreme southwest portion of White Pine County. In Clark County, the species occurs in the Spring Mountains and Sheep Range. Inch high fleabane occurs at elevations ranging from about 2,200 to 3,500 m (7,200 to 11,500 ft) where it prefers cracks in

vertical faces of limestone cliffs and large boulders in bristlecone pine, mixed conifer, pinyon-juniper, and sagebrush communities.

The population status of inch high fleabane is presumed stable, as there has been no documentation of recent declines, loss or extensive degradation of habitat, or loss of populations. Threats to inch high fleabane include habitat modification and other effects from dispersed recreational activities including hiking, picnicking, and rock scrambling. Because it is a narrowly distributed endemic, this species is also susceptible to stochastic events.

Clokey greasebush

Clokey greasebush (*Glossopetalon clokeyi*) is endemic to the Spring Mountains, occurring on approximately 14 ha (35 ac) of land in Kyle and Carpenter canyons between 2,150 and 2,800 m (7,050 and 9,150 ft) elevation. It is a perennial sub-shrub in the staff-tree family (*Crossosomataceae*), with spiny stems that typically reach a height of 15 to 20 cm (6 to 7.75 in). Its white flowers open in May or June and are followed by fruit in July. Its habitat occurs within mixed conifer forest communities with limber pine and ponderosa pine, where it is generally found in crevices and in cracks on primarily north-facing, vertical limestone cliffs. Vegetation on the cliff faces is generally sparse and dominated by small, xerophytic shrubs and caespitose perennials with very little, if any, soil accumulation (Nachlinger 1994).

The population status of Clokey greasebush is presumed stable, as there has been no documentation of recent declines, loss or extensive degradation of habitat, or loss of populations. Because of the inaccessible nature of its habitat, most sites supporting Clokey greasebush are not subject to threats. However, at some sites there has been evidence of adverse habitat modification and indirect effects on the species from dispersed recreational activities including hiking, picnicking, and rock scrambling, in particular, at Mary Jane Falls, Echo Cliff, and Robbers Roost. Habitat modification and individual displacement resulting from rock climbing are also threats, and as interest in recreational climbing increases, alteration and destruction of accessible habitat inevitably will occur (Nachlinger 1994). Because it is a narrowly distributed endemic, this species is also susceptible to stochastic events.

Smooth pungent (dwarf) greasebush and pungent dwarf greasebush

Smooth pungent (dwarf) greasebush (*Glossopetalon pungens* var. *glabrum*) is endemic to the Mojave Desert in southern Nevada and the Clark Mountains in San Bernardino County, California. Pungent dwarf greasebush (*Glossopetalon pungens* var. *pungens*) is endemic to Clark County, occurring in the Spring Mountains and Sheep Range. Both subspecies are perennial members of the staff-tree family with stems that typically reach 9 cm (3.5 in), and white flowers that open from April to June. The pungent dwarf greasebush is distinguished from the smooth pungent dwarf greasebush by its rough leaves and stems.

Both species occur at elevations between 1,200 and 2,400 m (4,000 and 7,800 ft) in pinyon-juniper and sagebrush communities on limestone cliffs and rocky slopes . Associated

plant species include white fir (in the Clark Mountains), ponderosa pine, pinyon pine, Utah juniper, California coffeeberry (*Rhamnus californica*), and Jaeger ivesia (*Ivesia jaegeri*).

The population status of both subspecies is presumed stable, as there has been no documentation of recent declines, loss or extensive degradation of habitat, or loss of populations. Threats to these subspecies include habitat modification and other effects from dispersed recreational activities and loss of individuals from rock climbing in popular climbing areas. Also, because they are endemic plants with a limited distribution, both are vulnerable to stochastic events.

Red Rock Canyon aster

Red Rock Canyon aster (*Ionactis caelestis*) is an endemic plant known from only a single population on Bridge Mountain in the Red Rock Canyon portion of the Spring Mountains. It is a perennial herbaceous member of the sunflower family with rough stems to 23 cm (9 in) in height. This plant has blue to blue-violet flowers that open in July and August. It occurs in very open mixed conifer forest on rocky sandstone outcrops. Its habitat consists of Aztec sandstone crevices in an area of approximately 2,600 ha (6,400 ac) atop the Red Rock escarpment. Associated species include Utah juniper, California coffeeberry, and Jaeger ivesia.

The population status of Red Rock Canyon aster is presumed stable, as there has been no documentation of recent declines, loss or extensive degradation of habitat, or loss of populations. Threats to the species include dispersed recreation, hiking, and rock climbing. It is also particularly susceptible to stochastic events because it is a narrow endemic with very limited distribution.

Hidden ivesia

Hidden ivesia (*Ivesia cryptocaulis*) is endemic to the Spring Mountains, where it is confined to the Charleston Peak ridge line and Mummy Mountain, at elevations ranging from 3,300 to 3,625 m (10,800 to 11,900 ft). It is a perennial member of the rose family (*Rosaceae*), with a mat-like, creeping growth habit and branches 5 to 10 cm (2 to 4 in) in length. Its yellow flowers open in June to late August. It occurs in the alpine zone or just above tree line on talus and scree slopes and rocky ridge lines in limestone frost-heave tundra soils. Plant composition in these areas is composed mainly of a low growing perennial herbaceous layer with a few krummholz bristlecone pines occurring at the lower limits of the distribution of hidden ivesia. Plant cover may be as little as 15 percent in this habitat (Smith 1995). Other plant species proposed for coverage under the MSHCP that occur with hidden ivesia include Charleston tansy, Jaeger whitlowgrass, Charleston pussytoes, and Charleston kittentails. Other associated species include bristlecone pine, mountain currant, Clokey fleabane, and alpine fescue (*Festuca brachyphylla*) (Knight 1992).

The population status of hidden ivesia is presumed stable, as there has been no documentation of recent declines, loss or extensive degradation of habitat, or loss of populations. The most significant human caused threat to this species is habitat modification resulting from dispersed

recreational activities including horseback riding, hiking, and camping. Because it is distributed across such a small area and is a narrow endemic, this species is also particularly susceptible to stochastic events.

Jaeger ivesia

Jaeger ivesia (*Ivesia jaegeri*) is endemic to the Spring Mountains in Nevada and the Clark Mountains in San Bernardino, California. It is a perennial herbaceous member of the rose family, with a matted growth habit, and stems that typically reach a length of 2 to 12 cm (0.75 to 4.75 in). Its yellow flowers open from May to July.

In the Clark Mountains, this species is known from two sites near the Clark Mountain summit on BLM managed lands. In Clark County, Jaeger ivesia occurs on approximately 35 ha (80 ac) in Lee, Kyle, and Carpenter canyons and Deer Creek in the Spring Mountains, and on La Madre Mountain, across the Sandstone Bluffs to the Mount Potosi area. This species is found in bristlecone pine and mixed conifer communities growing directly on bedrock and in crevices of vertical and near vertical cliff faces composed of limestone and dolomite outcrops in elevations from 1,600 to 3,500 m (5,200 to 11,200 ft). Slope exposures vary, but the plants invariably grow in shade or limited sunlight (Nachlinger 1994).

The population status of Jaeger ivesia is presumed stable, as there has been no documentation of recent declines, loss or extensive degradation of habitat, or loss of populations. Threats to this species include habitat modification and other effects from dispersed and concentrated recreational activities. Because it is a narrow endemic and has a limited distribution, Jaeger ivesia is also particularly susceptible to stochastic events.

Hitchcock bladderpod

Hitchcock bladderpod (*Lesquerella hitchcockii*), is a perennial member of the mustard family with stems to 4 cm (1 in) in length, and yellow flowers opening in June through August. Hitchcock bladderpod occurs from Clark County, north to east-central Nevada in White Pine County. It has been documented in scattered locations in south central White Pine County and the Quinn Canyon Range in eastern Nye County. Habitat for this species includes alpine, bristlecone pine, and mixed conifer communities on flat or sloping ground, talus slopes, dry ridges, and rocky hillsides at elevations ranging from 2,500 to 3,500 m (8,200 to 11,400 ft).

The population status of Hitchcock bladderpod is presumed stable, as there has been no documentation of recent declines, loss or extensive degradation of habitat, or loss of populations. Threats to Hitchcock bladderpod include adverse modification of habitat due to fire suppression and fuels management and the effects, both indirect and direct, of dispersed and concentrated recreational activities. Also, because of this species' limited distribution, it is particularly susceptible to stochastic events.

Charleston pinewood lousewort

Charleston pinewood lousewort (*Pedicularis semibarbata* var. *charlestonensis*) is endemic to southern Nevada, where it occurs in Lee Canyon, Deer Creek, and other forested locations in the Spring Mountains and Sheep Range. The species occurs in mixed conifer forests and bristlecone pine woodlands at elevations between 2,600 and 3,000 m (8,400 and 9,800 ft). This species is a perennial member of the figwort family, with stems to 20 cm (5 in) tall, and tiny yellow flowers open in May to June. Charleston pinewood lousewort co-occurs with several other plant species proposed for coverage under the MSHCP including Clokey paintbrush and Jaeger ivesia.

The population status of Charleston pinewood lousewort is presumed stable, as there has been no documentation of recent declines, loss or extensive degradation of habitat, or loss of populations. Threats to the Charleston pinewood lousewort include adverse modification of habitat due to fire suppression, fuels management, and dispersed and concentrated recreation, habitat degradation due to road construction and maintenance, wild horse and burro trampling, and degradation and habitat fragmentation due to mountain home development, improvement, and upkeep in the Spring Mountains.

White-margined beardtongue

The white-margined beardtongue (*Penstemon albomarginatus*) is endemic to the eastern Mojave Desert in Nevada, California, and Arizona. This plant is a short-lived, herbaceous, perennial member of the figwort family. It typically reaches a height of 3 dm (10 in) and has lavender-pink flowers with purple guidelines, flowering from April to June. The leaves have a white margin, hence the common name of the species. About 22 occurrences in 4 general areas are documented from San Bernardino County, California, primarily in the area north of Pisgah Crater. Two of the sites have not been relocated in many years and one is monitored regularly and has suffered severe impacts from military operations (Sheldon 1994).

The largest single occurrence of the white-margined beardtongue is known from Dutch Flat and Sacramento Valley areas, southeast of Yucca, in Mohave County, Arizona. The land ownership pattern in Dutch Flat area was historically a checkerboard pattern of public and private ownership (a legacy of the Santa Fe Railroad lands). The designation of an ACEC for the conservation of the white-margined beardtongue in 1993 coupled with the Hualapai Mountains Land Exchange in 1999, which transferred much of the private lands into public domain, increased the protection of this species in the Dutch Flat area (Anderson 2000).

Within Clark County, white-margined beardtongue is known from the Hidden Valley, Jean Lake, and Roach Lake areas in Mojave desert scrub and to a lesser extent in blackbrush communities. It often occurs on sand deposits on the leeward side of dry lake beds from 460 to 2,000 m (1,500 to 3,600 ft) elevation, in desert washes and occasionally on slopes above them. This species is dependent on the maintenance of the sand transport system from dry lake beds toward lower slopes. Associated plant species include creosote bush, white bursage, winterfat, Indian rice grass, and galleta grass.

The population status of white-margined beardtongue is presumed stable. However, in areas subject to intensive grazing, the populations may be at risk and declining. Threats to the species include urban development, OHV use, road maintenance, sand and gravel operations on public lands, and utility corridor maintenance and construction.

Charleston beardtongue

Charleston beardtongue (*Penstemon leiophyllus* var. *keckii*) is endemic to the Spring Mountains, occurring at elevations from 2,100 to 3,400 m (7,000 to 11,200 ft) in upper Kyle and Lee canyons, Deer Creek, and Mummy Mountain. It is a perennial member of the figwort family, typically reaching a height of 7 dm (27 in), with light blue to violet flowers that open in June to August. This plant occurs in bristlecone pine and mixed conifer forest communities, or with aspen, on gravelly or rocky slopes, or open meadows, and on ledges or talus slopes.

The population status of Charleston beardtongue is presumed stable, as there has been no documentation of recent declines, loss or extensive degradation of habitat, or loss of populations. Threats to Charleston beardtongue include habitat modification and indirect effects due to dispersed recreational activities at high elevations and concentrated recreation in Kyle and Lee canyons. Because of the narrow range and distribution of this endemic, it is particularly susceptible to stochastic events.

Jaeger beardtongue

Jaeger beardtongue (*Penstemon thompsoneae* var. *jaegeri*) is endemic to Clark County, Nevada where it occurs from Mount Potosi to Deer and Kyle Canyons, and Trout Creek in the Spring Mountains. It is also known from Deadman Canyon in the Sheep Range. This plant is a perennial member of the figwort family. It typically reaches a height of 15 cm (6 in), and has dark blue to blue-violet flowers opening in June and July. Characteristic habitat for this species is in mixed conifer forest and pinyon-juniper woodland on gravelly limestone banks and hillsides at elevations ranging from 1,900 to 2,800 m (6,300 to 9,300 ft). Jaeger beardtongue co-occurs with several other plant species proposed for coverage under the MSHCP including Clokey paintbrush and Charleston pinewood lousewort.

The population status of Jaeger beardtongue is presumed stable, as there has been no documentation of recent declines, loss or extensive degradation of habitat, or loss of populations. Threats to this species include adverse modification of habitat due to fire suppression and fuels management, dispersed recreational activities and concentrated recreational activities, habitat degradation and trampling by wild horses and burros, and habitat fragmentation resulting from recreational facility and mountain home development, improvement, and upkeep. Jaeger beardtongue is also susceptible to stochastic events because of its narrow range and small distribution.

Parish's phacelia

Parish's phacelia (*Phacelia parishii*) is a widely distributed Mojave Desert plant species occurring from San Bernardino County, California, to Clark, Nye, Lincoln, and White Pine counties in Nevada, and Mohave County, Arizona. It was first collected on an alkaline lake near Rabbit Springs in California, where it is now thought to be extirpated. It has also been documented near Yermo, Calico, and Stewart Valley in Inyo County; however, it appears to be extirpated from the Calico site. It also occurs on a series of unnamed playas south of Fort Irwin in California (BLM 2000). Parish's phacelia is an annual member of the waterleaf family (*Hydrophyllaceae*), typically reaching a height of 15 cm (6 in). Its yellow bell-shaped flowers have a lavender limb. Parish's phacelia flowers from April to July and is dependant upon rain and wind for seed dispersal.

In Arizona, Parish's phacelia is known from three sites in Mohave County. One site is located in the Hualapai Valley on the west edge of Red Lake. The other two Arizona sites occur near Burro Creek on the Mohave and Yavapai County line, west of Prescott. In Nevada, the species occurs in White Pine, Lincoln, Nye, and Clark counties. The extent of the distribution in Nevada encompasses about 1,900 ha (4,600 ac); however, complete surveys of potential habitat have not been conducted (Smith 1998).

The species commonly occurs on valley floors within Mojave desert scrub and saltbush scrub, often adjacent to playas and lake bed deposits with shadscale, four-wing saltbush, and greasewood (Smith 1998). The habitat is characterized by wet, heavy, clay soil with excessive concentrations of soluble salts. It is found at elevations from 760 to 1,700 m (2,500 to 5,600 ft).

The majority of populations of Parish's phacelia across its range are stable despite potential threats such as urban development and recreational activities (Smith 1998). Threats to Parish's phacelia include habitat modification and degradation resulting from casual (non-competitive, non-commercial) OHV use. Habitat degradation at military target sites, on roads, or other military access locations, and modification of habitat from the construction of military facilities and maintenance activities are also significant threats. The species is also threatened by land development.

Clokey mountain sage

Clokey mountain sage (*Salvia dorrii* var. *clokeyi*) is a southern Nevada endemic found in the Spring Mountains and the Sheep Range. This species is a perennial member of the mint family (*Lamiaceae*), that typically reaches a height of 20 cm (8 in). Its showy flowers are purple-blue and open in May to July. In the Spring Mountains the Clokey mountain sage occurs in Macks, Lee, and Kyle canyons, the Deer Creek area, Harris Saddle, and one outlier known from the summit of Mount Wilson in the Red Rock Canyon area. This plant occurs in bristlecone pine, mixed conifer, and pinyon-juniper communities. It is typically found on shallow gravelly soils

derived from limestones, dolomites, and sandstones, along ridges on bedrock outcrops, and in rocky slope drainages from 2,100 to 3,050 m (7,000 to 10,000 ft) in elevation. Slope aspects vary, but the plants are more often found in full or partial sun rather than in shade (Nachlinger 1994).

The trees most commonly associated with Clokey mountain sage include white fir, ponderosa pine, limber pine, pinyon pine, and bristlecone pine. Other Spring Mountains endemic species proposed for coverage under the MSHCP that are known to occur with Clokey mountain sage include rosy King sandwort, Clokey eggvetch, Clokey thistle, Hitchcock bladderpod, and Charleston grounddaisy.

The population status of Clokey mountain sage is presumed stable, as there has been no documentation of recent declines, extensive loss or degradation of habitat, or loss of populations. Significant threats to this species include adverse habitat modification and indirect effects due to dispersed and concentrated recreation activities, including hiking, equestrian use, OHV use, and dispersed camping. Habitat modification due to fuels management (cutting lower limbs and clearing the understory) may adversely affect the species. Clokey mountain sage is subject to habitat degradation from road construction and maintenance in and around Lee Canyon and Macks Canyon Road, and wild horse trampling in the northeastern quadrant of the Spring Mountains. Development of recreation facilities and mountain homes has resulted in habitat fragmentation and degradation.

Clokey catchfly

Clokey catchfly (*Silene clokeyi*), a member of the pink family, is endemic to the Spring Mountains where it is known from seven sites at the highest elevations of the range, on Mummy Mountain and along the Charleston Peak ridge line. It occurs among limestone rocks in alpine and bristlecone pine communities within a narrow elevational band between 3,475 and 3,505 m (11,400 and 11,500 ft). The species occurs in alpine fell fields, on steep eastern drop-offs of high ridge lines, and gently sloping plateaus. Clokey catchfly is a herbaceous perennial that typically reaches a height of 12 cm (4.75 in). The pink-rose to purple flowers open in June and July (Nachlinger 1994). Associated species include Jaeger whitlowgrass, Charleston tansy, hidden ivesia, Clokey thistle, and Hitchcock bladderpod, all of which are also proposed for coverage under the MSHCP. Other associated species include bristlecone pine and mountain fescue.

The population status of Clokey catchfly is presumed stable, as there has been no documentation of recent declines, loss or extensive degradation of habitat, or loss of populations. Threats to this species include habitat modification and other effects from dispersed recreational activities, including hiking, mountain biking, camping, and equestrian use. Additionally, Clokey catchfly is particularly vulnerable to stochastic events as a result of its narrow range and limited distribution.

Charleston tansy

Charleston tansy (*Sphaeromeria compacta*), the only *Sphaeromeria* in the Spring Mountains, is an endemic confined largely to Mummy Mountain and the Charleston Peak ridge line. The plant is a densely tufted perennial member of the sunflower family, typically reaching a height of 8 cm (3 in). It has silvery-silky leaves and stems and pale yellow flowers that open in July to August. It is found on talus slopes, in frost-heave broken rubble, and gravelly slopes at timberline, above 3,000 to 3,520 m (9,800 to 11,550 ft). In the Spring Mountains, this species is found only at timberline along the ridge line from the head of Lee Canyon south to the saddle area south of Charleston Peak.

Charleston tansy occurs in limestone-derived soils with other Spring Mountains endemics proposed for coverage under the MSHCP, including hidden ivesia, Jaeger whitlowgrass, and Clokey thistle. Other associated species include bristlecone pine, blue columbine (*Aquilegia scopulorum*), and mountain fescue.

The population status of Charleston tansy is presumed stable, as there has been no documentation of recent declines, loss or extensive degradation of habitat, or loss of populations. Threats to Charleston tansy include habitat modification and other effects from dispersed recreational activities, including hiking, mountain biking, camping, and equestrian use. This species is also particularly vulnerable to stochastic events as a result of its narrow range and limited distribution.

Charleston kittentails

The genus *Synthyris* is comprised of nine species occurring in the mountains of the western United States. Charleston kittentails (*S. ranunculina*) is known only from high elevation springs and seeps in the Spring Mountains (Knight 1992). This species is known from 33 sites in the vicinity of Mummy Mountain, along the upper Kyle and Lee canyons divide, to Charleston Peak and along the ridge line near Griffith Peak. It is a tufted, perennial member of the figwort family. Its basal leaves have 5 to 7 deep lobes, and its flowers are a blue to light violet color, opening in late June to early August. This plant occurs in shallow soils in permanently damp areas near springs, seeps, and snow banks of alpine, bristlecone pine, and mixed conifer forests from about 2,700 to 3,600 m (8,800 to 11,800 ft) elevation (Nachlinger and Sheldon 1997).

The most commonly occurring species at sites occupied by Charleston kittentails include bristlecone pine, mountain currant, and pink alumroot (*Heuchera rubescens*). It occurs with other species proposed for coverage under the MSHCP, including Charleston pussytoes, Clokey thistle, Jaeger whitlowgrass, Charleston draba, and Charleston tansy (Nachlinger and Sheldon 1997).

The population status of Charleston kittentails is presumed stable, as there has been no documentation of recent declines, loss or extensive degradation of habitat, or loss of populations. Threats to this species include habitat modification and other effects from dispersed recreational activities, primarily hiking and back-country camping at springs. Physical alteration of spring

and spring outflow habitats, resulting in alterations to the natural flow, temperature, and sediment regimes, also poses a threat to the species. Habitat degradation and population decreases due to introduction, competition, and encroachment of exotic species, dandelion in particular, are threats. Because it is a narrowly distributed endemic, Charleston kittentails is also susceptible to stochastic events.

Charleston grounddaisy

Charleston grounddaisy (*Townsendia jonseii* var. *tumulosa*) is a southern Nevada endemic found in Clark County with one outlier in Nye County. In Clark County, the plant occurs in the Spring Mountains and Sheep Range, at elevations ranging from 2,000 to 3,000 m (6,600 to 9,700 ft). This species is a herbaceous, perennial member of the sunflower family that typically attains a height of 3 cm (1.2 in) and grows in a tufted-matting form. It has white or pinkish flowers, with yellow centers, that open from late April through June.

In the Spring Mountains, Charleston grounddaisy can be found in the vicinity of Bonanza Peak; Mack, Lee, and Kyle canyons; Deer Creek, Bridge Mountain, Mount Wilson, and Mount Potosi. The population in Nye County is located at Sunnyside, roughly 240 km (150 mi) north-northeast of Charleston Peak. The characteristic habitat for this species includes shallow gravelly soils derived from limestones, dolomites, and sandstones along ridges and on rocky outcrops. It also occurs on somewhat deeper soils of forested slopes. Typical plant communities where this species occurs include bristlecone woodlands, mixed conifer forests, and pinyon pine associations (Nachlinger 1994).

The most common plants associated with Charleston grounddaisy include ponderosa pine, white fir, Clokey mountain sage and white squaw currant (*Ribes cereum*). Other species proposed for coverage under the MSHCP that have been documented in various habitats with the Charleston grounddaisy include rosy King sandwort, Clokey eggvetch, Clokey paintbrush, and Jaeger whitlowgrass. Charleston grounddaisies occur as widely scattered individuals and are found growing in full or partial sun.

The population status of Charleston grounddaisy is presumed stable, as there has been no documentation of recent declines, loss or extensive degradation of habitat, or loss of populations. The most significant threat to Charleston grounddaisy is habitat disturbance and destruction. Development including dispersed and concentrated recreation, road, trail, and recreational construction and maintenance, and mountain home development are threats in and around Lee Canyon and off the Deer Creek Highway and Macks Canyon Road. The cutting or clearing of woodlands along Macks Canyon Road directly modifies habitat for this species. Trampling by wild horses is also a threat to this species. Because Charleston grounddaisy is a narrowly distributed endemic, it is also susceptible to stochastic events.

Limestone (Charleston) violet

Viola purpurea is widespread in the southwestern United States; however, this variety (*V. p.* var. *charlestonensis*) is known only in Nevada and Utah. In Utah, limestone violet occurs on Claron

and Carmel limestone formations in the ponderosa pine zone of western Kane and Washington counties. This species is a herbaceous perennial member of the violet family (*Violaceae*). Charleston limestone violet grows to approximately 2 or 3 cm (0.75 to 1.2 in) in height, with stems located partially underground. The thick leaves appear purple on the underside and ashy above. The flowers are yellow and bloom from May to June.

Within Clark County, limestone violet occurs in the Virgin Mountains, Sheep Range, and in the Spring Mountains at Mud Spring, Lee Canyon, and Deer Creek, in mixed coniferous forests and pinyon-juniper communities at elevations ranging from 2,000 to 2,900 m (6,500 to 9,500 ft). Common associates of the limestone violet include ponderosa and pinyon pine, Utah juniper, and quaking aspen.

The population status of limestone violet is presumed stable, as there has been no documentation of recent declines, loss or extensive degradation of habitat, or loss of populations. The major threats to this species are habitat degradation and other effects from dispersed recreational activities such as hiking, equestrian use, OHV use, and dispersed camping. Habitat modification resulting from concentrated recreation is also a threat to the species.

Anacolia menziesii

Anacolia menziesii is a common species of moss of the family *Bartramiaceae*, occurring in the western United States. The only Nevada collection of this species is from the Red Rock Canyon area of the Spring Mountains, from a single location in the pinyon-juniper and blackbrush ecosystem at approximately 1,460 m (4,790 ft) in elevation (Stark 1996).

The population status of *Anacolia menziesii* is unknown, but is presumed stable given its widespread distribution and habitat preference. In Red Rock Canyon, the greatest threat to this species is habitat degradation by wild horse and burro trampling and grazing.

Claopodium whippleanum

Claopodium whippleanum is a common species of moss in the family *Leskeaceae*. It occurs in the western United States, and is particularly abundant in California. The only known Nevada occurrence of this species is in the Red Rock Canyon area of the Spring Mountains. The species was collected in the pinyon-juniper zone, where it was present in recessed, sheltered locations, at approximately 1,475 m (4,840 ft).

The population status of *Claopodium whippleanum* is unknown, but is presumed stable given its widespread distribution and abundance. In Red Rock Canyon the greatest threats to this species are habitat modification and degradation, and individual displacement by recreational climbers.

Dicranoweisia crispula

Dicranoweisia crispula is a widespread North American species of moss in the family *Dicranaceae*. The population recorded in Lee Canyon, in the Spring Mountains, is further south than previously recorded populations. The Lee Canyon population occurs on downed logs associated with mixed conifer and pinyon-juniper ecosystems at approximately 1,460 m (4,790 ft) (Stark 1996).

The population status of *Dicranoweisia crispula* is unknown, but presumed stable given its widespread distribution. Threats to this species include habitat degradation and modification through fire suppression and fuels management, post fire suppression, and historical fire management. Habitat degradation from wood collection and litter removal for firewood or for decorative purposes, is also a threat.

Syntrichia princeps

Syntrichia princeps is a common species of moss in the family *Pottiaceae*. It is known from the western United States with only two Nevada collections, both in Clark County. One collection is from the Virgin Mountains and the other was collected in a recessed, sheltered location near the population of *Claopodium whippleanum* at Willow Springs, at approximately 1,475 m (4,850 ft) elevation (Stark 1996).

The population status of *Syntrichia princeps* is unknown, but presumed stable given its widespread distribution and abundance. Habitat degradation and loss from dispersed recreational activities by hunters, hikers, equestrians, campers, mountain bikers, recreational climbers, and OHV users are possible threats to this species in Clark County. Other recreational impacts include littering, parking off designated roads and trails, removing and trampling of plants, and disturbance of natural surfaces. Habitat degradation by horse and burro trampling and grazing is also of concern.

ENVIRONMENTAL BASELINE

The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation process.

Clark County is located in the southernmost tip of Nevada and is bordered on the north by Lincoln and Nye counties, Nevada; on the east by Mohave County, Arizona and Washington County, Utah; and on the west and southwest by San Bernardino and Inyo counties, California. It covers approximately 7,880 square miles (4,043,200 ac), or about 7 percent of Nevada's total area. It is the most populated county in the state, with an estimated 1999 population of 1,321,319, which includes 1,269,120 people that live in the Las Vegas Valley (Clark County Department of Comprehensive Planning 2000). Elevations within Clark County range from 140 m (450 ft) above mean sea level along the Colorado River to 3,600 m (11,900 ft) at Charleston Peak.

Major transportation facilities in Clark County include: Interstates 15, 215, and 515; Highways 93 and 95; State Routes 160, 163, 164, 168, and 169; McCarran International Airport; and the Union Pacific Railroad. In general, road construction throughout Las Vegas Valley has accelerated over the past 10 years in response to urban growth. Highway 95 and Interstate 15 were expanded over the period, using mostly public lands and, as with other local transportation projects, sand and gravel from local operations.

The Spring Mountains of southern Nevada are the highest range in Clark County and lie between the Las Vegas and Pahrump valleys. The range is block-faulted and its highest point, Charleston Peak, rises to 3,600 m (11,900 ft) which is a full 3,000 m (9,840 ft) above the valley floor. The range is characterized by rugged terrain, with high peaks and ridges, steep slopes, vertical cliffs, and large canyons etched into the mountain block. The core of the Spring Mountains is surrounded by alluvial fans which form expansive aprons that gradually give way to the basin lowlands. The Spring Mountains also support extraordinary biological diversity. Twenty-seven plant and animal species are globally restricted to the Spring Mountains and another 11 species are locally endemic to the Spring Mountains and neighboring southern Nevada area (Nachlinger 1994).

The Las Vegas Valley is the major watershed in Clark County and is fed by precipitation in the Spring Mountains and Sheep Range to the west and north. The Las Vegas Valley drains toward the south and then easterly through Las Vegas Wash to Lake Mead and the Colorado River. Surface hydrology is marked by complex flow patterns in the alluvial fans of the valley with areas of concentrated but shifting flows. Las Vegas Wash is the only perennial stream in the Las Vegas Valley. Other primary surface waters include the Virgin and Muddy rivers in the northeastern portion of the county; the Colorado River; and lakes Mead and Mohave.

Land Uses in the Permit Area

The Permit Area includes all of Clark County. In addition, specifically for the desert tortoise, the Permit Area also includes NDOT rights-of-way (including material sites) below 5,000 feet in elevation and south of the 38th parallel in Nye, Lincoln, Mineral, and Esmeralda Counties. The land area of the Permit Area totals just over 5.1 million ac which is owned and administered by the Federal government (87 percent), state and local governments (3 percent), and private landholders (10 percent). Major land uses in the Permit Area are discussed below and in Chapter 4 of the MSHCP.

Urbanization and Private Lands

Land management for private lands is through local land use ordinances and other or state or Federal laws pertaining to specific activities. The cities of Las Vegas, North Las Vegas, Henderson, Mesquite, and Boulder City have comprehensive or master plans that provide policies and land use plans for existing and future uses and development. Clark County's Comprehensive Plan and land use and development plans provide direction for development in unincorporated communities and other areas of Clark County. The remaining private lands are zoned for low-density residential development (1 dwelling per 2 to 10 ac).

The Las Vegas Valley comprises 246,000 ac of non-Federal land and is the urbanized core of southern Nevada. The incorporated cities of Las Vegas, North Las Vegas, and Henderson within Las Vegas Valley comprise approximately 96,500 ac. The majority of Clark County's population (96 percent) is concentrated in Las Vegas Valley, as is the region's urban development. Outside the valley, communities are referred to as rural.

Federal Land Use in the Permit Area

The primary land and resource management agencies in the Permit Area are BLM (2.81 million ac), USFS (277,000 ac), NPS (454,000 ac), and the Service's Refuge Division (497,000 ac). As described under *Description of the Proposed Action*, the MSHCP reserve system will consist of areas (IMAs, LIMAs, MUMAs, and UMAs) defined by their kinds and levels of management as they affect the Covered Species. The IMAs and LIMAs provide the reserve system, with MUMAs providing conservation value as corridors, connections, and buffers for the IMAs and LIMAs. Management of MUMAs preserves the quality of habitat sufficient to allow for unimpeded use and migration of resident species to and from IMAs and LIMAs. The following discussion describes existing management on Federal lands.

Recreation

Public lands within the Permit Area contain ecologically diverse landscapes that include mountains, dry lake playas, Joshua tree forests, sand dunes, sandstone bluffs, and riparian areas. This diversity offers outstanding opportunities for casual and organized recreational activities. Demand for recreational opportunities are locally intense due to the expansion of the Las Vegas metropolitan area. Important recreational areas include Lake Mead NRA, Red Rock Canyon

NCA, Spring Mountains NRA, DNWR, Valley of Fire State Park, and Overton Wildlife Management Area (WMA).

Primitive or semi-primitive non-motorized use is characteristic of areas designated for Wilderness and WSAs. These areas are typically roadless, of rugged terrain, and lack ready access. Uses include hiking, camping, rock climbing, nature study, and hunting. Semi-primitive motorized use is typical in areas adjacent to WSAs and Wilderness. Uses are similar to those of the non-motorized areas but include OHV touring on roads, trails, and dry washes. Roaded natural areas comprise the majority of BLM's jurisdiction as well as portions of the Spring Mountains NRA, Red Rock Canyon NCA and Lake Mead NRA. Visitor use can be moderate to high with specific opportunities for picnicking, hiking, OHV touring, free play, organized events, camping, and interpretive activities. Vehicle use is restricted to approved roads within the Lake Mead NRA.

Rural recreational areas typically have some ambient human presence; developed recreation facilities and the natural environment is less important. Visitor use is moderate to high with competitive games and events, spectator sports, OHV touring, free play, and events. Sunrise Mountain/Rainbow Gardens, Nellis Dunes, and organized recreational shoreline areas along Lake Mead are examples of this level of recreation. Casual or dispersed recreation, the principal opportunities available to visitors within the Clark County, requires a variety of sites yet need no special facilities. These opportunities include automobile touring, hiking, hunting, fishing, primitive camping, backpacking, birdwatching, photography, rock climbing, caving, and competitive and non-competitive off-highway vehicle events. Water-based recreation is limited primarily to Lakes Mead and Mojave on the Colorado River and Overton Arm, and a few artificial ponds such as the one in Floyd R. Lamb State Park. Organized competitive events on public lands include model airplane fly-ins, model rocketry launches, dog field trails, horse endurance rides, and all-terrain bicycle events. OHV use accounts for the greatest single recreational use of the public lands.

Mineral Extraction

Mining in southern Nevada began in 1857 with discovery of lead ore at the Potosi mine, which later became the area's second largest producer of zinc. In 1892, the discovery of gold in the Keystone mine greatly stimulated activity in the Goodsprings district and southern Nevada. Much of BLM Las Vegas District is open to mine exploration and development. All but small designated areas within the Spring Mountains NRA, Red Rock Canyon NCA, and Lake Mead NRA are closed to new mining claims under the 1872 mining laws. There are very few areas of private lands with mining potential in the Permit Area. Many mining districts in the Permit Area have yielded significant production in the past, and some are currently producing large quantities of material. The principal mining districts are Searchlight, Eldorado Canyon, Bare Mountain (Fluorine), and Goodsprings (Potosi, Yellow Pine).

Exploration and mining of locatable minerals (all valuable mining deposits except those categorized as leasable or salable, see below) is authorized under the General Mining Law of 1872. Federal regulations are intended to provide for protection of non-mineral resources,

reclamation of disturbed areas and assure that activities are conducted in a manner that prevents unnecessary or undue degradation. Prior to approval of BLM Las Vegas RMP, approximately 95 percent of the Las Vegas District was open to entry under locatable mining laws. The Las Vegas RMP EIS identifies 7,328 ac disturbed by locatable mining activities between 1981 and 1995 with 4,853 ac reclaimed after disturbance. Leasable minerals (oil, gas, geothermal, sodium and potassium) are permitted with stipulations to assure protection of non-mineral resources susceptible to impacts resulting from exploration and development of leasable mineral resources. While there are areas within the Las Vegas District with potential for development of solid leasable minerals (sodium and potassium), there are no existing leases for these compounds, and no areas are classified as having high potential for their development. There has been no fluid leasable mineral (oil and gas) or geothermal production within the Las Vegas District. Salable minerals (common varieties of sand, gravel, stone, etc.) disposal is administered by BLM under the Materials Act (1947) as amended, on a case-by-case basis.

Livestock Grazing

Grazing allotments on public lands in the Permit Area were originally delineated in 1934; allotment boundaries, grazing preference (number of animal unit months), season of use, and base property (private land or water rights) were established. Grazing use is normally designated through land use planning and can range from a few days to a full year. Range inspections are made prior to grazing authorizations to determine if adequate forage is available, or if the potential to produce forage exists. Most livestock operators in the county have breeding herds rather than stocker-feeder operations. Numbers of livestock range from as few as 12 cows to as many as 625.

Under the BLM Las Vegas RMP, grazing currently is authorized on approximately 2.35 million ac of lands managed by BLM and on private lands. Livestock grazing is prohibited on NWR lands in Clark County. Grazing on lands within the Spring Mountains NRA historically occurred on eight allotments. The last of the grazing permits expired in 1993, and no new grazing permits have been issued. Grazing is authorized but not currently active on two allotments within the Lake Mead NRA in Clark County. By the close of 1999, Clark County, through the DCP, and with full cooperation of willing sellers, will have contracted to purchase and will have removed cattle from over 2 million ac of public lands within the County. Over 50 percent of the areal extent of grazing allotments in Clark County have now been purchased or contracted for purchase and grazing terminated pursuant to provisions of the DCP.

Rights-of-Way

Rights-of-way on public lands are authorized for a variety of uses including roads, electrical transmission lines, telephone lines, sewer lines, culinary water lines, natural gas pipelines, communication sites, electrical power plants and substations, and related power distribution lines. Issuance of right-of-way grants are subject to section 7 consultation requirements if they occur on Federal lands. The authorization process involves analysis of potential impacts to the environment as a result of the proposed action and preparation of an Environmental Assessment or Environmental Impact Statement if appropriate. Resource protection stipulations are

developed prior to approval. In the Permit Area, two designated utility corridors are reserved for the United States Government, as the result of special legislation. Public Law 101-67, the Apex Legislation, reserved numerous corridors within the area, including existing power-line rights-of-way, ranging from 300 to 1,800 feet (90 to 550 m) in width, for a total length of approximately 32 miles (50 km). The Aerojet legislation established a corridor in Coyote Springs Valley, with a total length of 4 miles (6 km), in Clark and Lincoln County.

Three major utility rights-of-way transect Clark County from north to south. None of these rights-of-way are within a designated corridor. Each Federal agency is responsible for the permitting of utility rights-of-way across lands under their jurisdiction. Establishment of designated corridors for utility rights-of-way must be identified in the agency's land use plan.

Wild Horses and Burros

Grazing by wild horses and burros occurs in many areas within the Permit Area, including lands managed by BLM, NPS, and USFS. The Wild and Free-Roaming Horse and Burro Act of 1971 mandates that wild horses and burros be protected from unauthorized capture, branding, harassment, or death. Wild horse and burro herds are found in the Spring, Muddy, and Eldorado Mountains, and in the Gold Butte region and in the vicinity of Red Rock Canyon. Portions of the Spring Mountains, Johnnie Territory, and Red Rock Canyon are managed by the USFS and BLM as the Spring Mountains NRA Territory. Burros occurring within Lake Mead NRA are managed under the Lake Mead NRA burro management plan. BLM has lead agency responsibility for other Herd Management Areas in Clark County. Currently, six herd areas occur within the Permit Area.

Federal Land Use Plans

Bureau of Land Management Las Vegas Resource Management Plan

On October 5, 1998, the Nevada State Director of BLM signed the Record of Decision for the Las Vegas RMP, providing management guidance for public lands in Clark and southern Nye counties over the next 20 years (BLM 1998). The Las Vegas District includes areas within all ecosystems identified by the County in the MSHCP with the exception of alpine, bristlecone pine, and mixed conifer ecosystems. Land management actions addressed in the RMP include land disposals, leases, utility rights-of-way, OHV management, road designations, and management of wild horse and burro herds. BLM lands in the Las Vegas District are managed as IMAs, LIMAs, and MUMAs. BLM Manual 6840 provides policy and guidance for conservation of candidates and other special status species, ensuring that actions authorized, funded, or carried out by the agency do not contribute to the need to list any candidate species.

Through the RMP, BLM is designating 1 million ac as ACECs and implementing management objectives emphasizing significant resources including soils, water, riparian, vegetation, and fish and wildlife. Of the 20 ACECs on BLM lands in Clark County, 4 are focused on protection of desert tortoise within its critical habitat. Management of these areas is discussed below under *Status of the Species in the Action Area - Desert Tortoise*. Four other ACECs focus on multiple

issues, but include habitat and wildlife values as the primary management concern. These ACECs are located in the River Mountains, Rainbow Gardens, Virgin River, and Virgin Mountains. RMP policies and actions are focused, in part, on the species and habitats included in the MSHCP, through management objectives and directions for water resources, riparian areas, vegetation, fish, wildlife, and special status species. Also included within the Las Vegas District are 21 Wilderness Study Areas (WSAs). Under interim management policies for WSAs, only permitted activities that create no new surface disturbance area are allowed.

BLM's Red Rock Canyon NCA is managed under a General Management Plan (GMP) (BLM 1999). Resources within the NCA are managed as LIMAs, providing both recreation and conservation benefits. Management prescriptions include protection of natural habitats and features, including sensitive wildlife and plants, and riparian areas. The GMP provides for an ongoing program of population monitoring of threatened, endangered, candidate, and other special status species, as well as other management programs focused on specific species to be covered under the MSHCP. The NCA encompasses several WSAs, and the North Fork Pine Creek Canyon Natural Area, which is to be managed for conservation of sensitive species and other wildlife.

Lake Mead National Recreation Area General Management Plan

Lake Mead NRA enabling legislation, Public Law 88-639, dated October 8, 1964, requires the NPS to manage the 1,482,475 ac in such a means as to enhance the recreation potential, and in a manner that will preserve the scenic, historic, scientific and other important features of the area. The 1986 Lake Mead NRA General Management Plan (GMP) outlined strategic resource conservation goals for the next 5 years, as well as specific actions for conservation. Existing policy and conservation goals include: (1) project planning, (2) inventory, (3) vital signs monitoring program, (4) resource protection, (5) environmental restoration, and (6) research. Lands within the Lake Mead NRA fall within the blackbrush, salt desert scrub, and Mojave desert scrub ecosystems, and are managed primarily as IMAs and LIMAs.

Spring Mountains National Recreation Area General Management Plan and Conservation Agreement

The Spring Mountains, located in Clark and Nye counties, Nevada, provides habitat for endemic flora and fauna found nowhere else in the world. This level of biodiversity exists primarily due to the presence of specialized features of this mountain range such as extreme vertical relief, geographic isolation, and geographic position on the boundary of the warm Mojave Desert and the cooler Great Basin Desert (MSHCP Appendix G). The Spring Mountains include habitat within each ecosystem identified in the MSHCP except Mojave desert scrub, mesquite/catclaw, and desert riparian ecosystems. Lands within the Spring Mountains NRA are managed as IMAs and LIMAs.

Public Law 103-63 dated August 4, 1993, established the Spring Mountains NRA and directed the USFS to develop a GMP, which was completed in 1996. The Spring Mountains NRA includes wilderness areas, WSAs, and multiple use areas managed for both recreation and species conservation.

On April 13, 1998, the USFS, Service, and Nevada Department of Conservation and Natural Resources signed the Conservation Agreement (CA) for the Spring Mountains NRA (MSHCP Appendix G). The USFS proposes to incorporate conservation actions identified in Section 2.8.4 of the MSHCP/EIS which includes measures previously committed to implementation of the CA. The CA is intended to promote conservation of endemic and sensitive species at the ecosystem level. To accomplish this goal, the following guidelines have been adopted (MSHCP Appendix G): (1) maintain viable populations of all native species in their natural habitats; (2) represent, within protected areas, all native ecosystem types across their range of variation; (3) maintain evolutionary and ecological processes; (4) manage over periods of time long enough to maintain the evolutionary potential of species and the ecosystem; and (5) accommodate human use and occupancy within these constraints. The CA identifies measures for conserving approximately 70 endemic, rare, and sensitive species, through public education, monitoring and inventory, research, restoration and enhancement, and resource protection.

Adequate monitoring of Covered Species and other rare or endemic species in the higher elevation ecosystems within the Spring Mountains NRA will occur in accordance with the Biological Monitoring Plan (Nachlinger 2000). Monitoring protocol in the Plan focuses on assessing the health of the alpine herbaceous, bristlecone pine woodland, and riparian spring fed high elevation plant communities. Monitored plant communities occur within areas most vulnerable to disturbance. Long-term monitoring of these plant communities will alert land managers when unacceptable levels of change occur that require additional conservation or management actions.

Desert National Wildlife Refuge Complex

The Service's Refuge Division manages the DNWR and Moapa Valley NWR in Clark County. The wildlife refuges are managed to protect species within their boundaries by permitting only those activities that are compatible with the purposes for which the area was withdrawn. The DNWR includes proposed wilderness areas and natural research areas. The Moapa Valley NWR is managed specifically for protection of the endangered Moapa dace, and other species of concern that occur there. Lands within the DNWR include portions of the bristlecone pine, mixed conifer, pinyon-juniper, sagebrush, blackbrush, salt desert scrub, and Mojave desert scrub ecosystems. The Moapa Valley NWR occurs within the Mojave desert scrub ecosystem and includes a portion of the Muddy Springs complex that forms the headwaters of the Muddy River. Both areas are managed as IMAs.

Southern Nevada Public Lands Management Act

In October of 1998, Congress enacted the Southern Nevada Public Lands Management Act (PLMA), which has provided an unprecedented opportunity to enhance both growth management

and environmental planning in Clark County. As estimated by the Congressional Budget Office, the sale of the approximately 27,000 ac of Federal lands scattered within the urban areas within the Las Vegas Valley, as mandated in PLMA, is expected to generate gross sales of an estimated $420 million from 1998 to 2003. Ultimate gross sales could be substantially higher. The PLMA, with some exceptions, mandates that 85 percent of the proceeds of the sales be deposited into a special account to be expended in five specific areas: (1) acquisition of environmentally sensitive lands in the state of Nevada, with a priority given to lands within Clark County; (2) development of the MSHCP; (3) development of parks, trails, and natural areas within Clark County; (4) capital improvements in specified and specially managed areas within Clark County, with a cap of 25 percent per fiscal year; and (5) reimbursement of BLM costs and expenses incurred in facilitating the sales.

It is estimated that expenditures in categories 4 and 5 above are likely to result in approximately 27 percent of the $60 million, or approximately $16 million per year, being paid to the Federal agencies. The balance of the fund, or approximately $46 million per year, would be available for the remaining three expenditure categories (acquisition of environmentally sensitive lands, development of the MSHCP, and development of parks, trails, and natural areas in Clark County), all of which would benefit the MSHCP. In addition, the special account must be invested in interest-bearing accounts, which will add to the amount available.

The County anticipates that approximately 50 percent of the total proceeds from PLMA will enhance the effectiveness of the MSHCP, through Federal acquisition of private lands including habitats for the MSHCP Covered Species and financial assistance in implementation of conservation measures. BLM, NPS, USFS, Service, and its Refuge Division have recently agreed to the terms of a Memorandum of Understanding, establishing a cooperative and mutually beneficial process to continue the development of the MSHCP throughout its 30-year term utilizing funds generated by the PLMA (MSHCP Appendix K).

Accomplishments of the Short-Term HCP and DCP

Since the desert tortoise was listed, most recovery tasks identified in the Desert Tortoise Recovery Plan have been initiated within the Permit Area through agency actions or HCPs. Many such tasks initiated or accomplished under the Short-Term HCP, as amended, and the DCP include: (1) Increased law enforcement; (2) construction and maintenance of tortoise barriers along major roads; (3) designation, signing, closure, and rehabilitation of roads; (4) inventory and monitoring of tortoise populations; (5) elimination of cattle and sheep grazing; (6) purchase of the Boulder City Conservation Easement; and (7) acquisition and management of privately-owned lands and grazing allotments for the benefit of the tortoise.

Through the terms of the Short-Term HCP, as amended, Clark County established, in perpetuity, a 541,000-acre desert tortoise conservation and management area in the Piute-Eldorado Valley. This area constitutes the Piute-Eldorado DWMA/ACEC and comprises a majority of the Nevada portion of the Piute-Eldorado CHU. Conditions of the permit required specific land-use controls, set management responsibilities, and required Federal land managers to budget management expenditures from their own funds and monies requested from the Short-Term HCP. These land-

use controls included: (1) the elimination of grazing; (2) restrictions on competitive and commercial OHV events; (3) limitations on intensive recreational uses; (4) standard review of, and consultation on, mining claims and plans of operation; (5) limitations on landfills to existing sites; (6) compliance with Council on Environmental Quality requirements; and (7) restrictions on existing uses which adversely impact tortoises.

The physical maintenance, enforcement of land-use controls, and biological monitoring of conserved habitat were a significant portion of the mitigation required for the incidental take permit for the Short-Term HCP, as amended. All of these activities were included in the management of conserved habitat. Other mitigation measures included initiation of public education and tortoise research programs, and imposition of a $550-per-acre mitigation fee on projects in the Permit Area.

Ecosystems in the Action Area

For the purposes of the MSHCP, the biological resources within Clark County were organized into assemblages of organisms within ecosystems and communities, which share similar characteristics including climate, geographical distribution, relation to water, elevational distribution, or specialized habitat requirements. RECON (2000) delineated the existing habitats within the Permit Area and categorized these habitats within 11 ecosystems as shown previously in Table 2 (see *Description of the Proposed Action* discussion). Table 4 identifies the Covered Species that occur within each ecosystem, which ecosystems provide primary and secondary habitats for each species, and the primary ecosystem in which effects of the proposed action on the Covered Species are discussed.

In developing the MSHCP/EIS, the Service and Applicants evaluated existing conditions and concluded that habitat for Covered Species within each ecosystem in the Permit Area has not been spatially or qualitatively reduced to the point where Covered Species can no longer persist. In addition, the Service and Applicants concluded that, based on the best available information, a sufficient quantity and quality of suitable habitat for each Covered Species exists within the Permit Area, such that viable populations could persist into the future. For the purposes of this Opinion, the environmental baseline for the Permit Area (i.e., Clark County) is discussed below by ecosystem.

Alpine Ecosystem

In Clark County, the alpine ecosystem is limited to elevations between 3,450 and 3,625 m (11,300 and 11,900 ft) in the Spring Mountains. The vegetation is dominated by cespitose perennial herbs and bunch grasses with very little tree cover. Soil development is very limited at this elevation where ground cover consists mostly of gravel, rock fragments and bedrock. Natural disturbances such as fire, colluvial deposition, mass-wasting (gravitational downslope movement of weathered rock debris), and occasional grazing by native wildlife are fairly common in the alpine zone (Nachlinger and Reese 1996).

The dominant plant species in the alpine ecosystem are bunch grasses such as alpine fescue, Sandberg bluegrass (*Poa sandbergii*), and bottle-brush squirreltail (*Sitanion hystrix*). Covered plant species that predominantly occur in this ecosystem include hidden ivesia, inch high fleabane, Hitchcock bladderpod, Charleston tansy, Charleston pussytoes, Jaeger whitlowgrass, Clokey catchfly, and Charleston kittentails (Nachlinger and Reese 1996).

The geographic, climatic, and biological isolation of the Spring Mountains has allowed new plant species to evolve or persist as relict populations, even though they may have been more widespread in the past but have gone extinct elsewhere. The biogeographic patterns of the plant species found in the alpine ecosystem of the Spring Mountains are an indication of a complex and varied geologic, climatic, and evolutionary history. Some species in this zone show affinities to related plants in the mountainous regions of southern California, the Cascade Range, the North American arctic region, as well as Asia and Europe. The patterns are evidence of a former continuum of alpine vegetation types across what is now desert (RECON 2000).

Approximately 500 ac of alpine habitat occurs in the Spring Mountains, all of which are within the Mount Charleston Wilderness and Carpenter Canyon Research Natural Area (RNA) of the Spring Mountains NRA. All of the alpine habitat is contained within an area classified as an IMA, and is managed by the USFS under the Spring Mountains GMP and CA. This ecosystem experiences a variety of impacts, most of which are associated with the growing human population in the region. A detailed list of potential ecosystem level threats and stressors in the alpine zone is provided in MSHCP, Appendix A.

Table 4. Association of Covered Species and Ecosystems in Clark County, Nevada (1 = primary association, 2 = secondary association, * = all ecosystem associations are the same). Circled numbers indicate the ecosystem under which the effects of the proposed action on the species is discussed.

ECOSYSTEMS[a]	AL	BP	MX	PJ	SB	BB	SS	MS	MC	DR	SP	SPECIFIC HABITAT REQUIREMENTS
SPECIES												
Mammals												
Silver-haired bat		*	*	*	*	*			*	*	*	
Long-eared myotis		*	*	*	*						*	
Long-legged myotis		*	*	*	*	*			*	*	*	
Palmer's chipmunk		2	①	2							1	
Birds												
Southwestern willow flycatcher										①		
Yellow-billed cuckoo										①		
American peregrine falcon			1	1	1					①		Cliffs, urban environments
Blue grosbeak									1	①		
Phainopepla									①	1	1	Mistletoe
Summer tanager										①		
Vermilion flycatcher									1	①		
Arizona Bell's vireo									1	①		
Reptiles												
Desert tortoise						2	2	①				
Western banded gecko				2	2	2	2	①	1	2		
Desert iguana							2	①	2			
Western red-tailed skink			2	①	2	2		2	2	1		
Large-spotted leopard lizard				2	2	2	①	1				

Table 4. (Continued)

ECOSYSTEMS[a]	AL	BP	MX	PJ	SB	BB	SS	MS	MC	DR	SP	SPECIFIC HABITAT REQUIREMENTS
Great Basin collared lizard				2	1	2	①	1	2	2		
California kingsnake				2	2	2	2	①	2	2		
Glossy snake				2	2	2	2	①				
Western long-nosed snake					2	2	2	①				
Western leaf-nosed snake							2	①				
Sonoran lyre snake			2	2		2	2	①	2			Rocky cover
Sidewinder							2	①	2			Loose sand
Speckled rattlesnake				2	2	2		①				Rocky foothills
Mojave green rattlesnake						2		①				
Amphibians												
Relict leopard frog										2	①	Perennial water
Invertebrates												
Dark blue butterfly		2	1	2							①	Specific host plant
Spring Mountains icarioides blue		2	1								①	Specific host plant
Mt. Charleston blue butterfly		①	1									Specific host plant
Spring Mountains acastus checkerspot		2	1	2							①	Specific host plant
Morand's checkerspot	1	①	2	2								Specific host plants
Carole's silverspot		2	①	1								Specific host plant
Nevada admiral		1	1	2							①	Specific host plants
Spring Mountains comma skipper		2	1	2							①	
Spring Mountains springsnail											①	Water w/ high mineral
Southeast Nevada springsnail											①	Water w/ high mineral

Table 4. (Continued)

ECOSYSTEMS[a]	AL	BP	MX	PJ	SB	BB	SS	MS	MC	DR	SP	SPECIFIC HABITAT REQUIREMENTS
Vascular Plants												
Clokey eggvetch			①	2								
Blue Diamond cholla								①				Succulent scrub
Rough angelica			2								①	
Sticky ringstem							2	①				Gypsum soils
Charleston pussytoes	①	2										
Las Vegas bearpoppy							2	①				Gypsum soils
White bearpoppy							①	2				
Rosy King sandwort		2	①									
Clokey milkvetch			2	①								
Threecorner milkvetch								①				Sandy soils
Spring Mountains milkvetch				①	2							
Alkali mariposa lily								①			2	
Clokey paintbrush		①	2									
Clokey thistle	2	2	①								2	
Jaeger whitlowgrass	①	2										
Charleston draba	2	①										
Inch high fleabane			①	2							2	
Pahrump Valley buckwheat							①		2			
Sticky buckwheat								①				Sandy soils
Clokey greasebush			①									Cliffs
Smooth pungent (dwarf) greasebush				①	2							Cliffs
Pungent dwarf greasebush				①	2							Cliffs

Table 4. (Continued)

ECOSYSTEMS[a]	AL	BP	MX	PJ	SB	BB	SS	MS	MC	DR	SP	SPECIFIC HABITAT REQUIREMENTS
Red Rock Canyon aster			①									High open plateau
Hidden ivesia	①	2										
Jaeger ivesia		①	2									Limestone crevices
Hitchcock bladderpod	2	①	2									
Charleston pinewood lousewort		2	①									
White-margined beardtongue						2		①				
Charleston beardtongue		①	2									
Jaeger beardtongue			①	2								
Parish's phacelia							①		2			
Clokey mountain sage		2	①									
Clokey catchfly	①	2										
Charleston tansy	①	2										
Charleston kittentails	①	2									2	
Charleston grounddaisy		2	①									
Limestone violet			①	2								
Non-vascular Plants												
Anacolia menziesii				①								
Claopodium whippleanum				①								
Dicranoweisia crispula			①	2								
Syntrichia princeps				①								

[a] AL = Alpine, BC = Bristlecone Pine, MX = Mixed Conifer, PJ = Pinyon-Juniper, SB = Sagebrush, BB = Blackbrush, SS = Salt Desert Scrub, MS = Mojave Desert Scrub, MC = Mesquite/Catclaw, DR = Desert Riparian/Aquatic, SP = Springs

According to Nachlinger and Reese (1996), the condition of the alpine ecosystem is generally excellent, primarily as a result of the remoteness of the landscape and the lack of roads into the area. This community is described as a stable and long-lived series which is adapted to high levels of natural disturbance. Most non-natural disturbances in this ecosystem are associated with dispersed recreation of the wilderness, with the heaviest impacts concentrated at established campsites and the Charleston Peak area. Because access is somewhat limited in the high elevations of the Spring Mountains, the alpine zone remains the most biologically diverse and relatively undisturbed ecosystem in this region.

Bristlecone Pine Ecosystem

The bristlecone pine ecosystem is found predominantly in the Spring Mountains and, to a lesser extent, in the Sheep Range at elevations ranging from about 2,925 to 3,500 m (9,000 to 11,500 ft) on exposed, dry, rocky slopes and ridges in the subalpine zone up to tree line. This ecosystem is primarily woodland dominated by conifers with an approximate 15 percent tree cover. Ground cover is composed mostly of gravel, rock fragments and bedrock, and litter. Natural disturbances such as fire, grazing by native wildlife, colluvial deposition, occasional mass-wasting and wind erosion, occasional drought and windthrow are common in the bristlecone pine ecosystem. Non-natural disturbances in this ecosystem include fire, camping, trash dispersal, and wild horse and burro grazing. The presence of non-native, invasive species such as red brome and dandelion (*Taraxacum officinale*) is also of concern (Nachlinger and Reese 1996).

The dominant plant species in this habitat is bristlecone pine, forming pure stands from tree line down to elevations where limber pine becomes co-dominant. Common associates include mountain currant, Ross sedge (*Carex rossii*), bottle-brush squirreltail, and Letterman needlegrass (*Achnatherum lettermanii*). Associated shrub species such as the widely distributed common juniper (*Juniperus communis*) tend to be widely scattered except in natural openings and near forest edges. The high elevations result in a short growing season for shrubs and flowering plants. The dominant conifers are slow growing and the successional stages are not well understood (RECON 2000).

There are approximately 15,800 ac of bristlecone pine habitat in Clark County, 86.1 percent of which is located in IMAs within the Mount Charleston Wilderness and Carpenter Canyon RNA and 2.5 percent in LIMAs within the Spring Mountains NRA. MSHCP analyses indicate that there are private inholdings totaling 6 percent within the NRA; however, most or all of these private lands have been, or will be, acquired by the USFS and will be included within the Wilderness Area in the near future. Approximately 5 percent of the bristlecone pine ecosystem occurs in IMAs within the DNWR in the Sheep Range.

The Spring Mountains NRA, Mount Charleston Wilderness, Carpenter Canyon RNA, and DNWR (14,400 ac or 91 percent of the total habitat) are intensively managed with a focus on roadless, primitive recreational uses and conservation of sensitive wildlife and plants. Table 5 summarizes the various land management categories within the bristlecone pine ecosystem.

Table 5. Management of habitat in the bristlecone pine ecosystem, Clark County, Nevada.

Category	Manager	Management Classification	Acres	% of Habitat
IMA	USFS	Wilderness	13,600	86.1
	Service	NWR	800	5.1
IMA Total			**14,400**	**91.1**
LIMA	USFS	NRA	400	2.5
LIMA Total			**400**	**2.5**
UMA	Private	Private	1,000	6.3
UMA Total			**1,000**	**6.3**
Grand Total			**15,800**	**100.0**

According to Nachlinger and Reese (1996), the condition of the bristlecone pine ecosystem is generally excellent. Fire is the most important form of natural disturbance in this ecosystem, and suppression activities and human-caused fire have altered the fire regime such that natural regeneration of bristlecone pine is impeded and unnaturally high cover of other conifers has occurred. Non-natural disturbances result from concentrated and dispersed recreation within this habitat, especially in easily accessed localized areas. This ecosystem experiences a variety of impacts, most of which are associated with the growing human population in the region. A detailed list of potential ecosystem level threats and stressors in the bristlecone pine ecosystem is provided in MSHCP Appendix A. However, the lack of roads and motorized access to the area minimizes non-natural disturbance and enables the ecosystem and its diverse biological resources to remain in excellent condition.

Mixed Conifer Ecosystem

The mixed conifer ecosystem occurs in the Spring Mountains and Sheep Range in Clark County. The ecosystem is generally separated into three community associations including white fir, ponderosa pine, and ponderosa pine/mountain shrub (RECON 2000). Vegetation typically forms a woodland or forest, dominated by a mix of conifers and deciduous trees. The dominant components of the ground cover are gravel and litter. Natural disturbances in this ecosystem include fire, grazing by native wildlife, colluvial deposition, mass-wasting and flash flooding, water and wind erosion, alluvial deposition, and avalanches. Non-natural disturbances are also a factor in the mixed conifer forests. Some of these include human-caused fire, wood cutting, wild horse and burro grazing, hiking and horseback riding, utility corridor clearing, and trampling (Nachlinger and Reese 1996).

The white fir community is found in both mountain ranges, generally on north- and east-facing slopes at elevations between 2,250 and 3,300 m (7,400 and 10,800 ft). White fir inhabits the warmest and driest habitats of all fir species. At the higher elevations, associated tree species include bristlecone pine and limber pine. At the lower sites, ponderosa pine becomes a common associate. Shrub species that occur in this community include mountain mahogany and common juniper. Associated herbaceous species, which also occur in the other mixed conifer communities, include various plant species proposed for coverage under the MSHCP, including

Clokey paintbrush, Jaeger ivesia, Hitchcock bladderpod, Jaeger beardtongue, Charleston grounddaisy, Clokey milkvetch, and Clokey thistle.

The ponderosa pine community is the most extensive of the mixed conifer forests in Clark County. It generally occurs between elevations of 1,200 and 2,700 m (3,900 to 8,900 ft) where ponderosa pine may form nearly monotypic stands. At its upper limits, white fir and bristlecone pine may be common associates. At lower elevations, it transitions into pinyon and Utah juniper woodlands. Associated shrub species include mountain mahogany, snowberry, manzanita (*Arctostaphylos* spp.), and little-leaved mountain mahogany (*Cercocarpus intricatus*).

The ponderosa pine/mountain shrub community is an extension of the coniferous forest characterized by lower canopy coverage of ponderosa pine (less than 30 percent) and co-dominance of mountain shrubs such as Gambel oak, alder leaf mountain mahogany (*Cercocarpus montanus*), snowberry, manzanita, and little-leaved mountain mahogany. This community occurs in both the Spring Mountains and Sheep Range as well as the Virgin Mountains in eastern Clark County.

There are approximately 56,400 ac of mixed conifer habitat in Clark County. The ponderosa pine community constitutes about 75 percent of the habitat or 42,000 ac. White fir communities comprise about 13 percent (7,500 ac) and ponderosa pine/mountain shrub communities about 12 percent (6,900 ac) (RECON 2000).

A total of 97 percent of the habitat is in IMAs and LIMAs within the Spring Mountains NRA or the DNWR. Both of these areas have restrictions on mining, livestock grazing, and motorized OHV use and are actively managed for ecosystem conservation. Areas within the Spring Mountains NRA managed as LIMAs for both conservation and a broader spectrum of recreational uses, include intensive recreational use areas, developed camping areas, hiking and biking trails, rock climbing areas, and designated motorized vehicle-use roads and trails. Another 3 percent of the habitat is managed as UMAs on private lands. Table 6 below summarizes land management in this ecosystem.

Table 6. Management of habitat in the mixed conifer ecosystem, Clark County, Nevada.

Category	Manager	Management Classification	Acres	% of Habitat
IMA	USFS	Wilderness	24,700	43.7
	USFS	Wilderness Study Area	2,100	3.7
	Service	NWR	19,300	34.3
IMA Total			**46,100**	**81.8**
LIMA	USFS	NRA	8,800	15.6
LIMA Total			**8,800**	**15.6**
UMA	Private	Private	1,500	2.6
UMA Total			**1,500**	**2.6**
Grand Total			**56,400**	**100.0**

Of the 7,500 ac of white fir habitat in Clark County, 59 percent is within the Mount Charleston Wilderness and Carpenter Canyon RNA, with an additional 5 percent in the Spring Mountains NRA. Within the forest boundaries, there are 100 ac of private inholdings. The remaining 2,600 ac of habitat occurs in the Sheep Range in the DNWR.

Ponderosa pine forest is found within the Spring Mountains NRA (28,200 total ac or 67 percent of the total habitat), of which 19,300 ac are within designated wilderness areas, 800 ac are in a Wilderness Study Area (WSA), and 8,100 ac are in mixed use areas. The Sheep Range of the DNWR occupy 12,500 ac (30 percent). Within the forest boundaries there are 1,300 ac of private inholdings (3 percent).

Of the 6,900 ac of ponderosa pine/mountain shrub habitat found in Clark County, 38 percent is within the Spring Mountains NRA, and 61 percent is in the Sheep Range in the DNWR. There are a small number of private inholdings within this habitat in the Spring Mountains.

According to Nachlinger and Reese (1996), the mixed conifer forest ecosystem is, in general, in fair to good condition. It is a stable, long-lived series in which fire plays an integral role in maintaining the characteristics of the ecosystem by encouraging a mosaic of diverse plant communities in various stages of ecological development. Mixed conifer forests dominated by ponderosa pine have experienced the highest natural fire frequency of all forest types. However, fire suppression activities coupled with other human related impacts, such as unnatural fire and dispersed recreation, have increasingly put this ecosystem at risk in Clark County. This ecosystem experiences a variety of impacts, most of which are associated with the growing human population in the region. A detailed list of potential ecosystem level threats and stressors in the mixed conifer ecosystem is provided in the MSHCP Appendix A.

Pinyon-Juniper Ecosystem

The pinyon-juniper ecosystem is widespread in Clark County and generally includes mountain shrub, pinyon, juniper, and intermixed grassland vegetation community types. These communities are distributed as elevational bands around the Spring, Sheep, and Virgin mountains and to a lesser degree in the McCullough Mountains at elevations ranging from 1,500 to 2,500 m (4,900 to 8,200 ft). Vegetation typically forms a woodland, dominated by conifers and deciduous and evergreen shrubs in the understory. The dominant components of the ground cover are gravel and litter. Natural disturbances in the pinyon-juniper ecosystem include grazing by native wildlife, wind erosion, fire, water erosion, colluvial deposition and mass-wasting, windthrow and flash flooding. Non-natural disturbances include wild horse and burro grazing, OHV use, wood cutting, logging, human-caused fire, and livestock grazing. Also of concern in this ecosystem is the prevalence of red brome, a non-native, invasive species (Nachlinger and Reese 1996).

The mountain shrub community is a deciduous shrubland that occurs on approximately 108,400 ac within Clark County. This community is supports species such as Gambel oak, maple (*Acer* sp.), alder leaf mountain mahogany, cliff rose (*Cowania mexicana*), bitterbrush (*Purshia tridentata*), serviceberry, buckbrush (*Ceanothus* sp.), snowberry, manzanita, ninebark

(*Physocarpus alternans*), mountain currant, squawbush (*Rhus trilobata*), and little-leaved mountain mahogany. Other associated species include sagebrush and rabbitbrush.

The pinyon pine community occurs on approximately 56,200 ac in the Permit Area. It is dominated by pinyon with woodland canopies at less than 30 percent and forest canopies between 30 and 60 percent cover. Primary associated tree species include ponderosa pine, white fir, mountain mahogany, and Utah juniper. Shrub associates include those listed above for mountain shrub community with a live oak component. The pinyon pine community is found above the more widespread pinyon-juniper association.

The pinyon-juniper association is a coniferous woodland or forest with structure similar to that of the other communities described here. It occurs on approximately 106,300 ac within Clark County. The species composition is as described above, with Utah juniper becoming a co-dominant with pinyon pine. This community is the intermediate between pinyon and juniper habitats.

The juniper association occurs on approximately 7,000 ac in the Permit Area. This is also a coniferous woodland and forest dominated by Utah juniper with woodland canopies less than 30 percent, and forest canopies below 60 percent cover. This community supports additional juniper species including Rocky Mountain juniper and western juniper (*Juniperus occidentalis*). Pinyon pine remains an important component in this community along with sagebrush, rabbitbrush, and blackbrush.

Pinyon-juniper associations occur on approximately 278,200 ac within the Permit Area. The existing IMA management designations in pinyon-juniper habitats include wilderness, WSAs (Mount Stirling, Pine Creek, and La Madre Mountain), ACECs, and NWR lands, which constitute approximately 173,800 ac (63 percent) of the total pinyon-juniper habitat in Clark County. These management designations have substantial restrictions of public access and recreational uses. BLM lands managed as IMAs include those designated as ACECs and WSAs. The BLM and USFS WSAs comprise approximately 84,600 ac of habitat and support inherent resource values.

Approximately 81,500 ac (29 percent) of pinyon-juniper habitats occur in LIMAs located within the Red Rock Canyon NCA (1,500 ac or less than 1 percent) and Spring Mountains NRA (80,000 ac or 29 percent of the total habitat), which are open to a wide variety of uses including recreational activities, limited mining, and wild horse and burro grazing.

Approximately 18,700 ac (7 percent) occur on undesignated BLM lands managed as MUMAs. These lands are not under the general management direction of BLM Las Vegas RMP. Private inholdings totaling approximately 4,200 ac (2 percent) generally occur in the Red Rock Canyon NCA and Spring Mountains NRA and along the major roads leading to these areas. There are also lands under long-term leases to private organizations and Clark County for recreational purposes in the Spring Mountains area. Table 7 summarizes the land management in this ecosystem and its associated communities.

Table 7. Management of habitat in the pinyon-juniper ecosystem, Clark County, Nevada.

Category	Manager	Management Classification	Acres	% of Habitat
IMA	BLM	ACEC	800	< 1.0
	BLM	WSA	37,100	13.3
	USFS	Wilderness	11,600	4.1
	USFS	WSA	47,500	17.1
	Service	NWR	76,500	27.5
	Service/USAF	NWR/Air Force Range	300	<1.0
IMA Total			**173,800**	**62.5**
LIMA	BLM	NCA	1,500	< 1.0
	USFS	NRA	80,000	28.7
LIMA Total			**81,500**	**29.3**
MUMA	BLM	Undesignated	18,700	6.7
MUMA Total			**18,700**	**6.7**
UMA	Private	Private	4,200	1.5
UMA Total			**4,200**	**1.5**
Grand Total			**278,200**	**100.0**

According to Nachlinger and Reese (1996), the pinyon-juniper ecosystem and its associated communities are in fair condition but in need of some improvement. The pinyon-juniper community where it transitions into sagebrush is the most disturbed within this zone. It is heavily impacted by human disturbances, such as recreational camping, wood cutting, and OHV use. Invasion by non-native plant species has resulted in changes in species composition and altered fire regimes. This ecosystem has rarely been observed to support old growth characteristics, rather it occurs in varying seral stages, and in some areas appears to be expanding. This may be due to fire suppression activities and historic grazing which caused a reduction in the shrub and herbaceous layers, allowing more successful establishment of pinyon pine and juniper. Despite the observation that this habitat may be expanding in distribution, the overall condition of the ecosystem will be at higher risk without additional active management of human activities. This ecosystem experiences a variety of impacts, most of which are associated with the growing human population in the region. A detailed list of potential ecosystem level threats and stressors in the pinyon-juniper ecosystem is provided in the MSHCP, Appendix A.

Sagebrush Ecosystem

In Clark County, the sagebrush ecosystem encompasses sagebrush, sagebrush/perennial grassland, and intermixed grassland vegetation community types. These communities are found in the Spring, Sheep, and Virgin mountains, typically between 1,500 and 2,800 m (4,900 to 9,200 ft) elevation (RECON 2000). The vegetation is a shrubland, dominated by various species of sagebrush with very little tree cover. Ground cover is comprised mostly of gravel with litter and limited soil and rock fragments and bedrock. Natural disturbances in this ecosystem include grazing by native wildlife, wind erosion and colluvial deposition, and mass-wasting. The

sagebrush ecosystem is also influenced by non-natural disturbances such as excessive wild horse and burro grazing, occasional OHV use, and the invasion of non-native red brome (Nachlinger and Reese 1996).

The sagebrush community is dominated by big sagebrush, low sagebrush (*Artemisia arbuscula*), Bigelow sagebrush (*A. bigelovii*), or black sagebrush (*A. nova*), depending on soil/rock type and elevation. In the Spring Mountains, at elevations below 2,800 m (9,200 ft), big sagebrush can be found in pure stands and commonly in pinyon-juniper and mixed conifer habitats. Other shrub species that occur with sagebrush include rabbitbrush, snakeweed (*Gutierrezia sarothrae*), blackbrush, shadscale, spiny hopsage, and bitterbrush. Grasses are also a component of sagebrush communities. Some species include wheatgrass (*Agropyron* spp.), bottle-brush squirreltail, and non-native red brome. The species composition of the sagebrush/perennial grassland community is similar to that described above with sagebrush typically occurring above 1,493 m (4,900 ft) in elevation. This community type and grassland habitats occur on approximately 7,100 ac, in the lower elevations of the Spring Mountains.

Sagebrush habitat occurs on approximately 134,600 ac within the plan area. The Service and U.S. Air Force (USAF) manage about 41 percent on the DNWR and NAFR, respectively. The USFS manages about 31 percent of the habitat on the Spring Mountains NRA, WSA and wilderness areas. BLM manages 28 percent within WSAs, NCAs, conserved habitat, and undesignated areas. Private inholdings account for less than 1 percent.

Of the total 134,600 ac of sagebrush habitat, about 58 percent is managed as IMAs for primitive, non-motorized, dispersed recreational use. Within this category, there are 22,400 ac (16.6 percent) managed as wilderness or WSAs by the USFS and BLM. The 29 percent of the habitat located within the Spring Mountains NRA and Red Rock Canyon NCA is managed for both conservation and a broader spectrum of recreational uses, including intensive recreational use areas, developed camping areas, hiking and biking trails, rock climbing areas, and designated motorized vehicle-use roads and trails. Approximately 16,300 ac (12 percent) are within MUMAs as undesignated BLM lands which are managed, under the Las Vegas RMP, to balance multiple uses with maintenance of habitat and species values. Private inholdings, totaling about 900 ac (less than 1 percent) are located around Red Rock Canyon and the Spring Mountains. Table 8 summarizes land management within the sagebrush ecosystem.

Table 8. Management of habitat in the sagebrush ecosystem, Clark County, Nevada.

Category	Manager	Management Classification	Acres	% of Habitat
IMA	BLM	ACEC	300	< 1.0
	BLM	WSA	17,500	13.0
	USFS	Wilderness	500	< 1.0
	USFS	WSA	4,400	3.2
	Service	NWR	52,800	39.2
	Service/USAF	NWR/Air Force Range	2,700	2.0
IMA Total			**78,200**	**58.0**
LIMA	BLM	NCA	3,000	2.2
	USFS	NRA	36,200	26.8
LIMA Total			39,200	29.1
MUMA	BLM	Undesignated	16,300	12.1
MUMA Total			**16,300**	**12.1**
UMA	Private	Private	900	< 1.0
UMA Total			**900**	< 1.0
Grand Total			**134,600**	**100.0**

According to Nachlinger and Reese (1996), the sagebrush ecosystem is in good condition overall. It is a presumably stable series but experiencing increasing disturbances associated with the rapid human population growth in the surrounding areas. The sagebrush communities are not generally considered biologically unique and do not support any endemic species; however, there is concern with further fragmentation and degradation of this and other low elevation habitats and landscapes in this region. Fire is also of concern in this ecosystem. As in other shrub dominated habitats, such as blackbrush and Mojave desert scrub, the natural fire frequency in undisturbed native deserts is low. Fire frequency in disturbed deserts invaded by non-native annual plant species accelerates to intervals that promote persistence of early seral species and elimination of native shrub vegetation. Fire in these ecosystems often results in extensive shrub mortality, allowing establishment of non-native species such as red brome. The sagebrush and other shrub dominated communities are becoming increasingly at risk due to non-natural disturbances and the invasion of non-native species. A detailed list of potential ecosystem level threats and stressors in the sagebrush ecosystem is provided in the MSHCP, Appendix A.

Blackbrush Ecosystem

The blackbrush ecosystem consists of the blackbrush and hopsage communities, both of which are transitional habitats between Mojave and Great Basin ecosystems. The blackbrush community occurs at elevations between 1,250 and 1,525 m (4,100 and 5,000 ft). It is dominated by blackbrush in association with juniper, spiny hopsage, Mormon tea, shadscale, desert thorn, snakeweed, creosote bush, and Joshua tree. The hopsage community encompasses 5,200 ac of the total blackbrush ecosystem and is characterized by the occurrence of spiny hopsage, typically with desert thorn, rabbitbrush, Mormon tea, and shadscale. Other associated shrubs include

sagebrush, blackbrush, winterfat, sticky ratany (*Krameria erecta*), white bursage, and creosote bush. The hopsage association occurs around the Spring Mountains and Sheep Range.

Blackbrush has an extensive distribution and occurs within the jurisdiction of each Federal land manager in Clark County. Of the total 824,800 ac of blackbrush habitat, 62 percent is managed by BLM; 33 percent by Refuges and USAF; 5 percent by USFS within the Spring Mountains NRA and WSA; and less than 1 percent by NPS (Lake Mead NRA). Private holdings (8,500 ac) total less than 1 percent of this ecosystem in the county, including lands that may be developed under the MSHCP and Permit. An additional 200 ac of Federal lands (USAF Indian Springs Air Force Auxiliary Field) are designated as an UMA and not covered under the MSHCP and Permit.

A total of 52 percent of the 824,700 ac of blackbrush habitat is managed as IMAs for primitive, non-motorized, dispersed recreational use. The 12 percent of the habitat located within the Spring Mountains NRA and Red Rock Canyon NCA is managed as LIMAs for both conservation and a broader spectrum of recreational uses, including intensive recreational use areas, developed camping areas, hiking and biking trails, rock climbing areas, and designated motorized vehicle-use roads and trails. Both of these areas are closed to new mining, livestock grazing, and OHV use and are actively managed for habitat conservation. BLM undesignated lands (34 percent) are managed as MUMAs to balance multiple uses, including mining, OHV activities, grazing, and other activities with maintenance of habitat and species values. Wild horses and burros remove the grasses and forbs and not the blackbrush shrubs which results in a reduction in the biodiversity of the ecosystem. Table 9 summarizes land management within the blackbrush ecosystem.

While Nachlinger and Reese (1996) state that the blackbrush ecosystem is not biologically unique, these associations often support an unusual diversity of species. The condition of the ecosystem in the Spring Mountains NRA is fair overall, but degraded. Fragmented habitat conditions have been documented and are expected to increase. Blackbrush habitat within WSAs that have not been impacted by wildfires are considered in good condition. Off-highway vehicle impacts are prevalent here and are often associated with access to dispersed camping sites and dry washes. Human related disturbance is most evident near the Spring Mountains NRA boundaries which are adjacent to private lands and in-holdings. A relatively small portion of this ecosystem, consisting of an unknown number of acres of blackbrush habitat, has been disturbed, destroyed, or degraded as a result of development. These disturbances are discussed in the Mojave desert scrub discussion below. A detailed list of potential ecosystem level threats and stressors in the blackbrush ecosystem is provided in MSHCP Appendix A.

Table 9. Management of habitat in the blackbrush ecosystem, Clark County, Nevada

Category	Manager	Management Classification	Acres	% of Habitat
IMA	BLM	ACEC	81,300	9.9
	BLM	WSA	84,800	10.3
	USFS	Wilderness	100	< 1.0
	USFS	WSA	8,500	1.0
	Service	NWR	166,900	20.2
	Service/USAF	NWR/Air Force Range	80,300	9.7
	NPS	NRA	3,100	< 1.0
IMA Total			**425,000**	**51.5**
LIMA	BLM	NCA	62,000	7.5
	USFS	NRA	34,500	4.1
	Service/USAF	NWR/Air Force Range	15,000	1.8
LIMA Total			**111,500**	**13.5**
MUMA	BLM	Undesignated	279,600	33.9
MUMA Total			**279,600**	**33.9**
UMA	Private	Private	8,500	1.0
	USAF	Air Force Range-Unmanaged	200	< 1.0
UMA Total			**8,700**	1.0
Grand Total			**824,800**	**100.0**

Salt Desert Scrub Ecosystem

In Clark County the salt desert scrub ecosystem occurs between 1,000 and 1,775 m (3,250 and 5,800 ft) in elevation in a mosaic pattern within stands of creosote-bursage and blackbrush communities. Saltbush is commonly found on playas, inter-mountain basins, and localized depressions where poorly draining, silty loam soils develop into desert pavement. The salt desert scrub ecosystem is composed of playa (barren, undrained desert basins), areas of urban development, and salt desert scrub vegetation.

Salt desert scrub includes broad, abundant shrubland occurring below 1,525 m (5,000 ft), principally dominated by one or more of the following: Shadscale, desert holly, Bailey's greasewood (*Sarcobatus baileyi*), desert thorn, Torrey saltbush, winterfat, buttonsage (*Artemisia spinescens*), four-wing saltbush, Mormon tea, horsebrush (*Tetradymia canescens*), and snakeweed. Other primary shrubs include greasewood (*Sarcobatus vermiculatus*), sagebrush, blackbrush, iodine bush (*Allenrolfea occidentalis*), and creosote bush. Primary associated forbs include halogeton (*Halogeton glomeratus*). Primary associated grasses include saltgrass and non-native annual grasses such as red brome.

Salt desert scrub habitat occurs on approximately 190,600 ac within the Permit Area. About 56 percent of the total is managed as IMAs for primitive, non-motorized, dispersed recreational use (wilderness, WSA, or Refuge). The 3 percent of the habitat located within the Spring

Mountains NRA and Red Rock Canyon NCA is managed as LIMAs for both conservation and a broader spectrum of recreational uses, including intensive recreational use areas, developed camping areas, hiking and biking trails, rock climbing areas, and designated motorized vehicle-use roads and trails. Both of these areas are closed to new mining, livestock grazing, and off-road motorized recreational vehicle use, and are actively managed for habitat conservation. An additional 7 percent of the habitat is managed as LIMAs within the DNWR and is very restricted in access but is within impact areas used by the USAF. BLM undesignated lands (21 percent) are managed as MUMAs under the Las Vegas RMP to balance multiple uses, including mining, OHV activities, grazing, and other activities with maintenance of ecosystem and species values.

Development within this ecosystem has mostly occurred north of Las Vegas. A relatively small portion of this ecosystem (18,500 ac) are managed as UMAs and occur on private lands, which may be developed or disturbed under the MSHCP. Existing disturbance has occurred as a result of military activities, and urban expansion of the cities of Las Vegas and North Las Vegas. Relatively small fragments of salt desert scrub habitat occur within the Permit Area, with the exception of the northwest quadrant of the county. Most of these fragments are surrounded by Mojave desert scrub habitat. Since the desert tortoise was listed, the majority of the existing disturbance within the Permit Area, occurred pursuant to the Short-Term HCP, DCP, and section 7 of the Act, and within the Mojave desert scrub ecosystem. These disturbances are discussed in the Mojave desert scrub ecosystem, below. Table 10 summarizes land management within the salt desert scrub ecosystem.

Table 10. Management of habitat in the salt desert scrub ecosystem, Clark County, Nevada

Category	Manager	Management Classification	Acres	% of Habitat
IMA	BLM	ACEC	2,700	1.4
	BLM	WSA	1,400	< 1.0
	NPS	DWMA	2,800	1.4
	Service	NWR	53,600	28.1
	Service/USAF	NWR/Air Force Range	51,700	27.1
IMA Total			**112,200**	**58.9**
LIMA	BLM	NCA	5,100	2.6
	USFS	NRA	400	< 1.0
	Service/USAF	NWR/Air Force Range	13,500	7.1
LIMA Total			**19,000**	**9.9**
MUMA	BLM	Undesignated	39,500	20.7
	NPS	NRA	100	< 1.0
MUMA Total			**39,600**	**20.7**
UMA	Private	Private	18,500	9.7
	USAF	Air Force Range-Unmanaged	1,300	< 1.0
UMA Total			**19,800**	10.3
Grand Total			**190,600**	**100.0**

As with other low elevation ecosystems, saltbush scrub is exposed to a wide variety of disturbances, many of which are associated with the human population growth in the valley. The condition of the ecosystem is fair to good overall but will undergo localized declines as Las Vegas expands to the north and northeast. Direct losses of habitat due to urban expansion and associated activities may occur. A detailed list of potential ecosystem level threats and stressors in the salt desert scrub ecosystem is provided in the MSHCP, Appendix A.

Mojave Desert Scrub Ecosystem

The Mojave desert scrub ecosystem is the most widespread ecosystem in the Permit Area, occurring over 65 percent of the county. Much of the development associated with the Las Vegas Valley has occurred within this ecosystem. Habitat within Mojave desert scrub occurs at elevations below 1,225 m (4,000 ft), and includes two major plant communities, Mojave mixed scrub and creosote-bursage. Also found within this ecosystem, are invasive, transitional grasslands, large tracts of urban development, small areas of barren land, and agricultural development.

The Mojave mixed scrub community is characterized by the occurrence of creosote bush in association with white bursage, indigo bush, desert thorn, shadscale, spiny hopsage, ratany, and Mormon tea, typically on slopes, washes, or upland areas in the Mojave desert. Primary associated shrubs include blackbrush, brittlebush (*Encelia farinosa*), cheesebush, bebbia (*Bebbia juncea*), desert saltbush, and desert holly. Other associated species include Joshua tree, Mojave yucca, teddybear cholla (*Opuntia bigelovii*), and hedgehog cactus (*Echinocereus* spp.).

The creosote-bursage community is the most widespread in Clark County and occurs below 1,200 m (4,000 ft) in valley bottoms and lowlands of mild slope aspect. It is principally dominated by creosote bush and white bursage. Primary associated shrub species include blackbrush, Mormon tea, indigo bush, shadscale, spiny hopsage, desert thorn, ratany, western honey mesquite (*Prosopis glandulosa* var. *torreyana*), and brittlebush. Other associated species include Joshua tree, Mojave yucca, and beavertail cactus (*Opuntia basilaris*). Table 11 summarizes land management within the Mojave desert scrub ecosystem.

The Mojave desert scrub ecosystem occurs on approximately 3,273,400 ac within the Permit Area. A total of 18 percent of the Mojave desert scrub habitat is managed as IMAs for primitive, non-motorized, dispersed recreational use (WSA or Refuge). The 37 percent of the habitat located within BLM critical habitat, Boulder City Conservation Easement, Overton WMA, Lake Mead NRA, State Parks, and Red Rock Canyon NCA is managed as IMAs for both conservation and a broader spectrum of recreational uses, including intensive recreational use areas, developed camping areas, hiking and biking trails, rock climbing areas, and designated motorized vehicle-use roads and trails. An additional 1 percent of the habitat managed as LIMAs by the DNWR is very restricted in access, but is within impact areas used by the USAF. Mojave desert scrub on BLM undesignated lands (34 percent) are managed as MUMAs to balance multiple uses, including mining, OHV activities, grazing, and other activities with maintenance of ecosystem and species values. Approximately 198,400 ac (6 percent) on private lands are managed as UMAs. Tribal lands overlay 74,900 ac of Mojave desert scrub habitat. These lands are not

covered under the MSHCP. In addition, 11,700 ac occur within UMAs on lands managed by the USAF, which do not fall under purview of the MSHCP.

Table 11. Management of habitat in the Mojave desert scrub ecosystem, Clark County, Nevada

Category	Manager	Management Classification	Acres	% of Habitat
IMA	BLM	ACEC	594,000	18.1
	BLM	WSA	340,500	10.4
	NPS	NRA/DWMA	440,400	13.4
	Service	NWR	124,100	3.8
	USAF	Air Force Range	8,200	< 1.0
	Service/USAF	NWR/Air Force Range	135,900	4.1
	Boulder City	Conservation Easement	86,700	2.6
	NDOW	WMA	8,700	< 1.0
	State Parks	State Park	32,400	1.0
IMA Total			**1,770,900**	**54.1**
LIMA	BLM	NCA	59,800	1.8
	Service/USAF	NWR/Air Force Range	43,200	1.3
	NPS	NRA	2,600	< 1.0
LIMA Total			**105,600**	**3.2**
MUMA	BLM	Undesignated	1,109,600	33.9
	NPS	NRA	2,300	< 1.0
MUMA Total			**1,111,900**	**34.0**
UMA	Private	Private	198,400	6.1
	Native American	Tribal lands	74,900	2.3
	USAF	Air Force Range-Unmanaged	11,700	< 1.0
UMA Total			**285,000**	**8.7**
Grand Total			**3,273,400**	**100.0**

Based on the baseline conditions described above, the overall condition of the Mojave desert scrub ecosystem is good. This determination is based on the range of conditions across the ecosystem which range from excellent to poor. Most areas within, or adjacent to disturbances, have been degraded as a result of human activities. This is particularly true for those areas within and adjacent to metropolitan Las Vegas, Searchlight, Mesquite, Jean, Primm, Apex, and Laughlin. Substantial disturbances have occurred as a result of linear rights-of way for infrastructure, primary and secondary roads and trails, mining operations, residential and commercial development, livestock grazing, wildfires, and military operations. Many disturbances result in invasion of non-native plant species and removal of the protective cryptogamic crust layer. Relatively undisturbed areas persist in conserved areas such as desert tortoise critical habitat, most of which is managed by BLM, Refuges, and NPS as reserves. This ecosystem experiences a variety of impacts, most of which are associated with the growing human population in the region. A detailed list of potential ecosystem level threats and stressors in the Mojave desert scrub ecosystem is provided in MSHCP Appendix A.

HCPs Issued within the Mojave Desert Scrub Ecosystem, Including Relatively Small Portions of Salt Desert Scrub and Blackbrush Ecosystems

Short-Term HCP

On May 23, 1991, the Service issued a biological opinion on the desert tortoise concerning the effects associated with issuance of incidental take permit PRT 756260 (File No. 1-5-91-FW-40) to Clark County. The Service concluded that incidental take of 3,710 desert tortoises on up to 22,352 ac of desert tortoise habitat within the Las Vegas Valley and Boulder City in Clark County, Nevada, was not likely to jeopardize the continued existence of the desert tortoise. The permit application was accompanied by the *Short-Term Habitat Conservation Plan for the Desert Tortoise in the Las Vegas Valley, Clark County, Nevada* (RECON 1991) and an implementation agreement (IA) that identified specific measures to minimize and mitigate the effects of the action on desert tortoises. The Service issued the incidental take permit to the applicants for the Short-Term HCP on July 24, 1991.

On July 29, 1994, the Service issued a biological opinion on the issuance of an amendment to incidental take permit PRT 756260 (File No. 1-5-94-FW-237). The Service concluded that the extension of the expiration date of the existing permit by one year (to July 31, 1995), and the disturbance of 8,000 additional acres of desert tortoise habitat within the existing Permit Area, was not likely to jeopardize the continued existence of the desert tortoise, and would not destroy or adversely modify designated critical habitat. The amendment did not authorize an increase in the number of desert tortoises allowed to be taken under the existing permit. Additional measures to minimize and mitigate the effects of the amendment were also identified. During the effective period of the Short-Term HCP (i.e., through July 1995), a total of 29,261 ac were disturbed.

Clark County Desert Conservation Plan

On July 11, 1995, the Service issued an incidental take permit (PRT 801045) to Clark County, Nevada, including cities within the county, and NDOT for activities proposed in the DCP (RECON 1995). The permit became effective August 1, 1995, and allows the incidental take of desert tortoises for a period of 30 years on 111,000 ac of non-Federal land in Clark County, and approximately 2,900 ac associated with NDOT activities in Clark, Lincoln, Esmeralda, Mineral, and Nye counties, Nevada. As of June 30, 2000, a total of 55,279 ac have been disturbed under the DCP. Under the Short-Term HCP, surveys for, and removal of, desert tortoises were required within the Permit Area prior to disturbance unless within an exclusionary area (i.e., urbanized area). During the term of the Short-Term HCP, only 276 desert tortoises were removed from lands to be developed. Consequently, Clark County proposed not to require mandatary survey and removal of tortoises in the Permit Area. Because these tortoises were determined to be non-essential in recovery of the species, the Service concurred with the County's proposal and allowed survey and removal to become voluntary under the DCP.

The DCP details Clark County's proposed measures to minimize, monitor, and mitigate the effects of the proposed take on the desert tortoise. The permittees imposed a fee of $550 per acre

of habitat disturbance to fund these measures. The permittees are required to expend $1.35 million per year, and up to $1.65 million per year for the first 10 years, to minimize and mitigate the potential loss of desert tortoise habitat. The majority of these funds, have been used to implement mitigation measures such as increased law enforcement; construction of highway barriers; road designation, signing, closure, rehabilitation; and tortoise inventory and monitoring within the lands initially conserved during the Short-Term HCP, and other areas being managed for tortoise recovery (e.g., ACECs or DWMAs). In developing the DCP, the I & M Committee recognized that the long-term survival and recovery of the species is dependent upon management and protection of critical habitat by Federal land managers. The projects and activities funded by the DCP and implemented to assist recovery of the desert tortoise, are intended to reduce adverse effects upon the tortoise, independent of actions taken by land managers.

As of June 2000, a total of 5,270 desert tortoises were processed by a pick-up service funded under the DCP, including 5,009 tortoises found in urban areas and reported by the public, 92 tortoises collected through voluntary survey and removal under the DCP, and 48 tortoises collected under biological opinions. These tortoises are housed at a transfer/holding facility and transferred to translocation sites, adoption and educational programs, zoos, and research areas. The Large Scale Translocation Site (LSTS) is on lands managed by BLM near Jean, Nevada, at least 16.09 km (10 mi) from desert tortoise management areas, and is fenced adjacent to roads. Tortoises are evaluated for URTD and only the healthy are released into the LSTS. Since the spring of 1997, approximately 2,100 desert tortoises have been released as part of the translocation effort.

Mesquite/Catclaw Ecosystem

Mesquite and catclaw acacia (*Acacia greggii*) generally form a clumped and scattered pattern throughout the Mojave Desert. This plant community is intermingled within the Mojave desert scrub ecosystem, and generally occurs below 1,220 m elevation (4,000 ft) in Clark County. Western honey mesquite and screwbean mesquite (*Prosopis pubescens*) are the two common native species of mesquite found in southern Nevada. Both species are phreatophytic and most often occupy areas that have a relatively high water table. Screwbean mesquite typically occupies habitats close to or adjacent to surface water such as wet meadows, springs, and riparian areas. Honey mesquite is also found in these environments, but can tolerate areas with lower water tables, occupying habitats where surface water is not available but groundwater is relatively close to the soil surface. In southern Nevada, mesquite typically occurs along washes, riparian areas, and the edges of playas, adjacent to springs, and in valley bottoms, where groundwater is closer to the soil surface. Mesquite is relatively tolerant of high soil alkalinity, and is usually found growing in association with other salt tolerant plants, such as various species of saltbush, Cooper's wolfberry (*Lycium cooperi*), saltgrass, and salt cedar. Catclaw acacia generally grows along sandy washes and roadsides, where soil moisture is greater. Plant species typically associated with catclaw acacia include white bursage, bebbia, and sandpaper plant (*Petalonyx nitidus*).

Mesquite historically occurred along the major washes and drainages throughout Las Vegas Valley, including Las Vegas Wash, Flamingo Wash, and Duck Creek. Prior to settlement of Las Vegas Valley, a series of four large springs (the Las Vegas Springs) created a creek 1.5 m (5 ft) wide and 0.6 m (2 ft) deep that flowed east to the Colorado River. Cottonwood, willow, and grass grew around the springs, and a 4.8 km (3 mi) wide by 19.3 km (12 mi) long mesquite bosque followed the creek along Las Vegas Wash to the Colorado River (Paher 1971). Mesquite was also common along the Virgin and Muddy rivers. Historical accounts in the diaries of the area's first explorers described the occurrence of both honey and screwbean mesquite, catclaw acacia, willow, cottonwood, and saltgrass along the Virgin River (Fremont 1845, Heap 1854, Carvalho 1859, Remy and Brenchley 1861, Merriam 1893, Jackson and Spence 1970-1973), and included a description of the parasitic mistletoe observed growing on mesquite trees (Remy and Brenchley 1861).

Urban development beginning in the 1970s (Clark County Comprehensive Planning 2000) has removed most of the mesquite and catclaw acacia that formerly existed in Las Vegas Valley. Agricultural activities and invasion of salt cedar have replaced most of the mesquite that previously grew in the flood plains of the Virgin and Muddy rivers and Meadow Valley Wash. Much of the remaining mesquite is subject to unauthorized woodcutting, wildfires, herbivory, and trampling from heavy human use. Mesquite woodlands may also be adversely affected by groundwater pumping, in areas where pumping results in a decline in the water table. Sand and gravel operations and other forms of mineral extraction, have degraded or eliminated catclaw acacia habitat at some locations, and OHV use of washes has damaged vegetation and wash channels. A detailed list of potential ecosystem level threats and stressors in mesquite/catclaw habitat is provided in the MSHCP Appendix A.

Most of the remaining mesquite woodlands in Clark County occur adjacent to the Muddy River and Meadow Valley Wash, at Corn Creek on the DNWR, at the Overton WMA, and at Stump Spring, 16 km (10 mi) southeast of Pahrump. Remnant patches exist along the Virgin River, at Las Vegas Springs and Cactus Springs, along Las Vegas Wash, and at various flowing springs in Lake Mead NRA. A small patch of native vegetation that includes mesquite, still exists at Sunset Park in Las Vegas, but is subject to frequent fires. Most of the mesquite in Las Vegas Wash has been replaced by salt cedar, and increased flows from urban runoff and wastewater discharge are causing channel erosion and problems with water quality. Large catclaw-dominated washes, including Piute, Empire, Roman, and Hiko washes, occur in Piute and Eldorado valleys in the extreme southern tip of Clark County. A large catclaw-dominated wash also occurs in the Arrow Canyon area northwest of the communities of Moapa and Glendale. An extensive drainage supporting about 3,000 ac of catclaw acacia occurs in extreme north Las Vegas within a BLM disposal area that will soon be developed.

Approximately 21,700 ac of mesquite and catclaw acacia habitat remain in Clark County. Of this, 58 percent is under BLM jurisdiction (undesignated, conserved and critical habitat, and WSA), 8 percent is managed by NPS (Lake Mead NRA), about 11 percent by DNWR and NAFR, and less than 1 percent by NDOW (Overton WMA) (Table 12). A total of 18 percent of the habitat, which is mostly catclaw acacia, is within conserved/critical habitat for the desert

tortoise, and is managed as IMAs to provide desert tortoise protection and associated habitat conservation measures which may benefit other Covered Species under the MSHCP. About 37 percent of the habitat is within undesignated lands managed as MUMAs by BLM, and currently has no specific conservation-related management in place. About 22 percent of the habitat occurs on private land as UMAs, and less than 1 percent within the Fort Mojave Indian Reservation, which is not covered under the MSHCP and Permit. In summary, approximately 13,000 ac (60 percent) of existing mesquite and catclaw acacia habitat in Clark County occur in MUMAs and UMAs, and 8,700 ac (40 percent) occur in IMAs (Table 12).

BLM's draft Mesquite Woodland Habitat Management Plan (HMP) (MSHCP, Appendix D) describes management actions proposed for mesquite woodlands on public lands administered by BLM in Clark and southern Nye counties. This plan proposes management actions to conserve approximately 2,230 ac of mesquite woodlands on public lands in Clark County. The HMP does not include management of catclaw habitat or mesquite woodlands in riparian areas along perennial waterways such as the Virgin and Muddy rivers. The Upper Muddy River Site Conservation Plan (RECON 2000 Appendix E) has been developed by TNC to address conservation efforts, including mesquite bosque conservation, for the entire upper watershed of the Muddy River, which encompasses approximately 23 km (14 mi) of the river from its headwaters to the Interstate 15 bridge at Glendale. The Las Vegas Wash Comprehensive Adaptive Management Plan, developed to curtail severe erosion and improve water quality in Las Vegas Wash, includes the development of a 130-acre Nature Center which will restore approximately 3 ac of mesquite habitat. A restoration plan is also being developed by the Las Vegas Valley Water District for the Las Vegas Springs area that will include conservation and protection of approximately 45 ac of mesquite and catclaw vegetation. Ongoing voluntary efforts of the MRREIAC, a local citizens group formed and supported by the river communities of Moapa, Logandale, Glendale, and Overton, include salt cedar removal and suppression, and restoration and enhancement of riparian vegetation, including mesquite, within portions of the Upper Muddy River flood plain. Salt cedar removal and restoration efforts at scattered springs throughout NPS and BLM lands have also benefitted mesquite habitats that occur at these locations.

Table 12. Management of habitat in the mesquite/catclaw ecosystem, Clark County, Nevada.

Category	Manager	Management Classification	Acres	% of Habitat
IMA	BLM	ACEC	3,900	18.0
	BLM	WSA	700	3.2
	NPS	NRA	1,700	7.8
	Service	NWR	2,200	10.1
	Service//USAF	NWR/Air Force Range	100	<1.0
	NDOW	WMA	100	<1.0
IMA Total			**8,700**	**40.1**
MUMA	BLM	Undesignated	8,000	36.8
MUMA Total			**8,000**	**36.8**
UMA	Private	Private	4,900	22.1
	Native American	Tribal lands	100	<1.0
UMA Total			**5,000**	**23.0**
Grand Total			**21,700**	**100.0**

Overall, based on the conditions described above, condition of the mesquite/catclaw ecosystem is excellent to fair for catclaw habitat and generally poor for mesquite habitat. Most catclaw habitats are relatively remote, and are afforded some protection within conserved or critical habitat for the desert tortoise. Mesquite habitat, however, is easily accessible, and has been heavily impacted from urban development, wood cutting, fires, salt cedar invasion, and groundwater depletion.

Desert Riparian and Aquatic Ecosystem

Desert riparian areas are uncommon in Clark County, and occur mainly within the flood plains of the Virgin and Muddy rivers, and Meadow Valley and Las Vegas washes. Riparian vegetation also occurs in the Muddy and Virgin river deltas leading into Lake Mead, and intermittently along the waterline of Lake Mead and the Colorado River below Hoover Dam, but is subject to frequent water level fluctuations due in part to Hoover Dam operations. Larger springs with well-developed spring brooks may also support small patches of woody riparian vegetation. Vegetation of the desert riparian ecosystem in Clark County consists mainly of non-native salt cedar, intermingled with remnant patches of screwbean and honey mesquite, coyote willow (*Salix exigua*), Goodding willow (*S. gooddingii*), desert willow (*Chilopsis linearis*), velvet ash, and cottonwood. Arrow weed is common in the flood plain adjacent to stream channels. Desert riparian habitat encompasses less than 1 percent of the land area in Clark County; however, it contributes disproportionately to the total biodiversity in arid environments. Many species found in a variety of habitats in other parts of the country are confined to riparian habitats in desert environments due to the harsh conditions of an arid climate.

Historical condition of riparian areas in Clark County was discussed briefly in the previous section on the *Mesquite/Catclaw Ecosystem*. Prior to the European settlement of southern Nevada, riparian vegetation most likely consisted of dense desert shrubs, mesquite, willow, and

salt grass meadows, with patches of cottonwoods occurring intermittently within the flood plain where conditions were favorable for phreatophyte development. Most riparian flood plains are now dominated by salt cedar, interspersed with remnant patches of mesquite, cottonwood, and willow. Riparian vegetation along the Colorado River was lost after construction of Hoover Dam and the formation of Lake Mead. Prior to the formation of Lake Mead, the Muddy River flowed into the Virgin River before joining with the Colorado River. The Muddy and Virgin rivers now flow separately into the Overton Arm of Lake Mead. The headwaters of the Virgin River originate in Dixie National Forest above Zion National Park in Utah, and the Muddy River originates from numerous thermal springs in the Warm Springs area west of the communities of Moapa and Glendale in Clark County. Meadow Valley Wash originates in Lincoln County and joins with the Muddy River at Glendale. Meadow Valley Wash presently supports perennial flows in Lincoln County south until approximately the Clark/Lincoln county boundary, at which point flow becomes ephemeral and occurs only after rainfall.

The absence of major dams on the main stem of the Virgin River allows natural flooding events to occur within the flood plain during peak flows. However, numerous diversions exist on the river and may function similar to dams at lower flows in that water is ponded behind the diversion structures and channel morphology directly downstream of the structures is altered. These diversions have also depleted average stream flows in the Virgin River. Most of the Virgin River streambed has not been channelized, which allows the river to frequently change stream channel course within the flood plain and form braided channels, oxbows, and backwaters that help promote formation of riparian and wetland vegetation. No dams exist on the Muddy River; however, diversions and groundwater pumping have reduced stream flow, and the stream bed has been extensively channelized, resulting in severe erosion and undercutting of stream banks. A detailed list of potential ecosystem level threats and stressors in desert riparian habitat is provided in the MSHCP, Appendix A.

Of the 16,900 ac of desert riparian habitat remaining in Clark County, 31 percent is managed as IMAs by NDOW (Overton WMA) and 34 percent by BLM as MUMAs (undesignated) (Table 13). Specific management policies and actions for habitat and species conservation are provided on the lands managed by NDOW. Desert riparian habitat on BLM lands is managed under the Las Vegas RMP. Desert riparian areas under BLM management include approximately 13 linear km (8 linear miles) of river corridor through the Virgin River Natural Area and 1.2 km (0.75 mile) along the Muddy River. Tribal lands include about 20 percent, and private lands about 16 percent of the primary riparian habitat. Tribal lands include 2.3 miles of frontage along the Muddy River.

Private lands include 21 km (13 miles) of frontage along the Virgin River and 43 km (27 mi) along the Muddy River. Private land uses along the Virgin River are 64 percent agricultural, 29 percent vacant, and 7 percent residential. No active wildlife or habitat conservation management or land-use restrictions are assumed for these holdings. Private land uses along the Muddy River are 44 percent residential, 30 percent agricultural, 14 percent vacant land, and 12 percent commercial/industrial. The Muddy River (and West Creek fork) have levees for a reach of approximately 3.9 km (2.4 mi) upstream from the NDOW dam at Overton. In summary,

approximately 11,700 ac (70 percent) of existing desert riparian habitat in Clark County occur in MUMAs and UMAs, and 5,200 ac (30 percent) in IMAs (Table 13).

The BOR is in the process of identifying lands supporting southwestern willow flycatcher habitat for possible future acquisition, on a willing-seller basis. Land acquisition by the BOR may include flycatcher habitat on private lands along the Virgin River in Clark County. The BOR's riparian habitat acquisition program is part of the Reasonable and Prudent Alternative developed for the biological and conference opinion issued to the BOR for their Lower Colorado River Operations and Maintenance program, to avoid jeopardy to Federally-listed species, including the southwestern willow flycatcher (Service 1997). The Reasonable and Prudent Alternative for the southwestern willow flycatcher states that BOR must protect 1,400 ac of riparian habitat for the flycatcher. Protection can occur through acquisition, easements, partnerships, ecological restoration, or other means that result in long-term preservation of the habitat from destruction and from alteration in ways that would decrease its value as flycatcher habitat.

Table 13. Management of habitat in the desert riparian ecosystem, Clark County, Nevada.

Category	Manager	Management Classification	Acres	% of Habitat
IMA	NDOW	WMA	5,200	30.7
IMA Total			**5,200**	**30.7**
MUMA	BLM	Undesignated	5,700	33.7
MUMA Total			**5,700**	**33.7**
UMA	Private	Private	2,700	15.9
	Native American	Tribal lands	3,300	19.5
UMA Total			**6,000**	**35.5**
Grand Total			**16,900**	**100.0**

Overall, based on the conditions described above, condition of the desert riparian ecosystem is variable, and ranges from good to poor. Native riparian vegetation has mostly been replaced by salt cedar in all riparian areas in Clark County, and diversions have depleted stream flows in the Muddy and Virgin rivers, and Meadow Valley Wash. Portions of the Muddy River, and the Virgin River to a lesser extent, have been channelized, causing accelerated erosion and a decrease in the water table adjacent to the river. However, the Virgin River has retained some natural hydrological functions, and through periodic flooding events is able to change stream course, and form braided channels, oxbows, and backwaters necessary for formation of riparian vegetation.

Springs Ecosystem

In southern Nevada, perennial springs are widely distributed from the high mountains to the low deserts. The greatest density of springs occur in the Spring, Virgin, Newberry, and McCullough mountains, Lake Mead NRA, Gold Butte, and the Moapa Valley. Biogeographic evidence based on the distribution of fish species, indicate that springs east of the Spring Mountains range were

once connected to streams flowing into the Colorado River, and are considered part of the Colorado River drainage system (Hubbs and Miller 1948). Springs on the western slopes of the Spring Mountains flow to internal drainage basins. In general, springs form when faulting or erosion expose cavernous systems in limestone, fractures in the earth allow subsurface water to seep out, or when the water table intersects the land surface (Hershey 1989). Springs are recharged by winter snow melt, summer thunderstorms, and discharge from local aquifer systems. In large valleys, groupings of several localized springs may be connected by an aquifer system to form spring complexes. Most of the springs in the Permit Area are cold water springs ranging in size from small isolated pools with short springbrooks, to larger spring-fed watercourses such as the Muddy River. Riparian vegetation along springbrooks and river banks range from sedges and grasses to well-developed woodland communities (Sada and Nachlinger 1996).

A smaller number of desert springs are classified as thermal springs where the water is derived from deep sources and charged with salts and various gasses. Water temperature is warm and relatively constant, only changing a few degrees throughout the year. Soils of thermal springs generally have a high salt concentration, so growth near these springs is restricted to species adapted to saline conditions such as saltgrass, iodine bush, and ink weed (*Suaeda torreyana*) (Bradley and Deacon 1967). Other aquatic vegetation usually surrounds the spring source forming small marshes around the spring complexes.

Many animal species are restricted to springs or habitat adjacent to spring systems. Bats rely on springs for drinking sites and may roost in limestone crevices, caves, and dead trees adjacent to springs (Ramsey 1997). In the Spring Mountains all bat roosts were found near water (Ramsey 1997). Several butterflies endemic to the Spring Mountains are attracted to areas with surface water and utilize host plants and nectar sources adjacent to springs (Weiss et al. 1995). Permanent stream systems in Clark County provide habitat for many Covered Species.

Springs are widely distributed throughout most ecosystems in Clark County (Table 14). Springs occur from high elevation habitats (bristlecone pine to pinyon-juniper) to low elevation habitats (sagebrush to Mojave desert scrub habitats, including mesquite and desert riparian habitats) and in highly disturbed areas (agriculture, grasslands, and urban areas) within these ecosystems. Of a total of 506 recorded springs, 121 (24 percent) are found in high elevations and 385 (76 percent) are in low elevation habitats. Areas influenced by human activities have 30 springs (6 percent). The low elevation blackbrush habitat accounts for 142 springs, or 28 percent of the total; while the high elevation pinyon-juniper habitat has 96 springs, or 19 percent of the total. Ponds are man-made impoundments or naturally occurring areas of open water. These occur predominately in lower elevation areas, most often within areas influenced by human activities. The 1998 EPA database lists 64 intermittent ponds, 128 permanent ponds and catchments, and 20 mining, industrial, and sewage ponds in Clark County.

Many springs have been altered by natural and human-related factors. Natural factors include fire, avalanche, and flood, while human-related factors include ungulate use (cattle, horses, burros, and elk), diversion, and recreational activities. Out of a total of 63 springs studied in the Spring Mountains in 1995 and 1997, 59 percent were either moderately or highly disturbed by

ungulate use, recreation, or diversion (Sada and Nachlinger 1996, 1998). Diverted springs and springs exposed to heavy ungulate use were the most highly disturbed. Springs with trail or road access were also more heavily disturbed. Exotic and invasive weedy plants such as salt cedar, red brome, dandelion, Kentucky bluegrass (*Poa pratensis*), and summer clover (*Trifolium longipes*), were more common members of the riparian community at disturbed sites. Other invasive species known to occur at spring sites include Russian knapweed (*Acroptilon repens*), cheatgrass, and bindweed (*Convolvulus arvensis*). Springsnail populations have been extirpated from at least three springs in the Spring Mountains over the past 20 years. A detailed list of potential ecosystem-level threats and stressors in the springs ecosystem is provided in the MSHCP Appendix A.

Table 14. Distribution of springs and other water developments throughout ecosystems in Clark County, Nevada.

Vegetation Type	Reservoir	Marsh	Catchment	Pond	Springs	Total
Bristlecone pine	0	0	0	0	14	14
Mixed conifer	1	0	1	2	34	37
Pinyon-juniper	1	0	4	0	96	101
Sagebrush	0	0	6	0	27	33
Blackbrush	10	1	9	0	142	161
Salt desert scrub	2	0	13	0	4	19
Mojave desert scrub	37	3	77	18	157	292
Mesquite/Catclaw	11	0	17	0	30	60
Desert riparian	2	0	1	0	2	5
Total	**64**	**4**	**128**	**20**	**506**	**722**

Of the 506 springs known in Clark County, 243 (48 percent) occur on BLM lands (conserved and critical habitat, WSA, Red Rock Canyon NCA, undesignated), 115 (23 percent) on USFS lands (Wilderness, WSA, Spring Mountains NRA), 36 (7 percent) on NPS lands (Lake Mead NRA), 26 (5 percent) on Service lands (DNWR), 2 (less than 1 percent) on Refuge/USAF lands (NAFR), and 3 (less than 1 percent) on State lands (Overton WMA and other State lands). Seventy-four springs occur on private land, and four on Tribal lands (15 percent). Thirty-six percent of springs occur within UMAs and MUMAs, while 64 percent occur in IMAs and LIMAs (Table 15).

The Spring Mountains NRA CA is intended to provide long-term protection for the rare and sensitive fauna and flora of the Spring Mountains, including a variety of spring- associated flora and fauna. Springs within the Spring Mountains NRA, and within the scope of the CA, are located within IMAs, where management is oriented toward protection of biological resources; or LIMAs, where management limits the range of uses to primarily low-impact recreational uses. Refer to MSHCP Appendix G for a description of CA actions related to protection of springs in the Spring Mountains NRA.

Table 15. Management of habitat in the springs ecosystem, Clark County, Nevada.

Category	Manager	Management Classification	No. of Springs	% of Total Springs
IMA	BLM	ACEC	38	8
	BLM	WSA	79	16
	Boulder City	Conservation Easement	3	< 1
	NPS	NRA	36	7
	NDOW	WMA	2	< 1
	State Lands	State Lands	1	< 1
	USFS	Wilderness	37	7
	USFS	WSA	24	5
	Service	NWR	26	5
	Service/USAF	NWR/Air Force Range	2	< 1
IMA Total			**248**	**49**
LIMA	BLM	NCA	22	4
	USFS	NRA	54	11
LIMA Total			**76**	**15**
MUMA	BLM	Undesignated	104	20
MUMA Total			**104**	**20**
UMA	Private	Private	74	15
	Native American	Native American Resrv.	4	< 1
UMA Total			**78**	**15**
Grand Total			**506**	**100**

Overall, based on the conditions described above, condition of the Springs ecosystem is highly variable. Those springs with easy access have been heavily impacted from recreational activity, ungulate use, and diversions or impoundments, and are in poor condition. Other more remote springs, such as springs in higher elevations in wilderness areas, are in relatively good condition. Very few springs are in excellent condition.

Status of the Species within the Action Area

For the purposes of this discussion, the action area is defined as the Permit Area and includes all lands in Clark County managed as IMAs, LIMAs, MUMAs, and UMAs, and roads and highways outside Clark County for NDOT activities as described in the *Introduction*. During development of the MSHCP/EIS, the Service was closely involved with the Applicant's BAC (comprised of species experts from the resource management agencies and scientific community) in the analysis and identification of the conservation needs for each of the Covered Species. The MSHCP incorporates a county-wide reserve design consisting of federally-managed reserve lands and habitat corridors, interspersed with private lands wherein urban development and other uses could occur. Conservation of Covered Species will occur primarily within IMAs and LIMAs, which would be protected by implementation of the MSHCP. The IMAs and LIMAs are proposed as the "reserve system" in Clark County, with MUMAs providing conservation value as

corridors, connections, and buffers and management preserves the quality of habitat sufficient to allow for unimpeded use and migration of the resident species in the IMAs and LIMAs. Within the context of this reserve design, 11 ecosystem types were identified. All existing management prescriptions included within approved agency management plans were evaluated to determine their effectiveness in addressing existing threats and stressors and providing the conservation needs for each proposed Covered Species. Species proposed for coverage under the MSHCP include only those for which the BAC determined that the IMAs, LIMAs, and MUMAs could provide for their conservation needs.

The process of assessing the status of the Covered Species in the Permit Area involved an analysis of the percentage of the range of the Covered Species in the Permit Area relative to their rangewide distribution, or inclusion of recovery units for the desert tortoise; how important the Permit Area is to Covered Species at the species or distinct population segment level; the existing level of management under the DCP; and the likelihood that viable populations of the Covered Species will persist in the Permit Area without the MSHCP and Permit. These data are summarized in Table 16, while specific information on the status of Covered Species is provided in the following narratives. The effects to the Covered Species that are anticipated to occur as a result of management under the MSHCP and Permit are discussed in the *Effects of the Action* section.

Table 16. Summary of the Status of the Species in the Permit Area.

SPECIES	A. Portion of Species' Range in Permit Area (Percent)	B. Importance of Permit Area to Species[1]	C. Baseline Management Level (DCP conditions)[2]	D. Likelihood of Maintaining Viable Populations in Permit Area w/o permit[3]
Mammals				
Silver-haired bat	< 10	L	2	*
Long-eared myotis	< 10	L	3	H
Long-legged myotis	< 10	L	3	H
Palmer's chipmunk	100	H	3	H
Birds				
Southwestern willow flycatcher	< 10	H	2	M
Yellow-billed cuckoo	< 10	L	2	L
American peregrine falcon	< 10	L	2	M/H
Blue grosbeak	< 10	L/M	2	M
Phainopepla	< 10	L/M	2	M
Summer tanager	< 10	L	1	M
Vermilion flycatcher	< 10	L/M	2	M
Arizona Bell's vireo	10 - 25	M	2	M
Reptiles				
Desert tortoise (recovery units)	51-75	H	3	H
Western banded gecko, desert ssp.	< 10	L	1	H
Western banded gecko, Utah ssp	10 - 25	M	1	H
Desert iguana	< 10	L	1	H
Western red-tailed skink	10 - 25	M	1	H
Large-spotted leopard lizard	< 10	L	1	H
Great Basin collared lizard	< 10	L	1	H
California kingsnake	< 10	L	1	H
Glossy snake, Mojave ssp.	< 10	L	1	H
Glossy snake, desert ssp.	26 - 50	M	1	H
Western long-nosed snake	< 10	L	1	H
Western leaf-nosed snake	< 10	L	1	H
Sonoran lyre snake	< 10	L	1	H
Sidewinder	< 10	L	1	H
Speckled rattlesnake, SW ssp.	< 10	L	1	H
Speckled rattlesnake, Panamint ssp.	< 10	L	1	H
Mojave green rattlesnake	< 10	L	1	H
Amphibian				
Relict leopard frog	76 - 99	H	2	M

SPECIES	A. Portion of Species' Range in Permit Area (Percent)	B. Importance of Permit Area to Species[1]	C. Baseline Management Level (DCP conditions)[2]	D. Likelihood of Maintaining Viable Populations in Permit Area w/o permit[3]
Invertebrates				
Dark blue butterfly	100	H	3	H
Spring Mtns. icarioides blue	100	H	3	H
Mt. Charleston blue butterfly	100	H	3	H
Spring Mtns. acastus checkerspot	100	H	3	H
Morand's checkerspot	100	H	3	H
Carole's silverspot	100	H	3	H
Nevada admiral	100	H	3	H
Spring Mtns. comma skipper	100	H	3	H
Spring Mtns. springsnail	100	H	3	H
Southeast Nevada springsnail	76 - 99	H	3	H
Vascular Plants				
Clokey eggvetch	76 - 99	H	3	H
Blue Diamond cholla	100	H	3	H
Rough angelica	100	H	3	H
Sticky ringstem	10 - 25	M	3	H
Charleston pussytoes	100	H	3	H
Las Vegas bearpoppy	76 - 99	H	3	H
White bearpoppy	26 - 50	M	2	M
Rosy King sandwort	100	H	3	H
Clokey milkvetch	100	H	3	H
Threecorner milkvetch	76 - 99	H	2	M
Spring Mtns. milkvetch	100	H	3	H
Alkali mariposa lily	10 - 25	M	2	H
Clokey paintbrush	76 - 99	H	3	H
Clokey thistle	100	H	3	H
Jaeger whitlowgrass	100	H	3	H
Charleston draba	100	H	3	H
Inch high fleabane	76 - 99	H	3	H
Pahrump Valley buckwheat	26 - 50	H	3	M
Sticky buckwheat	76 - 99	H	2	M
Clokey greasebush	100	H	3	H
Smooth pungent greasebush	76 - 99	H	3	H
Pungent dwarf greasebush	100	H	3	H

SPECIES	A. Portion of Species' Range in Permit Area (Percent)	B. Importance of Permit Area to Species[1]	C. Baseline Management Level (DCP conditions)[2]	D. Likelihood of Maintaining Viable Populations in Permit Area w/o permit[3]
Red Rock Canyon aster	100	H	3	H
Hidden ivesia	100	H	3	H
Jaeger ivesia	76 - 99	H	3	H
Hitchcock bladderpod	76 - 99	H	3	H
Charleston pinewood lousewort	100	H	3	H
White-margined beardtongue	51 - 75	H	3	M
Charleston beardtongue	100	H	3	H
Jaeger beardtongue	100	H	3	H
Parish's phacelia	25 - 50	M	2	M
Clokey mountain sage	100	H	3	H
Clokey catchfly	100	H	3	H
Charleston tansy	100	H	3	H
Charleston kittentails	100	H	3	H
Charleston grounddaisy	76 - 99	H	3	H
Limestone violet	51 - 75	M	3	H
Non-vascular Plants				
Anacolia menziesii	< 10	L	1	M
Claopodium whippleanum	< 10	L	1	M
Dicranoweisia crispula	< 10	L	1	M
Syntrichia princeps	< 10	L	1	M

*Transient spring migrant, status of breeding populations in the Permit Area is unknown.

[1] Relative importance of the entire Permit Area, including IMAs, LIMAs, MUMAs, and UMAs, to the species, based on the rangewide distribution of the species, distribution and abundance of the species in the Permit Area, quality of habitat in the Permit Area, and value of the area for reproduction. *(H)* highly important, (*M*), moderately important, and *(L)* of limited importance (See individual species discussions)

[2]Management level:

1 - General management: Management provided under existing resource management plans or state regulations resulting in some conservation and protection of the species.

2 - Moderate level of management: Same as 1 above with enhanced management through targeted agency actions (e.g., inventory and monitoring).

3 - High level of management: Same as 1 or 2 above with additional conservation and protection provided through a CA, species/habitat management plan, or recovery plan (desert tortoise)

[3] Likelihood that viable populations of the Covered Species will persist in the Permit Area under the existing baseline conditions (i.e., under the DCP), based on general information on abundance and distribution of the Covered Species in the Permit Area, importance of the Permit Area to the species (column B), existing level of management (column C), and other factors affecting the status of the species in the Permit Area. *(H)*: Likely to persist; (*M*): Moderately likely to persist; (*L*) Likelihood of persistence low.

Species of Greatest Concern

Desert tortoise

The desert tortoise is widely distributed below approximately 1,375 m (4,500 ft) within the Permit Area, primarily within the Mojave desert scrub ecosystem (approximately 3,273,000 ac) and to a lesser degree, the salt desert scrub (approximately 190,700 ac) and blackbrush ecosystems (approximately 824,700 ac). The Permit Area includes portions of two of the six desert tortoise recovery units: the Northeastern Mojave RU and the Eastern Mojave RU. Potential desert tortoise habitat within the Permit Area (approximately 4,288,000 ac) encompasses more than 75 percent of the Northeastern Mojave RU and less than 20 percent of the East Mojave RU.

The Northeastern Mojave RU occurs primarily in Nevada, but extends into California along the Ivanpah Valley and into extreme southwestern Utah and northwestern Arizona. Vegetation within this unit is characterized by creosote bush scrub, big galleta-scrub steppe, desert needlegrass scrub-steppe, and blackbrush scrub (in higher elevations). Topography is varied, with flats, valleys, alluvial fans, washes, and rocky slopes. Much of the northern portion of the recovery unit is characterized as basin and range with elevations from 775 to 3,650 m (2,500 to 12,000 ft). Desert tortoises in this recovery unit, the northern portion of which represents the northernmost distribution of the species, are found in low densities (approximately 10 to 20 adults per square mile).

The Eastern Mojave RU occurs primarily in California, but extends into Nevada in the Amargosa, Pahrump, and Piute valleys. Vegetation within this unit is transitional between the Colorado Desert and Mojave Desert communities. Representative plant species include big-galleta-scrub steppe, succulent scrub (*Yucca, Opuntia* sp.), creosote bush scrub, cheesebush scrub (east Mojave type), and Indian rice grass scrub-steppe. Topography is characterized by flats, valleys, alluvial fans, washes, and rocky slopes. Elevations range from 481 to 1,493 m (1,600 to 4,900 ft). Current tortoise population densities within the unit are patchy and varied.

Within the Northeastern Mojave RU, the Desert Tortoise Recovery Plan recommends designation of the following six ACECs/DWMAs or portions thereof: Piute-Eldorado, Beaver Dam Slope, Gold Butte-Pakoon, Mormon Mesa, Coyote Spring, and Ivanpah. The Desert Tortoise Recovery Plan further recommends designation of the following three ACECs/DWMAs in the Eastern Mojave RU or portions thereof: Fenner, Ivanpah, and Piute-Eldorado. The Permit Area includes non-Federal lands within all or a substantial portion of four DWMAs/ACECs: Piute-Eldorado, Mormon Mesa, Coyote Spring, and Gold-Butte-Pakoon. In total, approximately 1.8 million ac of tortoise habitat has been designated as desert tortoise ACEC/DWMA in the Northeastern Mojave RU and 1.2 million ac within the Eastern Mojave RU.

The Piute-Eldorado DWMA/ACEC occurs in both the Northeastern Mojave RU and Eastern Mojave RU. Interstate 15 and U.S. Highway 95 run north-south through the area. The Desert Tortoise Recovery Plan recommends that Jean and Roach dry lake beds and the community of

Searchlight, Nevada, be excluded from the DWMA/ACEC. Current desert tortoise densities within this DWMA/ACEC are among the highest in the Northeastern Mojave RU and Eastern Mojave RU.

The Mormon Mesa DWMA/ACEC occurs in northern Clark and southern Lincoln counties. Current desert tortoise densities within the Mormon Mesa DWMA/ACEC, range from 41 to 87 tortoises per square mile with an average adult density of 20 per square mile. Northern sections of the DWMA are considered to have good quality habitat, but habitat in the southern portion is of lesser value and patchy. The Desert Tortoise Recovery Plan recommends that the Mormon Mesa DWMA/ACEC contain 800 to 1,000 square miles.

The Coyote Springs DWMA/ACEC occurs in Clark and Lincoln counties, west of the Mormon Mesa DWMA. This DWMA/ACEC consists predominantly of land managed by BLM and the Service's DNWR. Much of the tortoise habitat within this DWMA/ACEC is comprised of valleys or low elevation areas between the Spotted, Desert, and Sheep ranges. Most of Coyote Springs Valley remains in pristine, undisturbed condition, isolated from the adverse effects associated with development in Las Vegas Valley to the south. Desert tortoise densities range in this area from very low (0 to 20 per square mile) to moderate (40 to 90 per square mile). The Desert Tortoise Recovery Plan recommends that the Coyote Springs DWMA contains 950 to 1,050 square miles.

In 1988, Public Law 100-275 authorized the exchange of BLM-administered lands in Lincoln and Clark counties, Nevada, for private lands in Dade County, Florida. The Aerojet-General Corporation (Aerojet) was the owner of the land in Florida. In addition to the approximately 29,055 ac that were patented to Aerojet in exchange for the Florida lands, there was also a provision for Aerojet to lease approximately 13,767 ac of BLM-administered lands in the same area. Aerojet intended to use approximately 2,760 ac of the conveyed lands for the development, manufacture, and testing of rocket motors and other aerospace and defense-related products. An additional 10,735 ac could be used for a power line corridor. The remaining 15,560 ac of conveyed lands and 13,767 ac of leased lands were intended to serve as a conservation area and buffer for the rocket facility. Because these undeveloped areas would continue to function as important desert tortoise habitat, the Service included these lands within the Mormon Mesa CHU when critical habitat was designated in 1994. In 1998, investors obtained the patented lands and lease for BLM-administered lands from Aerojet.

The Gold-Butte-Pakoon DWMA/ACEC is located in northwestern Mohave County, Arizona and northeastern Clark County. Because the entire DWMA/ACEC has been grazed by livestock over the past century, much of the perennial grasses have been reduced or eliminated. Relatively few human disturbances are expected to occur within this DWMA/ACEC over the next several decades largely due to its isolation. Desert tortoise densities range from 5 to 56 per square mile, with an average adult density of 20 per square mile. The Desert Tortoise Recovery Plan recommends that the Gold-Butte-Pakoon DWMA/ACEC contain between 270 and 310 square miles.

Non-HCP Take Authorized Under Section 7 or 10(a)(1)(A) for Desert Tortoise within the Permit Area

Incidental take has been authorized to Federal agencies in Clark County by the Service under section 7 of the Act since the desert tortoise was listed. Between October 25, 1989, and September 12, 2000, a total of 342 biological opinions have been issued for Federal actions that may affect desert tortoise in Clark, Nye, and Lincoln counties, Nevada. These biological opinions covered disturbance of 292,098 ac of desert tortoise habitat and authorized the incidental take of 16,897 desert tortoises (6,107 harassed and 10,790 killed or injured) and an additional 195 tortoises (148 harassed and 47 killed or injured) for each year the biological opinion is in effect These figures are cumulative limits for incidental take of desert tortoise and do not include take or habitat disturbance associated with Clark County's Short-Term HCP and DCP which are discussed in the *Environmental Baseline* section under the Mojave desert scrub ecosystem. In addition, several biological opinions authorized unquantifiable or unlimited take of tortoises through harassment. Incidental take limits represent the *worse case scenario* for each Federal action and the actual take is likely a fraction of the authorized take. The Service estimates that over 95 percent of the habitat disturbance and incidental take authorized under section 7 in Nevada for desert tortoise occurred within Clark County. Major consultations included in the database above for activities that may affect the desert tortoise within the Permit Area, are summarized below.

On April 27, 1990, the Service issued a 2-year section 10(a)(1)(A) permit (PRT-747182) to TNC, NDOW, and BLM for the collection of 871 desert tortoises for scientific research at the Desert Tortoise Conservation Center. Basic and applied biology of the desert tortoise was conducted involving many of these tortoises between April 1991 and August 1993 (Nishikawa 1994). The tortoises were removed from 12 private land parcels totaling 7,204 ac within the Las Vegas Valley. Following removal of the desert tortoises, the parcels were available for urban development as settlement of a lawsuit on the listing of the desert tortoise.

On September 26, 1991, the Service issued a biological opinion (File No. 1-5-91-F-112) to BLM for implementation of their 1984 Management Framework Plan (MFP) within the boundaries of Short-Term HCP (PRT-756260) in the Las Vegas Valley. As a result of the action, approximately 42,240 ac of Bureau land were authorized for disposal by sale, land exchange, mineral leases, rights-of-way leases, or recreation or public purpose (R&PP) leases. These lands could be developed for residential, industrial, commercial, and public infrastructure projects to accommodate rapid urban development. On November 2, 1995, formal consultation was reinitiated on the 1991 programmatic biological opinion to expand the programmatic boundary from 263,267 to 378,978 ac to accommodate the rapid urban development in the Las Vegas Valley and surrounding area.

On April 11, 1996, the Service issued a programmatic biological opinion (File No. 1-5-96-F-023R) to BLM's Las Vegas District for implementation of their MFP and the land exchange portion of their Stateline RMP within the Las Vegas Valley. Implementation of these plans, when finalized, may result in disposal or development of approximately 125,000 ac of land administered by BLM by sale, land exchange, or lease. As a result of urban expansion, most

BLM lands within the Las Vegas Valley are highly fragmented and impacted by human activities, particularly a 4,000-acre "exclusionary" zone. The BLM delineated an exclusionary zone within the programmatic boundary which does not contain suitable desert tortoise habitat. Except for lands within the exclusionary zone, BLM currently collects a remuneration fee which is annually indexed for inflation (rate is $603 per acre, effective March 1, 2000) to compensate for the loss of tortoise habitat within the programmatic boundary. The fees are used to fund management actions which are expected providing direct and indirect benefits to the desert tortoise over time, which will assist in its recovery.

On November 21, 1997, the Service issued a programmatic biological opinion (File No. 1-5-97-F-251) to BLM for implementation of multiple-use actions within their Las Vegas District, excluding desert tortoise critical habitat, proposed desert tortoise ACECs, and the area covered by the Las Vegas Valley programmatic consultation. The BLM proposed to authorize activities within the programmatic area that may result in loss of tortoises or their habitat through surface disturbance, land disposal, and fencing, for a period of 5 years. The total area covered under this biological opinion is approximately 2,636,600 ac, which includes approximately 263,900 ac of BLM-withdrawn lands in Clark County. This programmatic consultation is limited to activities which may affect up to 240 ac per project, and a cumulative total of 10,000 ac of desert tortoise habitat excluding land exchanges and sales. Only land disposals by sale or exchange within Clark County may be covered under this consultation up to a cumulative total of 14,637 ac. Therefore, a maximum total of 24,637 ac of desert tortoise habitat may be affected by the proposed programmatic activities. As in the Las Vegas Valley programmatic, BLM collects a remuneration fee of $603 per acre of disturbance of desert tortoise habitat which is used to fund desert tortoise conservation and recovery measures.

On June 18, 1998, the Service issued a programmatic biological opinion (File No. 1-5-98-F-053) to BLM for implementation of the Las Vegas District RMP. The project area for this consultation covers all lands managed by BLM's Las Vegas Field Office, including desert tortoise critical habitat, proposed desert tortoise ACECs, and BLM-withdrawn land. Under the RMP, the BLM designated approximately 648 square miles of tortoise habitat as desert tortoise ACEC in the Northeastern Mojave RU, and approximately 514 square miles of tortoise habitat as desert tortoise ACEC in the Eastern Mojave RU. In total, the BLM manages 743,209 ac of desert tortoise habitat within four tortoise ACECs for desert tortoise recovery. To accomplish recovery of the desert tortoise in the northeastern and eastern Mojave RUs, the BLM is implementing appropriate management actions in desert tortoise ACECs through the RMP including:

1. Manage for zero wild horses and burros within desert tortoise ACECs.
2. Limit utility corridors to 900 m (3,000 ft) in width, or less.
3. Do not authorize new landfills or military maneuvers.
4. Require reclamation for activities which result in loss or degradation of tortoise habitat, with habitat to be reclaimed so that pre-disturbance conditions can be reached within a reasonable time frame.
5. Limit all motorized and mechanized vehicles to designated roads and trails within ACECs and existing roads, trails, and defined dry washes outside ACECs.

6. Allow non-speed OHV events within ACECs, subject to restrictions and monitoring determinations.
7. Prohibit OHV speed events, mountain bike races, horse endurance rides, four-wheel hill climbs, mini-events, publicity rides, high-speed testing, and similar speed based events.
8. Within ACECs, do not allow commercial collection of flora. Only allow commercial collection of fauna within ACECs upon completion of a scientifically-credible study that demonstrates commercial collection of fauna does not adversely impact affected species or their habitat. This action will not affect hunting or trapping, and casual collection as permitted by the State.

Under the RMP and associated programmatic biological opinion, the BLM collects remuneration fees for disturbance of desert tortoise habitat.

Southwestern willow flycatcher

The southwestern willow flycatcher inhabits the desert riparian ecosystem in Clark County. A key component of southwestern willow flycatcher habitat is the presence of slow-flowing or standing water, or saturated soil at least during part of the breeding season. Historical records of southwestern willow flycatcher in Clark County document its occurrence at Corn Creek, Indian Springs, and the Colorado River, and list it as a common migrant and summer resident in southern Nevada riparian areas (Alcorn 1988). Occupied, suitable, and potential habitat for the flycatcher exists within the flood plains of the Virgin and Muddy rivers, and Las Vegas and Meadow Valley washes. Habitat also exists in the Virgin and Muddy River deltas, the waterline around Lake Mead, and along the Colorado River below Hoover Dam. However, these habitats are susceptible to long-term inundation and draw-down caused by unpredictable water level fluctuations resulting from operation and maintenance of Hoover Dam.

Occupied flycatcher habitat is present at several locations along the Virgin River between Mesquite and Lake Mead. Surveys for southwestern willow flycatcher have been conducted annually along the Virgin River in Nevada since 1995, however, surveys have not yet covered all potential habitat sites. Confirmed nesting has been documented since 1997. Nesting success was 36 percent in 1997, 33 percent in 1998, and 54 percent in 1999 (McKernan and Braden 1998, 1999, Crowe et al. 1999). Surveys conducted in the spring and summer of 2000 documented approximately 25 flycatcher territories in the Clark County portion of the Virgin River (Robert McKernan, San Bernardino County Museum, pers. comm. 2000).

Nesting has occurred in both native willow and non-native salt cedar along the Virgin River. Nests in salt cedar usually occur in locations adjacent to, or intermingled with willow and/or cottonwood habitat. Suitable habitat at some locations along the Virgin River is maintained in part by agricultural irrigation runoff. Suitable habitat is also currently impacted by unauthorized livestock grazing. Fluctuations in the water level of Lake Mead due to Hoover Dam operations have also impacted flycatcher habitat in the Virgin River delta. In 1997, 6 pairs of breeding flycatchers produced 14 nests in the Virgin River delta. In 1998 the entire site was exposed to long-term inundation, which resulted in the loss of the willow vegetation and abandonment of the

site. Flycatcher nests along the Virgin River are also parasitized by brown-headed cowbirds. Parasitism rates were 23 percent in 1997, 33 percent in 1998, and 0 percent in 1999 (McKernan and Braden 1998, 1999, Crowe et al. 1999).

Surveys in Las Vegas Wash have been conducted annually since 1998. Suitable and potential habitat exists in Las Vegas Wash, but nesting has not been confirmed. Surveys conducted in the spring and summer of 2000 detected seven willow flycatchers in May and June, but nesting was not observed (Spencer Martin, SWCA, pers. comm. 2000).

Surveys in the Muddy River delta have been conducted since 1997. Two pairs associated with two nests were detected in the summer of 1997, but both nests were parasitized by cowbirds (McKernan and Braden 1998). Suitable habitat in Meadow Valley Wash is currently present only in the portion of the wash that occurs in Lincoln County, where water flow is mostly perennial. Nesting in the Clark County portion of the Meadow Valley Wash has not been detected.

In order for viable populations of the southwestern willow flycatcher to persist in Clark County, existing habitat must be protected along the Virgin and Muddy rivers, as well as additional sites within the flood plains of these rivers that have the capability of forming new patches of riparian vegetation. The hydrologic and vegetative components of these river systems are dynamic in nature, and as the river floods and shifts its course, new vegetation may be created in one area and lost in another. As habitat patches are lost and created, flycatchers will shift their breeding sites accordingly. Therefore, protection of existing habitat only is not adequate to ensure persistence of flycatchers in Clark County. Additional sites that have the capability of forming riparian vegetation at some point in the future must also be protected. Hydrologic functions that allow these rivers to periodically flood and change course within the flood plain must be kept intact to promote formation and maintenance of riparian vegetation.

Preliminary information on the recovery needs of the flycatcher indicate that a minimum of 50 flycatcher territories are needed along the Virgin River, including Arizona and Utah, for the flycatcher to persist in this area. At least 27 territories are known to exist along the Clark County portion of the Virgin River and the Muddy River delta, and future studies in areas not yet surveyed may identify additional territories or sites with suitable or potential habitat. Based on this information, it is estimated that riparian habitat sufficient to support at least 40 to 50 flycatcher territories along the Virgin and Muddy Rivers in Clark County is needed for the flycatcher to persist in the county.

Two biological opinions have been prepared that pertain to southwestern willow flycatcher in Nevada. The Service determined that, after adherence to the terms and conditions of the biological opinion, a 160-acre development on the Fort Mojave Indian Reservation would not result in take of the flycatcher (File Number 1-5-95-F-197, dated May 23, 1995). The removal of 5 ac of salt cedar in Las Vegas Wash was authorized that may have adversely affected up to two to three pairs of nesting flycatchers through removal of habitat (File Number 1-5-98-F-051, dated

April 9, 1998). However, nesting has yet to be documented in Las Vegas Wash, and it is highly unlikely that the removal of vegetation in Las Vegas Wash outside of the known breeding season resulted in the take of flycatchers.

Yellow-billed cuckoo

Potential habitat for the yellow-billed cuckoo occurs in the desert riparian ecosystem in Clark County. Historical records of the yellow-billed cuckoo document its occurrence in Clark County at Corn Creek, Floyd Lamb State Park, Las Vegas Wash, and the lower Virgin River. Surveys for the yellow-billed cuckoo on the Virgin and Muddy rivers were conducted by NDOW and San Bernardino County Museum in 2000. Up to nine cuckoos were detected at a location adjacent to the Moapa Valley National Wildlife Refuge along the Muddy River. It is estimated that up to two pair may be breeding at this site, but nesting has yet to be confirmed (Cris Tomlinson, Nevada Division of Wildlife, pers. comm. 2000). Cuckoos have also been detected during 1999 surveys along the Virgin River, but nesting was not documented. One cuckoo was detected in Las Vegas Wash during surveys for southwestern willow flycatcher in 1998 (SWCA 1998). Six to seven pairs were reported as probable breeders at Beaver Dam Wash in 1979 (Alcorn 1988), but recent breeding activity for this species in southern Nevada has not been observed.

The yellow-billed cuckoo is believed to be a rare summer resident or transient in Nevada. According to currently available information, yellow-billed cuckoos in arid regions of the southwest are most often found in relatively large tracts of mature deciduous riparian forest with brushy understory. Extensive riparian forests may never have been common in southern Nevada, and yellow-billed cuckoos may always have been rare in this part of their range. There is no specific management plan in place for the summer tanager within the Permit Area.

Blue Diamond cholla

The entire range of the Blue Diamond cholla is within the Red Rock Canyon NCA and adjacent private lands in the Permit Area. For information on status, refer to *Status of the Species - Rangewide.*

The Blue Diamond cholla population occurs on BLM lands and private lands owned by J.H. Gypsum, a mining company. In 1994, 880 ac of BLM land between BLM-managed Red Rock Canyon National Conservation Area (Red Rock Canyon NCA) and private land were added to expand the Red Rock Canyon NCA. This is the single most important conservation action for this species, as most of the habitat of Blue Diamond cholla (approximately 83 percent) now falls under Red Rock Canyon NCA management (refer to the discussion on the Red Rock Canyon NCA in the Environmental Baseline section).

Since its designation as a candidate species, increased awareness on the part of land management and regulatory agencies and the private mining company has resulted in a commitment to take proactive measures to conserve the species. The Blue Diamond cholla CA signed in 2000 is expected to remove the threats to the species, and ensure the long-term survival of Blue Diamond cholla, by consolidating, maintaining, or improving existing habitat in the Blue Diamond Hills.

In addition, inclusion of Blue Diamond cholla habitat within the Red Rock Canyon NCA affords the species protection by prohibiting future mineral entry (mining claims filed prior to the expansion of the Red Rock Canyon NCA would still be valid).

Las Vegas bearpoppy

In Nevada, the Las Vegas bearpoppy is restricted to Clark County from the Las Vegas Valley eastward to the area north of Lake Mead. A 1996 status survey documented 79 extant sites in Nevada, including 21 in the Las Vegas Valley, which is undergoing rapid urban development. Past and potential future loss of populations in the Las Vegas Valley, the westernmost portion of the species' range, constitute a 25 percent reduction in the global range of this species. Most of the 58 bearpoppy sites outside of the Las Vegas Valley are subject to threats from multiple uses on public lands. Up to half of these are subject to deteriorating habitat quality due to their proximity to the urban fringe.

The Las Vegas bearpoppy and its habitat are threatened by urban development, burro and livestock grazing, mineral exploration and development, water impoundment and development, utility and highway corridors, OHV and other recreational uses. Studies have provided preliminary evidence that the effectiveness of endemic pollinator populations in the Las Vegas Valley has been reduced, possibly due to fragmentation of the plant populations on which they depend, or through other direct or indirect impacts of urbanization. Ongoing declines in pollinator effectiveness could result in reproductive failure in some populations in the Las Vegas Valley (Tepidino and Kuta 1996).

Three sites in the Las Vegas Valley have been identified as key conservation areas because of the genetic diversity they displayed, as well as the number of acres supporting the populations. A Memorandum of Agreement (MOA) is being developed among Federal, Sate, and local entities to facilitate conservation efforts on these sites (MSHCP Appendix F).

The BLM's Habitat Management Plan for the Las Vegas Bearpoppy (1998) identifies actions needed to protect and improve habitat conditions on public land in the district. Implementation of management actions under this plan has begun and protection of the species on BLM lands is progressing. In addition, a monitoring program has been developed and implemented cooperatively between BLM and NPS across the range of this species.

Sticky buckwheat

In Clark County, sticky buckwheat is distributed within the Muddy River drainage from Weiser Wash to the confluence with the Virgin River and on the Virgin River from Sand Hollow Wash to the confluence of the Colorado River at Middle Point. Sticky buckwheat occurs between 427 and 762 m (1,400 and 2,500 ft) elevation in association with typical Mojave Desert species, including creosote bush, white bursage, desert thorn, shadscale, bladder sage, and spiny hopsage. The species generally occurs in fine-grained soil habitats (sand or sand-clay mixtures), such as low dunes, washes, beaches, and areas of aeolian accumulation. Its range overlaps with that of

threecorner milkvetch, a species also covered under the MSHCP. The habitat of sticky buckwheat falls primarily under the management authority of the NPS and BLM.

The species and its habitat are threatened by recreation, burro and livestock grazing, sand and gravel mining activity between Mesquite and the Muddy River, utility corridor construction and maintenance, flooding, and displacement by salt cedar and arrow weed in shoreline habitat. General management for this species is provided under the BLM RMP and Lake Mead NRA GMP, however there is no specific management in place other than periodic inventory.

Threecorner milkvetch

The Clark County populations of threecorner milkvetch occur in the vicinity of Dry Lake Valley, Glendale, Riverside, Overton Arm, and Sandy Cove. Surveys on public lands identified hundreds of plants on the western slops of Mormon Mesa near Logandale. The majority of habitat for threecorner milkvetch is under BLM management. Other landowners/managers include NPS, Lake Mead NRA, the State of Nevada, BOR, and private entities, including Union Pacific Railroad.

The species and its habitat are threatened by dispersed shoreline recreation on Lake Mead, concentrated OHV travel in sandy areas (especially adjacent to Mesquite, Bunkerville, and along the Muddy River), trampling by burros, sand and gravel mining, expansion of rural communities and associated activities, and utility development.

There is no specific management plan in place for threecorner milkvetch within the Permit Area. The species and its habitat are managed under the general direction and sensitive species management guidelines of the Lake Mead GMP and BLM RMP.

Other Covered Species Not Listed as Threatened or Endangered

Silver-haired bat

Occurrence records indicate that the silver-haired bat is a transient Spring migrant in Clark County. During the winter, it migrates and likely hibernates in its more northerly winter ranges. Migratory patterns are not well understood. It is usually found in high elevation forested habitats and lower elevation riparian areas (Hall 1946, O'Farrell and Rahn 2000). The majority of the records for this species in Clark County are in pinyon-juniper, sagebrush, and salt desert scrub habitat, and agricultural and urban zones, at elevations ranging from 480 to 2550 m (1575 to 8365 ft). The species roosts almost exclusively in trees in the summer. Maternity roosts are generally in woodpecker hollows. It uses multiple roosts, switching them often. Most records of occurrence for this species are in foraging areas rather than in discrete roosting locations.

There is no specific management plan in place for the silver-haired bat within the Permit Area. The species and its habitat are managed under the general direction and sensitive species management guidelines of existing agency management plans.

Long-eared myotis

The long-eared myotis has been documented throughout Clark County, but is uncommon almost everywhere. Occurrence records indicate that it is non-migratory and hibernates locally. It has been documented throughout the county at elevations ranging from 690 to 3,100 m (2,260 to10,135 ft) with a mean elevation of 2,080 m (6,815 ft). Records from Clark County are generally from the mixed conifer and higher ecosystems of the Spring Mountains. It is typically found roosting during the day in hollow trees, under exfoliating bark, crevices in small rock outcrops, and occasionally in mines, caves, and buildings. Night roosts include caves, mines, and under bridges. It roosts singly or in small groups. Maternity roosts in the Spring Mountains have been documented in rock crevices and snags (Ramsey 1997). A population decline may have occurred recently in the Spring Mountains (Michael O'Farrell, pers. comm. 2000).

In the Spring Mountains, the long-eared myotis and its habitat are managed under the Spring Mountains NRA GMP and CA, which identify ecosystem and species-specific conservation actions to protect the species. Elsewhere in the Permit Area, the species and its habitat are managed under the general direction and sensitive species management guidelines of existing agency management plans.

Long-legged myotis

The majority of the records for the long-legged myotis in Clark County are from the Spring Mountains in pinyon-juniper, blackbrush, mountain shrub, sagebrush, and salt desert scrub communities at elevations ranging from 930 to 4,420 m (3,050 to 14,500 ft). It is generally not found in lower elevation desert habitat. It roosts during the day in hollow trees, particularly large diameter snags or live trees with lightning scars. It also uses rock crevices, caves, mines, and buildings when available. Caves and mines are used for night roosts and hibernacula. Maternity roosts in the Spring Mountains have been documented in rock crevices and snags (Ramsey 1997). The long-legged myotis is a year-round resident that hibernates, but may be periodically active during winter.

In the Spring Mountains, the long-legged myotis and its habitat are managed under the Spring Mountains NRA GMP and CA, which identify ecosystem and species-specific conservation actions to protect the species. Elsewhere in the Permit Area, the species and its habitat are managed under the general direction and sensitive species management guidelines of existing agency management plans.

Palmer's chipmunk

The entire range of the Palmer's chipmunk is within the Spring Mountains. For information on status, refer to *Status of the Species - Rangewide*. The species is managed under the direction of the Spring Mountains NRA GMP and CA, which identify ecosystem and species-specific conservation actions to protect the species.

American peregrine falcon

In the Permit Area, American peregrines are known to nest primarily in steep rugged cliffs along the Colorado River, typically close to or overlooking water. In the Spring Mountains, nesting is probable below the Red Rock Canyon escarpment and perhaps elsewhere above deep canyons. They are also known to nest on the ledges of tall buildings in Las Vegas. Peregrines have always been considered rare in Nevada; however, early studies in Nevada were limited, and its historical abundance and distribution in Nevada is mostly unknown. Historical accounts of breeding peregrines in southern Nevada documented successful nesting at Lake Mead (Alcorn 1988). Surveys are conducted periodically by NDOW, NPS, and BLM in the Spring Mountains, Lake Mead, and along the Colorado River to Lake Mojave. Surveys in 2000 detected four to five territories in the Lake Mead area and four to five territories below Hoover Dam to Lake Mojave (Cris Tomlinson, NDOW, pers. comm. 2000). Surveys conducted in 2000 for the Nevada Breeding Bird Atlas detected two territories in the Spring Mountains and one territory in the Mormon Mountains just north of the Clark County border in Lincoln County (Ted Floyd, Great Basin Bird Observatory, pers. comm. 2000).

There is no specific management plan in place for the American peregrine falcon throughout most of the Permit Area. The species and its habitat are managed under the general direction and sensitive species management guidelines of the Lake Mead NRA GMP, BLM RMP, and Red Rock Canyon GMP. The species is also managed under the direction of the Spring Mountains NRA GMP and CA, which identify ecosystem and species-specific conservation actions to protect the species.

Blue grosbeak

Suitable habitat for the blue grosbeak in Clark County occurs in the desert riparian ecosystem. This species is most often observed in scrubby or brushy vegetation including mesquite, salt cedar, willows, cottonwoods, and other riparian woody species, along rivers and streams and adjacent to open areas. All blue grosbeak nests found during surveys along the Virgin River in 1999 were constructed in salt cedar (Crowe et al. 1999). It was a relatively common species throughout the Virgin River area during surveys conducted in 1997, 1998, and 1999. It also occurs in riparian vegetation along the Muddy River, Meadow Valley Wash, and Las Vegas Wash. It has also been observed at springs and in mesquite woodlands throughout the county (Jeri Krueger, pers. comm. 2000).

There is no specific management plan in place for the blue grosbeak within the Permit Area. The species and its habitat are managed under the general direction and sensitive species management guidelines of existing agency management plans.

Phainopepla

Suitable habitat for the phainopepla in Clark County occurs in the mesquite/catclaw and desert riparian ecosystems. Springs may also provide habitat for phainopeplas if the associated vegetation includes mistletoe-infested mesquite or catclaw. This species is nearly always observed in mistletoe-infested mesquite or catclaw in Clark County.

Known nesting sites include Meadow Valley Wash, the Muddy and Virgin rivers, Corn Creek, Stump Spring, Cactus Spring, various springs scattered throughout Clark County, and the catclaw washes in extreme southern Clark County, including Hiko, Piute, Empire, and Roman washes. Nesting within Las Vegas Valley is rare, but is known to occur in the mesquite at Sunset Park. Nesting substrate includes mesquite, catclaw, ash, oak, and cottonwood. Phainopeplas in southern Nevada are known to arrive in Clark County in late September to October, but do not begin breeding until February or March. Phainopeplas may occupy several sites throughout the winter months before choosing a breeding site. Nesting occurs from late February or March through April or May (Krueger 1998). Following the breeding season, phainopeplas disperse and are not seen again until the following September or October. No long-term surveys have been conducted during the breeding season in Clark County. Annual surveys conducted by NDOW since 1993 have shown that phainopepla populations in Clark County exhibit short term fluctuations in size. Short-term trend data (1993 through 1999) for pre-breeding season phainopeplas indicate an increase in winter populations from 1993 to 1999 (NDOW 1999). Parasitism by brown-headed cowbirds has not been observed.

On BLM lands where it occurs in mesquite woodlands, the phainopepla is managed under the direction of the Mesquite Woodland HMP, which identifies ecosystem and species-specific conservation actions for the species. Elsewhere in the Permit Area, the species and its habitat are managed under the general direction and sensitive species management guidelines of the Lake Mead NRA GMP, BLM RMP, and Red Rock Canyon GMP.

Summer tanager

Suitable habitat for the summer tanager in Clark County occurs in the desert riparian ecosystem. The summer tanager is most often associated with mature riparian woodlands that contain large trees. The species is considered a summer resident in southern Nevada. Sites that support potential habitat include the Muddy and Virgin rivers, Las Vegas Wash, and possibly a few locations along the Colorado River. It has also been observed at larger springs that support well-developed woody riparian vegetation scattered throughout Clark County. Historic records have documented the species at Corn Creek, along the Colorado River in the extreme southern tip of Clark County, and in Pine Creek Canyon at the eastern base of the Spring Mountains (Alcorn 1988).

There is no specific management plan in place for the summer tanager within the Permit Area. The species and its habitat are managed under the general direction and sensitive species management guidelines of existing agency management plans.

Vermilion flycatcher

Suitable breeding habitat for the vermilion flycatcher in Clark County occurs in the desert riparian ecosystem, and the mesquite ecosystem if the vegetation is associated with surface water or saturated soil. The vermilion flycatcher is most often associated with shrubby or brushy vegetation adjacent to open areas such as grassy meadows or agricultural fields. In Clark County, the species is found in mesquite (mostly screwbean), cottonwood, ash, willow, and mulberry. It is considered a resident in the southern part of Nevada. Austin (1971) reported it as a winter resident in desert scrub, and a permanent, year-round, resident in riparian areas. Known nesting sites occur in riparian areas along the Muddy and Virgin Rivers. The species has also been observed within the community of Blue Diamond at the base of Red Rock Canyon, and within the communities of Logandale and Bunkerville along the Virgin River. Potential habitat also occurs in Las Vegas Wash, Meadow Valley Wash, and possibly at scattered sites in the Lake Mead area and along the Colorado River. Parasitism by the brown-headed cowbird has been documented in the Muddy River area. During the 2000 breeding season, 11 out of 34 nests (32 percent) were parasitized (Polly Sullivan, USGS BRD, pers. comm. 2000).

There is no specific management plan in place for the vermilion flycatcher within the Permit Area. The species and its habitat are managed under the general direction and sensitive species management guidelines of existing agency management plans.

Arizona Bell's vireo

Suitable habitat for Arizona Bell's vireo in Clark County occurs in the desert riparian ecosystem. This species is most often observed in dense thickets of mesquite, willow, arrow weed, and salt cedar along perennial waterways. Historical accounts in Clark County include observations of this species along the Colorado and Virgin rivers and in Las Vegas Valley (Alcorn 1988). The species is also known to occur along the Muddy River, Meadow Valley Wash, and Lake Mead area; however, specific location and nesting information is not available. Recent surveys along the Virgin River documented 42.3 percent nesting success (11 out of 26 nests) in 1998 and 57.7 percent nesting success (15 out of 26 nests) in 1999 (Crowe et al. 1999). Nesting substrate included Goodding willow, coyote willow, arrow weed, screwbean mesquite, salt cedar, and Russian olive. Vireo nests are parasitized by brown-headed cowbirds. Surveys along the Virgin River documented a 46.4 percent parasitism rate in 1998 and a 23.1 percent parasitism rate in 1999. Parasitized nests in 1998 did not successfully fledge any vireos.

There is no specific management plan in place for the Arizona Bell's vireo within the Permit Area. The species and its habitat are managed under the general direction and sensitive species management guidelines of existing agency management plans.

Desert iguana

Potential habitat for the desert iguana within the Permit Area primarily includes the creosote-bursage community within the Mojave desert scrub ecosystem. Most desert iguana habitat in Clark County is managed by BLM and NPS. Desert iguanas have been adversely affected by

development and habitat disturbance authorized under sections 7 and 10 of the Act as described for the desert tortoise above. However, implementation of conservation actions under existing HCPs and terms and conditions of biological opinions issued within the Permit Area since the desert tortoise was listed, provide conservation for this species as well as others that co-occur with the desert tortoise.

Most records for the desert iguana in Clark County include the southernmost area of the county, south of State Route 163, and in Eldorado and Piute valleys. Most occurrence records are from data reported to NDOW by commercial collectors. Desert iguanas have been collected in Clark and southern Nye counties. The removal of gravid females through collection would result in impacts to the population or species by reducing the reproduction and recruitment of the population. These effects are particularly concerning for long-lived species such as the desert iguana, that requires 3 to 4 years to reach sexual maturity and may only produce a single clutch of eggs per year. However, the overall effects to the desert iguana from commercial collection in the Permit Area are relatively low to moderate because: (1) desert iguanas are widespread and locally abundant, (2) the Permit Area includes less than 5 percent of its overall range, (3) approximately 33 percent of the commercially collected iguanas were taken in southern Nye County, outside the Permit Area, and (4) desert iguanas occur across vast areas and are less likely to be observed and collected by collectors than other species such as the chuckwallas. A total of 7,781 desert iguanas were collected on approximately 340 square miles of the Permit Area, from 1986 through 1998, which represents 23 lizards per square mile over 13 years or approximately two desert iguanas per square mile, per year in the Permit Area.

Western banded gecko

This lizard species may be found in a wide variety of habitat types within the Permit Area, from the desert riparian ecosystem up into the pinyon-juniper ecosystem. Geckos are frequently killed by domestic pets, particularly at the interface between residential development and habitat. These lizards are frequently killed by vehicles on roads in the Permit Area, particularly State Routes 160, 163, 164, 165, and 168; U.S. Highways 93 and 95; and Interstate 15. Banded geckos are collected by hobbyists and commercially collectors. A total of 736 banded geckos were commercially collected within 151 square miles of the Permit Area, from 1986 through 1998.

NDOW is conducting a mark/recapture study involving the banded gecko in Red Rock Canyon NCA to determine the effects of roads on the lizard and natural history information on the species. The results of this investigation are anticipated within the initial years of the MSHCP and will be considered in the adaptive management evaluation for this species. Although the banded gecko is more widely distributed than the desert tortoise, implementation of conservation actions under existing HCPs and terms and conditions of biological opinions issued within the Permit Area since the desert tortoise was listed, provide conservation for this species as well as others that co-occur with the desert tortoise.

Western red-tailed skink

This species is the least known species of reptile proposed for coverage under the MSHCP. Although the skink is expected to occur within all ecosystems within the Permit Area except the alpine, bristlecone pine, salt desert scrub, and spring ecosystems, no data exist on its ecology or natural history within the Permit Area. The western red-tailed skink is known from the Sheep Range, and Spring and Newberry mountains, within the Permit Area (Stebbins 1985). Populations of skinks occurring within Mojave desert scrub, salt desert scrub, and blackbrush ecosystems in the Permit Area, have likely benefitted, to some degree, by conservation and protection actions implemented under existing HCPs and terms and conditions of biological opinions issued since the desert tortoise was listed.

The western red-tailed skink is rarely encountered and, therefore, not subject to commercial collection pressure. The easternmost range of this subspecies of the Gilbert skink ends within the Permit Area. Although widely distributed, this species is not expected to occur on most lands to be developed under the MSHCP, based on existing occurrence records for the species.

Large-spotted leopard lizard

The large-spotted leopard lizard is generally widespread throughout much of the Permit Area. Occurring primarily in salt desert scrub and Mojave desert scrub ecosystems, this lizard species may also be found in suitable habitat into pinyon-juniper habitat. Most occurrence records for this species are from the Piute and Eldorado valleys, and extreme southern and southwestern Clark County.

Habitat modification or disturbance within these ecosystems have likely affected this species. Leopard lizards that occur within the interface with residential development may be killed by domestic pets. Leopard lizards are frequently killed by vehicles on roads in the Permit Area, particularly State Routes 160, 163, 164, 165, and 168; U.S. Highways 93 and 95; and Interstate 15. From 1986 through 1998, a total of 3,047 leopard lizards were reported collected by commercial collectors within Clark County. These lizards were collected over 344 square miles of the Permit Area.

Although more widely distributed than the desert tortoise, implementation of conservation actions under existing HCPs and terms and conditions of biological opinions issued within the Permit Area since the desert tortoise was listed, provide conservation for this species as well as others that co-occur with the desert tortoise.

Great Basin collared lizard

This subspecies of collared lizard is widely distributed throughout the Permit Area, from desert riparian to pinyon-juniper ecosystems. Primary habitat for the Great Basin collared lizard occur within the salt desert scrub and Mojave desert scrub ecosystems. Most occurrence records for this species include Piute and Sandy valleys, and extreme southern Clark County south of State Route 163.

As with the leopard lizard, collared lizards have been impacted by habitat modification or disturbance and killed by domestic pets within the interface with residential development. Collared lizards are frequently killed by vehicles on roads in the Permit Area, particularly State Routes 160, 163, 164, 165, and 168; U.S. Highways 93 and 95; and Interstate 15. These lizards were collected over 344 square miles of the Permit Area. From 1986 through 1998, a total of 830 collared lizards were reported collected by commercial collectors within Clark County. These lizards were collected over 181 square miles of the Permit Area.

Although more widely distributed than the desert tortoise, implementation of conservation actions under existing HCPs and terms and conditions of biological opinions issued within the Permit Area since the desert tortoise was listed, provide conservation for this species within the Mojave desert scrub, salt desert scrub, and blackbrush ecosystems.

California kingsnake

This subspecies of the common kingsnake is widely distributed throughout the Permit Area, from desert riparian to pinyon-juniper ecosystems. Primary habitat for the California kingsnake occurs within the Mojave desert scrub ecosystem. California kingsnakes may be found within these ecosystems where suitable cover exists, including human sources of cover such as discarded building or household materials, and in irrigated and agricultural areas. Kingsnakes that occur within the interface with residential development may be killed by domestic pets.

Kingsnakes are impacted in the Permit Area by primary and secondary roads, particularly State Routes 160, 162, 163, and 168; U.S. Highways 93 and 95; and Interstate 15. From 1986 through 1998, a total of 48 California kingsnakes were reported collected by commercial collectors within Clark County. These snakes were collected over 33 square miles of the Permit Area. Although kingsnakes are among the most popular snake species kept in captivity, collecting pressure for this species is relatively low because (1) large numbers of this species are bred in captivity to meet the pet trade and hobby demand, and (2) most collection of this species occur through chance encounters, most likely on roads.

Although more widely distributed than the desert tortoise, implementation of conservation actions under existing HCPs and terms and conditions of biological opinions issued within the Permit Area for the desert tortoise provide conservation for this species in the Mojave desert scrub, salt desert scrub, and blackbrush ecosystems.

Glossy snake

The Applicants request coverage for both subspecies of glossy snake (Mojave and desert glossy) that occur within the Permit Area. The Mojave glossy snake is narrowly distributed within the Permit Area, occurring within the extreme southwestern portion of the Permit Area. The desert glossy occurs throughout the remaining portion of the Permit Area, east of the Mojave subspecies range. Primary habitat for the glossy snake occurs within the Mojave desert scrub ecosystem. However, they may also be found within the blackbrush and salt desert scrub ecosystems.

Glossy snakes that occur within the interface with residential development may be killed by domestic pets. These snakes are frequently killed by vehicles on roads in the Permit Area, particularly State Routes 160, 163, 164, 165, and 168; U.S. Highways 93 and 95; and Interstate 15. Glossy snake species are commercially harvested within the Permit Area but the numbers reported as collected are relatively low primarily due to infrequent encounter rates. From 1986 through 1998, a total of 97 glossy snakes were reported collected by commercial collectors within Clark County. These snakes were collected over 53 square miles of the Permit Area. Collection of this species occur most likely on roads, through chance encounters.

Because most glossy snakes occur within desert tortoise habitat, implementation of conservation actions under existing HCPs, and terms and conditions of biological opinions issued within the Permit Area for the desert tortoise provide conservation for this species in the Mojave desert scrub, salt desert scrub, and blackbrush ecosystems. Fifty-four percent of potential habitat in mesquite/catclaw and Mojave desert scrub ecosystems occur within IMAs and LIMAs (most suitable habitat). Less suitable potential habitat for the glossy snake within IMAs and LIMAS occurs in: Pinyon-juniper (92 percent), sagebrush (87 percent), blackbrush (52 percent), and salt desert scrub (69 percent) ecosystems.

Western long-nosed snake

The western long-nosed snake is widely distributed throughout the Permit Area, from Mojave desert scrub to sagebrush ecosystems. Fifty-four percent of potential habitat in mesquite/catclaw and Mojave desert scrub ecosystems occur within IMAs and LIMAs (most suitable habitat). Less suitable potential habitat for the long-nosed snake within IMAs and LIMAS occurs in: Sagebrush (87 percent), blackbrush (52 percent), and salt desert scrub (69 percent) ecosystems.

Habitat modification or disturbance within these ecosystems have likely affected this species. Snakes that occur within the interface with residential development are killed by humans and domestic pets. Long-nosed snakes are impacted by vehicles on roads in the Permit Area, particularly State Routes 160, 163, 164, 165, and 168; U.S. Highways 93 and 95; and Interstate 15. From 1986 through 1998, a total of 188 long-nosed snakes were reported collected by commercial collectors within Clark County. These snakes were collected over 79 square miles of the Permit Area. Collection of this species occurs mostly at night on roads, through chance encounters.

Implementation of conservation actions under existing HCPs and terms and conditions of biological opinions issued within the Permit Area for the desert tortoise provide conservation for this species in the Mojave desert scrub, salt desert scrub, and blackbrush ecosystems.

Western leaf-nosed snake

The western leaf-nosed snake is known to occur only within the Mojave and salt desert scrub ecosystems of the Permit Area. Leaf-nosed snakes that occur within the interface with residential

development are killed by domestic pets. These snakes are frequently killed by vehicles on roads in the Permit Area, particularly State Routes 160, 163, 164, 165, and 168; U.S. Highways 93 and 95; and Interstate 15.

Leaf-nosed snakes are difficult to keep in captivity and, therefore not a species in high demand by collectors or hobbyists. From 1986 through 1998, a total of 45 leaf-nosed snakes were reported collected by commercial collectors within Clark County. These snakes were collected over 24 square miles of the Permit Area. Collection events for this species most likely occur on roads, through chance encounters.

The Permit Area approximates the northern limit of distribution of the western leaf-nosed snake in Nevada. Its range approximates that of the desert tortoise. Thus, implementation of conservation actions under existing HCPs, and terms and conditions of biological opinions issued within the Permit Area since the desert tortoise was listed, provide conservation for this species as well as others that co-occur with the desert tortoise. No comprehensive studies have been completed for this species in Clark County or elsewhere within its range, and population status and trend is currently unknown. Fifty-eight percent of potential habitat occur within IMAs and LIMAs.

Sonoran lyre snake

The Sonoran lyre snake is widely distributed throughout suitable habitat within the Permit Area, occupying habitat within the mesquite/catclaw, Mojave desert scrub, salt desert scrub, blackbrush, pinyon-juniper, and mixed conifer ecosystems. The Permit Area represents the northwestern distribution of the lyre snake. Because this secretive snake is restricted to rocky areas with crevices, it is seldom encountered within the Permit Area. Consequently, it is collected the least of the commercially collected reptile species proposed for coverage under the MSHCP. From 1986 through 1998, only 11 lyre snakes were reported collected by commercial collectors within Clark County over 8 square miles of the Permit Area. Although the distribution of this species potentially includes much of the Permit Area, most lyre snakes occur within those portions of the ecosystems that provide rocky shelter. Lyre snakes are impacted by roads that traverse their habitat

Although most lyre snakes occur on rocky foothills, implementation of conservation actions under existing HCPs, and terms and conditions of biological opinions issued within the Permit Area since the desert tortoise was listed, provide conservation for this species. Fifty-eight percent of potential habitat in Mojave desert scrub and salt desert scrub ecosystems occur within IMAs and LIMAs (most suitable habitat). Less suitable potential habitat for the lyre snake within IMAs and LIMAS occurs in: Mixed conifer (97 percent), pinyon-juniper (92 percent), blackbrush (52 percent), and mesquite/catclaw (40 percent) ecosystems.

Sidewinder

The Mojave desert subspecies of the sidewinder, is the only subspecies that occurs within the Permit Area. The sidewinder occurs primarily in low-lying areas dominated by loose sand and sandy hummocks within the Mojave desert scrub ecosystem. This rattlesnake may also be found to a lesser degree in mesquite/catclaw and salt desert scrub ecosystems. Although the distribution of this species potentially includes much of the Permit Area, most sidewinders occur within those areas that provide suitable habitat conditions where it may be locally abundant. This species of rattlesnake is impacted within the Permit Area, by malicious killing by humans when encountered, vehicular traffic, OHV activity, habitat destruction and fragmentation, and predation by domestic dogs and cats. These snakes are frequently killed by vehicles on roads in the Permit Area, particularly State Routes 160, 163, 164, 165, and 168; U.S. Highways 93 and 95; and Interstate 15. Implementation of conservation actions under existing HCPs, and terms and conditions of biological opinions issued within the Permit Area since the desert tortoise was listed, provide conservation for this species. Fifty-eight percent of potential habitat in Mojave desert scrub and salt desert scrub ecosystems occur within IMAs and LIMAs (most suitable habitat). Less suitable potential habitat for the sidewinder within IMAs and LIMAS occurs in mesquite/catclaw (31 percent) ecosystems.

Although sidewinders are locally abundant, only 166 sidewinders have been reported as collected in the Permit Area over 71 square miles from 1986 through 1998. Unlike the chuckwalla, impacts to the species that result from collection of these snakes are less concerning primarily because: (1) most individuals are collected by chance encounter which typically does not involve selective removal of dominant individuals, (2) these snakes do not bask or defend territories from prominent sites, and thus are not highly visible to collectors except when crossing roads, (3) their commercial demand is low, and (4) they are highly cryptic in their habitat. From 1986 through 1998, a total of 166 sidewinders were reported collected by commercial collectors within Clark County.

Speckled rattlesnake

The range of the Panamint subspecies of the speckled rattlesnake occurs along the western half of the Permit Area, whereas the range of the southwestern speckled rattlesnake occurs along the eastern half of the Permit Area. Speckled rattlesnakes may also be found to a lesser degree in blackbrush, sagebrush, and pinyon-juniper ecosystems. Although the distribution of this species includes four ecosystems, across much of the Permit Area, most speckled rattlesnakes occur on rocky hillsides. This species of rattlesnake is impacted within the Permit Area by malicious killing by humans when encountered, OHV activity, habitat destruction and fragmentation, and predation by domestic dogs and cats. These snakes are frequently killed by vehicles on well-traveled roads in the Permit Area, particularly State Routes 160, 163, 164, 165, and 168; U.S. Highways 93 and 95; and Interstate 15.

Although most speckled rattlesnakes are found in rocky hillsides, implementation of conservation actions under existing HCPs and terms and conditions of biological opinions issued within the Permit Area, since the desert tortoise was listed, provide conservation for this species.

Fifty-seven percent of potential habitat in Mojave desert scrub ecosystem occur within IMAs and LIMAs (most suitable habitat). Less suitable potential habitat for the speckled rattlesnake within IMAs and LIMAS occurs in: Pinyon-juniper (92 percent), sagebrush (87 percent), and blackbrush (52 percent) ecosystems.

Although the current level of commercial collection for these species is low in Nevada and the Permit Area, the total number of speckled rattlesnakes collected across their range is unknown. Unlike the chuckwalla, impacts that result from collection of these snakes are relatively minor, primarily because: (1) most individuals are collected by chance encounter which typically does not involve selective removal of dominant individuals, (2) these snakes do not bask or defend territories from prominent sites, and thus are not highly visible to collectors except when crossing roads, (3) their distribution across the landscape is more uniform, which results in fewer collections over larger areas, and (4) a total of only 216 speckled rattlesnakes were reported collected by commercial collectors within Clark County over 82 square miles of the Permit Area from 1986 through 1998.

Mojave green rattlesnake

The range of the Mojave rattlesnake within the Permit Area represents less than 5 percent of its rangewide distribution. Mojave green rattlesnakes may also be found to a lesser degree in the blackbrush ecosystem. Most Mojave green rattlesnakes are found within the Permit Area, in Mojave desert scrub habitat dominated by creosote bush. This species of rattlesnake is impacted within the Permit Area by malicious killing by humans when encountered, OHV activity, habitat destruction and fragmentation, and predation by domestic dogs and cats. These snakes are frequently killed by vehicles on well-traveled roads in the Permit Area, particularly State Routes 160, 163, 164, 165, and 168; U.S. Highways 93 and 95; and Interstate 15.

Conservation actions under existing HCPs, and terms and conditions of biological opinions issued for the desert tortoise within the Permit Area provide conservation for this species. Fifty-seven percent of potential habitat in Mojave desert scrub ecosystems occur within IMAs and LIMAs (most suitable habitat). Less suitable potential habitat for the Mojave green rattlesnake within IMAs and LIMAS occurs in blackbrush (52 percent) ecosystems.

Impacts to this species that result from collection of these snakes are relatively minor, primarily because: (1) most individuals are collected by chance encounter which typically does not involve selective removal of dominant individuals, (2) these snakes do not bask or defend territories from prominent sites, and thus are not highly visible to collectors except when crossing roads, (3) their distribution across the landscape is more uniform, which results in fewer collections over larger areas, and (4) only 74 Mojave green rattlesnakes were reported as commercially collected over 36 square miles in the Permit Area from 1986 through 1998.

Relict leopard frog

The current distribution of known relict leopard frog is limited to Clark County, and in vicinity of Littlefield, Mohave County, Arizona. The population at Corral Spring within Lake Mead NRA, where the species was first rediscovered in 1991, has apparently been extirpated. The relict leopard frog is currently known to occur at six locations within the Permit Area. Collection of this species is not allowed without a permit from NDOW. Encroachment of non-native plants and animals (e.g., salt cedar, bullfrogs, and predatory fishes) are major threats to this species rangewide and within the Permit Area. The range of the relict leopard frog within the Permit Area includes all known locations except one in Arizona. NPS and NDOW are currently developing plans to create refugia for the relict leopard frog within the historic range of the species.

All known extant populations in the Permit Area occur within LIMAs and are managed by NPS. Surveys for additional sites have been conducted in coordination with NPS staff and monitoring of known populations is ongoing by NPS and NDOW biologists. Currently occupied sites for this species are considered conserved and not subject to development under the MSHCP. However, should refugia become established, relict leopard frogs may be subject to effects that result from permitted activities on non-Federal lands including livestock grazing, development, or other habitat disturbances.

Spring Mountains acastus checkerspot butterfly

The Spring Mountains acastus checkerspot butterfly is endemic to the Spring Mountains. For information on status and threats, refer to *Status of the Species Rangewide*. The species is managed under the direction of the Spring Mountains NRA GMP and CA, which identify ecosystem and species-specific conservation actions to protect the species.

Dark blue butterfly

The dark blue butterfly is endemic to the Spring Mountains. For information on status and threats, refer to *Status of the Species - Rangewide*. The species is managed under the direction of the Spring Mountains NRA GMP and CA, which identify ecosystem and species-specific conservation actions to protect the species.

Morand's checkerspot butterfly

Morand's checkerspot butterfly is endemic to the Spring Mountains. For information on status and threats, refer to *Status of the Species Rangewide*. The species is managed under the direction of the Spring Mountains NRA GMP and CA, which identify ecosystem and species-specific conservation actions to protect the species.

Spring Mountains comma skipper

The Spring Mountains comma skipper is endemic to the Spring Mountains. For information on status and threats, refer to *Status of the Species Rangewide*. The species is managed under the direction of the Spring Mountains NRA GMP and CA, which identify ecosystem and species-specific conservation actions to protect the species.

Spring Mountains icarioides blue butterfly

The Spring Mountains icarioides blue butterfly is endemic to, and abundant in the Spring Mountains. For information on status and threats, refer to *Status of the Species - Rangewide*. The species is managed under the direction of the Spring Mountains NRA GMP and CA, which identify ecosystem and species-specific conservation actions to protect the species.

Mt. Charleston blue butterfly

The Mt. Charleston blue butterfly is endemic to the Spring Mountains. For information on status and threats, refer to *Status of the Species Rangewide*. The species is managed under the direction of the Spring Mountains NRA GMP and CA, which identify ecosystem and species-specific conservation actions to protect the species.

Nevada admiral

As currently understood the Nevada Admiral is endemic to the Spring Mountains. Historical collections of this butterfly made in the Sheep Range in 1969 have not been reverified by recent surveys. For information on status and threats, refer to *Status of the Species Rangewide*. The species is managed under the direction of the Spring Mountains NRA GMP and CA, which identify ecosystem and species-specific conservation actions to protect the species. In the Sheep Range, it is managed under the general direction and sensitive species management guidelines of the DNWR.

Carole's silverspot butterfly

Carole's silverspot butterfly is endemic to the Spring Mountains. For information on status and threats, refer to *Status of the Species Rangewide*. The species is managed under the direction of the Spring Mountains NRA GMP and CA, which identify ecosystem and species-specific conservation actions to protect the species.

Spring Mountains springsnail

The Spring Mountains springsnail is endemic to the Spring Mountains, found only in Red, Willow, and Kiup Springs. For information on status and threats, refer to *Status of the Species Rangewide*. The species is managed under the direction of the Spring Mountains NRA GMP and CA, which identify ecosystem and species-specific conservation actions to protect the species.

The species and its habitat are also managed under the general direction and sensitive species management guidelines of the Red Rock Canyon NCA GMP.

Southeast Nevada springsnail

The Southeast Nevada springsnail is endemic to Southeast Nevada, occurring in the Spring Mountains and several isolated basins in Nye County, Nevada. For information on status and threats, refer to *Status of the Species Rangewide*. There is no specific management plan in place for the Southeast Nevada springsnail within the Permit Area. The species and its habitat are managed under the general direction and sensitive species management guidelines of the Red Rock Canyon NCA GMP and BLM RMP.

Rough angelica

Rough angelica is endemic to the Spring Mountains. For information on status and threats, refer to *Status of the Species Rangewide*. Rough angelica populations occur within the Spring Mountains NRA and the Red Rock Canyon NCA. The species is managed under the direction of the Spring Mountains NRA GMP and CA, which identify ecosystem and species-specific conservation actions to protect the species, and the general direction and sensitive species management guidelines of the Red Rock Canyon NCA GMP. Because of its known rarity, limited distribution, and threats to the species, a long-term monitoring project for populations of rough angelica in the Spring Mountains NRA was implemented by TNC, the Service, and the USFS in 1994. This monitoring effort will annually assess the status of the species and detect any biologically significant changes in population density and age structure over time.

Charleston pussytoes

Charleston pussytoes is endemic to the Spring Mountains. For information on status and threats, refer to *Status of the Species Rangewide*. The majority of known populations occur within the Spring Mountains NRA with a few sites located on private lands. The species is managed under the direction of the Spring Mountains NRA GMP and CA, which identify ecosystem and species-specific conservation actions to protect the species.

Sticky ringstem

In Clark County, sticky ringstem exhibits a patchy distribution, primarily in the Frenchman Mountain area east of Las Vegas and further east to the Muddy Mountains and Gold Butte. It occurs within salt desert scrub and Mojave Desert scrub habitats on gypsiferous soils on rolling hills and terraces at about 1,070 m (3,500 ft) elevation. It is often associated with the Las Vegas bearpoppy.

The BLM Habitat Management Plan for the Las Vegas Bearpoppy (1998) identifies actions needed to protect and improve habitat conditions for the Las Vegas bearpoppy. In areas where it co-occurs with Las Vegas bearpoppy, the sticky ringstem will benefit from conservation measures carried out under the bearpoppy plan. Implementation of conservation actions under

this plan has begun and protection of bearpoppy and ringstem habitats on BLM lands is progressing. Where it occurs on NPS lands, the ringstem and its habitat are managed under the general direction and sensitive species management guidelines of the Lake Mead NRA GMP.

White bearpoppy

White bearpoppy occurs in the western half of Clark County where an unknown number of populations near the Las Vegas Valley have been extirpated by urban development. In Clark County, 60 percent of the remaining habitat is under the management of the DNWR. Additional habitat is on land managed by BLM, NPS, USAF, and private entities.

There is no specific management plan in place for white bearpoppy within the Permit Area. The species and its habitat are managed under the general direction and sensitive species management guidelines of the DNWR and the BLM RMP. The Air Force provides protective management for sensitive species on the Nellis Air Force Base and Range.

Rosy King sandwort

Rosy King sandwort is endemic to the Spring Mountains. For information on status and threats, refer to *Status of the Species - Rangewide*. The species is managed under the direction of the Spring Mountains NRA GMP and CA, which identify ecosystem and species-specific conservation actions to protect the species.

Clokey milkvetch

Clokey milkvetch is endemic to the Spring Mountains. For information on status and threats, refer to *Status of the Species Rangewide*. The species is managed under the direction of the Spring Mountains NRA GMP and CA, which identify ecosystem and species-specific conservation actions to protect the species.

Clokey eggvetch

In the Spring Mountains, Clokey eggvetch is known from 13 sites on about 21 ac of habitat within two general areas centered around upper Lee Canyon and Wheeler Pass. It is found on ridges and open slopes in gravelly soils derived from limestone between 1,890 and 2,775 m (6,200 and 9,100 ft) in elevation where annual precipitation averages 38 to 50 cm (15 to 20 in). It is often found within fairly open ponderosa and mixed conifer forests or under shrubs in drier oak-sagebrush shrub lands and pinyon-juniper-oak woodlands on the north and west sides of the range. Dominant tree and shrub species occurring with Clokey eggvetch in the Spring Mountains are ponderosa pine, white fir, curlleaf mountain mahogany, pinyon pine, and big sagebrush. Clokey eggvetch co-occurs in habitats with several other species proposed for coverage under the MSHCP including rosy King sandwort, Clokey mountain sage, and Charleston grounddaisy (The Nature Conservancy 1996).

For a discussion on threats to this species, refer to *Status of the Species Rangewide*. The species is managed under the direction of the Spring Mountains NRA GMP and CA, which identify ecosystem and species-specific conservation actions to protect the species. Because of its known rarity, limited distribution, and threats to the species, a long-term monitoring project for populations of rough angelica in the Spring Mountains NRA was implemented by TNC, the Service, and the USFS in 1994. This monitoring effort annually assesses the status of the species and detects any biologically significant changes in population density and age structure over time.

Spring Mountains milkvetch

Spring Mountains milkvetch is endemic to the Spring Mountains. For information on status and threats, refer to *Status of the Species - Rangewide*. The majority of the habitat for this species occurs within the Spring Mountains NRA with a small portion on private lands. The species is managed under the direction of the Spring Mountains NRA GMP and CA, which identify ecosystem and species-specific conservation actions to protect the species. Spring Mountains milkvetch is also managed under the general direction and sensitive species management guidelines of the Red Rock Canyon GMP.

Clokey paintbrush

In Clark County, Clokey paintbrush is locally common in the Spring Mountains at higher elevations with occurrence records from Macks, Kyle, Lee, and Clark canyons, and Deer Creek. It also occurs in the bristlecone pine woodlands and mixed conifer forest in the Sheep Range. Clokey paintbrush often co-occurs with several other plant species proposed for coverage under the MSHCP including Jaeger ivesia, smooth pungent dwarf greasebush and Clokey thistle. For further information on status and threats, refer to *Status of the Species - Rangewide*.

The species is managed under the direction of the Spring Mountains NRA GMP and CA, which identify ecosystem and species-specific conservation actions to protect the species. The species and its habitat are also managed under the general direction and sensitive species management guidelines of the DNWR.

Clokey thistle

Clokey thistle is endemic to the Spring Mountains. For information on status and threats, refer to *Status of the Species - Rangewide*. The majority of the habitat for this species occurs within the Spring Mountains NRA with a small portion on private lands. The species is managed under the direction of the Spring Mountains NRA GMP and CA, which identify ecosystem and species-specific conservation actions to protect the species.

Alkali mariposa lily

In Nevada, there are eight known populations in Clark County and one in Nye County. Of the Clark County sites, six are located in the Red Rock Canyon NCA, one site is in the Las Vegas

Valley, and one near the northeast county line on BLM lands. Threats to this species and its habitat in the Permit Area include dispersed and concentrated recreation in the Red Rock Canyon NCA, wild horse and burro grazing and trampling, habitat degradation from competitive and casual OHV activities, and spring outflow diversion and modification, including decreased spring flows resulting from groundwater draw down.

There is no specific management plan in place for alkali mariposa lily within the Permit Area. The species and its habitat are managed under the general direction and sensitive species management guidelines of the BLM RMP and Red Rock Canyon NCA GMP.

Jaeger whitlowgrass

Jaeger whitlowgrass is endemic to the Spring Mountains. For information on status and threats, refer to *Status of the Species Rangewide*. The species is managed under the direction of the Spring Mountains NRA GMP and CA, which identify ecosystem and species-specific conservation actions to protect the species.

Charleston draba

Charleston draba is endemic to the Spring Mountains. For information on status and threats, refer to *Status of the Species Rangewide*. The species is managed under the direction of the Spring Mountains NRA GMP and CA, which identify ecosystem and species-specific conservation actions to protect the species.

Pahrump Valley (forked) buckwheat

In Clark County, Pahrump Valley buckwheat occurs in Sandy Valley, along the state line adjacent to San Bernardino County, California. For information on status and threats, refer to *Status of the Species - Rangewide*. Where it occurs in mesquite woodlands, Pahrump Valley buckwheat is managed under the BLM's Mesquite Woodland HMP. Elsewhere, in the Permit Area, the species and its habitat are managed under the general direction and sensitive species management guidelines of the BLM RMP.

Inch high fleabane

In Clark County, the inch high fleabane is known from the Spring Mountains and Sheep Range. In the Spring Mountains, it occurs at elevations of 2,200 to 3,500 m (7,200 to 11,500 ft) in Kyle, Lee, Fletcher, and Carpenter canyons and in Deer Creek, where it is found in vertical faces of limestone cliffs and large boulders in bristlecone pine, mixed conifer, pinyon-juniper, and sagebrush communities. Dispersed recreation such as rock climbing, particularly in Lee Canyon, Kyle Canyon, and the Deer Creek area, is a threat to the species. For more information on status and threats, refer to *Status of the Species - Rangewide*. The inch high fleabane is managed under the direction of the Spring Mountains NRA GMP and CA, which identify ecosystem and species-specific conservation actions to protect the species.

Clokey greasebush

Clokey greasebush is endemic to the Spring Mountains. For information on status and threats, refer to *Status of the Species - Rangewide*. The species is managed under the direction of the Spring Mountains NRA GMP and CA, which identify ecosystem and species-specific conservation actions to protect the species.

Smooth pungent (dwarf) greasebush and pungent dwarf greasebush

In Clark County, this species occurs in the Spring Mountains and Sheep Range. For information on status and threats, refer to *Status of the Species - Rangewide*. Both subspecies of greasebush are managed under the direction of the Spring Mountains NRA GMP and CA, which identify ecosystem and species-specific conservation actions to protect the species. Pungent dwarf greasebush is also managed under the general direction and sensitive species management guidelines of DNWR.

Red Rock Canyon aster

In Clark County, the entire range of the Red Rock Canyon aster falls within the Red Rock Canyon NCA. For information on status and threats, refer to *Status of the Species - Rangewide*. The species and its habitat are managed under the general direction and sensitive species management guidelines of the Red Rock Canyon NCA GMP.

Hidden ivesia

Hidden ivesia is endemic to the Spring Mountains. For information on status and threats, refer to *Status of the Species - Rangewide*. The species is managed under the direction of the Spring Mountains NRA GMP and CA, which identify ecosystem and species-specific conservation actions to protect the species.

Jaeger ivesia

Within the Permit Area, Jaeger ivesia is known from the Spring Mountains and Red Rock Canyon. The most common plants associated with Jaeger ivesia include, small-leaf mock orange (*Philadelphus microphyllus*), rock spirea, and Clokey greasebush. Other species proposed for coverage under the MSHCP often documented with this species at lower and middle elevation sites include inch high fleabane, Clokey thistle, and smooth pungent (dwarf) greasebush.

Dispersed and concentrated recreational activities such as hiking and camping, particularly in the Mary Jane Falls, Echo Cliff, Deer Creek, and Robbers Roost areas where habitat is accessible, are the most significant threats to the species. Habitat modification and individual displacement by rock climbing in popular climbing areas on the east side of the Spring Mountains, and trail construction and maintenance are also of concern. The species is managed under the direction of the Spring Mountains NRA GMP and CA, which identify ecosystem and species-specific conservation actions to protect the species.

Hitchcock bladderpod

Habitat for the Hitchcock bladderpod in Clark County includes alpine, bristlecone pine, and mixed conifer communities in the Spring Mountains and Sheep Range. In the Spring Mountains, it occurs in the vicinity of the Charleston Loop and South Loop trails, Kyle Canyon, Big Falls, and Mummy Mountain. For further discussion on status and threats, refer to *Status of the Species - Rangewide.*

The species is managed under the direction of the Spring Mountains NRA GMP and CA, which identify ecosystem and species-specific conservation actions to protect the species, and under the general direction and sensitive species management guidelines of the DNWR.

Charleston pinewood lousewort

The entire range of the Charleston pinewood lousewort falls within Clark County, where it occurs in the Spring Mountains and Sheep Range. For information on status and threats, refer to *Status of the Species - Rangewide.* The species is managed under the direction of the Spring Mountains NRA GMP and CA, which identify ecosystem and species-specific conservation actions to protect the species, and under the general direction and sensitive species management guidelines of the DNWR.

White-margined beardtongue

Within Clark County 15 populations of white-margined beardtongue are documented in Hidden, Jean Lake, and Roach Lake valleys. It occurs in Mojave Desert scrub and to a lesser extent in blackbrush communities, on sand deposits on the leeward side of dry lake beds between 460 and 1,100 m (1,500 and 3,600 ft) in elevation in flat wash bottoms of outwash canyons and occasionally on slopes above them. This species is dependent on the maintenance of the sand transport system from dry lake beds toward lower slopes. Associated plant species include creosote bush, white bursage, winterfat, Indian rice grass and galleta grass (*Hilaria rigida*).

Threats to the species within the Permit Area include development of Hidden Valley, OHV activity, road maintenance along I-15, potential development of an airport and other facilities in Jean, interruption of sand transport from airport development, and utility corridor maintenance and construction. There is no specific management plan in place for white-margined beardtongue in the Permit Area. The species and its habitat are managed under the general direction and sensitive species management guidelines of the BLM RMP.

Charleston beardtongue

Charleston beardtongue is endemic to the Spring Mountains. Charleston beardtongue often co-occurs with several other plant species proposed for coverage under the MSHCP including Hitchcock bladderpod and Clokey paintbrush. For information on status and threats, refer to *Status of the Species - Rangewide.* The species is managed under the direction of the Spring

Mountains NRA GMP and CA, which identify ecosystem and species-specific conservation actions to protect the species.

Jaeger beardtongue

The entire range of the Jaeger beardtongue falls within Clark County, where it occurs in the Spring Mountains and Sheep Range. For information on status and threats, refer to *Status of the Species - Rangewide*. The species is managed under the direction of the Spring Mountains NRA GMP and CA, which identify ecosystem and species-specific conservation actions to protect the species, and under the general direction and sensitive species management guidelines of the DNWR.

Parish's phacelia

In the Permit Area, *Parish's phacelia* has been documented from two very small sites in Sixmile Springs near Pahrump, a 1,400-acre site just north of Apex, and in the Indian Springs and Three Lakes valleys near the Pintwater Range. These sites occur on private lands, undesignated BLM lands, and Nellis Air Force Range and DNWR lands. A historic population in Las Vegas Valley is apparently extirpated (Smith 1998). For additional information on status and threats, refer to *Status of the Species - Rangewide*. There is no specific management plan in place for the Parish's phacelia within the Permit Area. The species and its habitat are managed under the general direction and sensitive species management guidelines of the BLM RMP and DNWR.

Clokey mountain sage

The entire range of the Clokey mountain sage falls within Clark County, where it occurs in the Spring Mountains and Sheep Range. For information on status and threats, refer to *Status of the Species - Rangewide*. The species is managed under the direction of the Spring Mountains NRA GMP and CA, which identify ecosystem and species-specific conservation actions to protect the species, and under the general direction and sensitive species management guidelines of the DNWR.

Clokey catchfly

Clokey catchfly is endemic to the Spring Mountains. For information on status and threats, refer to *Status of the Species - Rangewide*. The species is managed under the direction of the Spring Mountains NRA GMP and CA, which identify ecosystem and species-specific conservation actions to protect the species.

Charleston tansy

Charleston tansy is endemic to the Spring Mountains. Charleston tansy often co-occurs with several other plant species proposed for coverage under the MSHCP including Hidden ivesia and inch high fleabane. For information on status and threats, refer to *Status of the Species -*

Rangewide. The species is managed under the direction of the Spring Mountains NRA GMP and CA, which identify ecosystem and species-specific conservation actions to protect the species.

Charleston kittentails

Charleston kittentails is endemic to the Spring Mountains. For information on status and threats, refer to *Status of the Species - Rangewide*. The species is managed under the direction of the Spring Mountains NRA GMP and CA, which identify ecosystem and species-specific conservation actions to protect the species.

Charleston grounddaisy

In Clark County, the Charleston grounddaisy occurs primarily in the Spring Mountains on approximately 15 ac of habitat, and in one known location in the Sheep Range. For information on status and threats, refer to *Status of the Species - Rangewide*. The species is managed under the direction of the Spring Mountains NRA GMP and CA, which identify ecosystem and species-specific conservation actions to protect the species, and under the general direction and sensitive species management guidelines of the DNWR.

Limestone (Charleston) violet

Within Clark County, limestone violet occurs in the in the Virgin Mountains, Sheep Range, and in the Spring Mountains, at Mud Spring, Lee Canyon, and Deer Creek. For information on status and threats, refer to *Status of the Species - Rangewide*. The species is managed under the direction of the Spring Mountains NRA GMP and CA, which identify ecosystem and species-specific conservation actions to protect the species, and under the general direction and sensitive species management guidelines of the DNWR and the BLM RMP.

Anacolia menziesii

In Clark County, *Anacolia menziesii* is presently known only from a single location in Red Rock Canyon. For information on status and threats refer to *Status of the Species-Rangewide*. The species is managed under the general direction and sensitive species management guidelines of the Red Rock Canyon NCA GMP.

Claopodium whippleanum

In Clark County, *Claopodium whippleanum* is known only from Red Rock Canyon. For information on status and threats refer to *Status of the Species-Rangewide*. The species is managed under the general direction and sensitive species management guidelines of the Red Rock Canyon NCA GMP.

Dicranoweisia crispula

In Clark County, *Dicranoweisia crispula* is known only from Lee Canyon, in the Spring Mountains. For information on the status and threats refer to *Status of the Species-Rangewide.* While not specifically included in the Spring Mountains NRA CA, this species is managed under the general direction and sensitive species management guidelines of the Spring Mountains NRA GMP.

Syntrichia princeps

In Clark County, *Syntrichia princeps* is presently known only from the Virgin Mountains and Red Rock Canyon. For information on the status and threats refer to *Status of the Species-Rangewide.* This species is managed under the general direction and sensitive species management guidelines of the Red Rock Canyon NCA GMP and BLM RMP.

EFFECTS OF THE ACTION

Although the Act primarily focuses on conservation and recovery of listed species and critical habitat, section 2(b) of the Act provides for protection and conservation of ecosystems on which federally-listed threatened and endangered species depend. Each of the 11 ecosystems identified in the MSHCP/EIS and this Opinion, of which the Covered Species are an integral part, consist of dynamic complexes of plant, animal, fungal, and microorganism communities and their associated nonliving environment interacting as an ecological unit (Noss and Cooperrider 1994). Most actions which adversely affect components of the ecosystem, directly or indirectly, affect the Covered Species.

The effects of the Covered Activities include both direct and indirect adverse effects, as well as beneficial effects that would be derived from implementation of the MSHCP conservation strategy. A direct effect of the action is the disturbance or destruction of up to 145,000 acres of habitat, over a 30-year period, on non-Federal lands within Clark County, including Federal lands identified for disposal by the BLM and areas affected by NDOT activities in Clark, Lincoln, Esmeralda, Mineral, and Nye counties below the 38th parallel. Most of this loss would occur within the lower elevation habitats, in particular, the Mojave Desert scrub. Indirect effects of the action would occur on Federal lands.

As the human population of the County increases, it is assumed that there will be a resultant increase in the amount of recreational and other uses of BLM, NPS, USFS, and Refuge lands, in the IMAs, LIMAs, and MUMAs. However, the Service has determined that a sufficient quantity and quality of suitable habitat for each Covered Species exists, and will continue to exist following issuance of the Permit, within the Permit Area, primarily in IMAs and LIMAs, and in MUMAs to the extent necessary to maintain connectivity within the reserve system. This determination is based on the following: 1) The status of the Covered Species, including distribution and abundance, and the ecosystems upon which they depend, 2) the areas included in UMAs and to a lesser degree, MUMAs, relative to conserved areas (i.e., IMAs and LIMAs), 3) most Covered Activities would occur in the Mojave desert scrub ecosystem which includes approximately 3.2 million ac, and 4) the implementation of measures proposed in the *Description of the Proposed Action* and MSHCP. The use of IMAs, LIMAs, and MUMAs by the increased human population, which are not Covered Activities, are generally expected to degrade or destroy habitat, and harass or otherwise disturb the Covered Species that occur there; however, the conservation measures carried out under the MSHCP would minimize these adverse effects.

Overall, the proposed action will also result in beneficial effects to the ecosystems and Covered Species, through implementation of minimization, mitigation, and other conservation measures. The relative magnitude of direct, indirect, and beneficial effects anticipated as a result of Covered Activities following implementation of proposed measures including special terms and conditions of the Permit, is summarized for each of the Covered Species in Table 17. A subset of those measures include the continuation and augmentation of measures proposed and implemented during the DCP for the desert tortoise. Many of the measures are subject to future decisions made pursuant to the AMP and may or may not be funded during the entire 30-year term of the proposed Permit. However, because the DCP and the MSHCP have been integrated

into one plan, the measures proposed in the MSHCP/EIS are intended to supersede and replace those set forth in the DCP.

The management of Covered Species is evaluated and summarized in Table 17. The net change in the level of management was determined by comparing the baseline (existing) management level which is occurring under the DCP (see *Status of the Species in the Action Area*), with anticipated changes in management following issuance of the Permit and implementation of the MSHCP. No net change would be expected for Covered Species such as the desert tortoise (federally threatened with critical habitat) or species endemic to the Spring Mountains, that are currently managed at a relatively high level under a recovery plan or CA which would continue under the MSHCP. Other species such as the relict leopard frog would benefit from increased management under the MSHCP and Permit. The overall effect to each Covered Species may be determined by comparing the adverse and beneficial effects to the net change in management under the MSHCP (Table 17). Those Covered Species with *low* to *moderate* levels of adverse effects and *moderate* to *high* levels of beneficial effects, combined with a *high* level of management are considered the most conserved and secure group of Covered Species. In contrast, those species with *moderate* to *high* levels of adverse effects would require *moderate* to *high* beneficial effects and increased levels of management to be considered adequately conserved under the MSHCP.

As part of the MSHCP process, Federal and State land and resource managers may ultimately implement approximately 650 specific conservation actions, as described in section 2.8 and Appendix A of the MSHCP. These actions, grouped into the general categories of public education, research, monitoring, inventory, protective measures, restoration and enhancement measures, and land use policies and actions, would be carried out on lands under Federal management. These actions will be accomplished under existing Federal resource management plan guidance and direction and in accordance with the various recovery and conservation plans and agreements within the Permit Area, including the Desert Tortoise Recovery Plan, the Mesquite Woodland Habitat Management Plan (MSHCP Appendix D), Upper Muddy River Site Conservation Plan (MSHCP Appendix E), MOA for the Las Vegas bearpoppy (MSHCP Appendix F), Spring Mountains NRA CA (MSHCP Appendix G), and Blue Diamond Cholla CA (MSHCP Appendix H).

Table 17. Summary of Effects of the Proposed Action on Covered Species

SPECIES	MAGNITUDE OF EFFECT ON COVERED SPECIES[1] Adverse Effects: Direct[2]	Indirect[3]	Beneficial effects[4]	MANAGEMENT LEVEL[5] Baseline (DCP)	Under MSHCP	Net Change
Mammals						
Silver-haired bat	L	L	M	2	2	0
Long-eared myotis	L	L	M	3	3	0
Long-legged bat	L	L	M	3	3	0
Palmer's chipmunk	L	L/M	H	3	3	0
Birds						
Southwestern willow flycatcher	L/M	M	H	2	3	+ 1
Yellow-billed cuckoo	L	L/M	M	2	3	+ 1
American peregrine falcon	L	L	L	2	2	0
Blue grosbeak	L/M	M	M/H	2	3	+ 1
Phainopepla	M	M	H	2	3	+ 1
Summer tanager	L	L	M	1	3	+ 2
Vermilion flycatcher	L/M	M	M/H	2	3	+ 1
Arizona Bell's vireo	L/M	M	M/H	2	3	+ 1
Reptiles						
Desert tortoise	M	M	H	3	3	0
Banded gecko, desert ssp.	L	L	M	1	2	+1
Banded gecko, Utah ssp.	L	L	M	1	2	+ 1
Desert iguana	M	M	M	1	2	+ 1
Western red-tailed skink	L	L	H	1	2	+ 1
Leopard lizard	M	M	M	1	2	+ 1
Collared lizard	M	M	M	1	2	+ 1
California kingsnake	L	L	M	1	2	+ 1
Glossy snake, Mojave ssp.	L	L	M	1	2	+ 1
Glossy snake, desert ssp.	L	L	M	1	2	+ 1
Long-nosed snake	L	L	M	1	2	+ 1
Western leaf-nosed snake	L	L	M	1	2	+ 1
Sonoran lyre snake	L	L	M	1	2	+ 1
Sidewinder	L	L	M	1	2	+ 1
Speckled rattlesnake, SW ssp.	L	L	M	1	2	+ 1
Speckled rattlesnake, Panamint ssp.	L	L	M	1	2	+ 1
Mojave green rattlesnake	L	L	M	1	2	+ 1
Amphibian						
Relict leopard frog	L	L	H	2	3	+ 1
Invertebrates						
Dark blue butterfly	L	M	H	3	3	0
Spring Mtns. icarioides blue	L	M	H	3	3	0

Table 17 (cont.)	MAGNITUDE OF EFFECT ON COVERED SPECIES[1]			MANAGEMENT LEVEL[5]		
	Adverse Effects:					
SPECIES	Direct[2]	Indirect[3]	Beneficial effects[4]	Baseline (DCP)	Under MSHCP	Net Change
Mt. Charleston blue butterfly	L	M	H	3	3	0
Spring Mtns. acastus checkerspot	L	M	H	3	3	0
Morand's checkerspot	L	M	H	3	3	0
Carole's silverspot	L	M	H	3	3	0
Nevada admiral	L	M	H	3	3	0
Spring Mtns. comma skipper	L	M	H	3	3	0
Spring Mtns. springsnail	L	M	H	3	3	0
Southeast Nevada springsnail	L	M	H	3	3	0
Vascular Plants						
Clokey eggvetch	L	M	H	3	3	0
Blue Diamond cholla	L	L	M	3	3	0
Rough angelica	L	M	H	3	3	0
Sticky ringstem	L	M	M	3	3	0
Charleston pussytoes	NONE	L	H	3	3	0
Las Vegas bearpoppy	M	M	M	3	3	0
White bearpoppy	M	M	H	2	3	+1
Rosy king sandwort	L	M	H	3	3	0
Clokey milkvetch	L	M	H	3	3	0
Threecorner milkvetch	L	M	H	2	3	+1
Spring Mtns. milkvetch	L	M	H	3	3	0
Alkali mariposa lily	M	M	M	2	3	+1
Clokey paintbrush	L	M	H	3	3	0
Clokey thistle	L	M	H	3	3	0
Jaeger whitlowgrass	NONE	L	H	3	3	0
Charleston draba	L	M	H	3	3	0
Inch high fleabane	L	M	H	3	3	0
Pahrump Valley buckwheat	L	M	M	2	3	+1
Sticky buckwheat	L	M	H	2	3	+1
Clokey greasebush	L	M	H	3	3	0
Smooth pungent greasebush	L	M	H	3	3	0
Pungent greasebush	L	M	H	3	3	0
Red Rock Canyon aster	L	M	H	2	2	0
Hidden ivesia	NONE	L	H	3	3	0
Jaeger ivesia	L	M	H	3	3	0
Hitchcock bladderpod	L	M	H	3	3	0
Charleston pinewood lousewort	L	M	H	3	3	0
White-margined beardtongue	L	M	H	2	3	+1

Table 17 (cont.)	MAGNITUDE OF EFFECT ON COVERED SPECIES[1]			MANAGEMENT LEVEL[5]		
	Adverse Effects:					
SPECIES	Direct[2]	Indirect[3]	Beneficial effects[4]	Baseline (DCP)	Under MSHCP	Net Change
Charleston beardtongue	L	M	H	3	3	0
Jaeger beardtongue	L	M	H	3	3	0
Parish's phacelia	L	M	H	2	3	+1
Clokey mountain sage	L	M	H	3	3	0
Clokey catchfly	NONE	L	H	3	3	0
Charleston tansy	NONE	L	H	3	3	0
Charleston kittentails	NONE	L	H	3	3	0
Charleston grounddaisy	L	M	H	3	3	0
Limestone violet	L	M	M	3	3	0
Non-vascular Plants						
Anacolia menziesii	NONE	L	M	1	2	+1
Claopodium whippleanum	NONE	L	M	1	2	+1
Dicranoweisia crispula	NONE	L	M	1	2	+1
Syntrichia princeps	NONE	L	M	1	2	+1

[1]Magnitude of effect on the Covered Species refers to the level of effects, both adverse and beneficial, that result from implementation of the *Description of the Proposed Action*. The net effect to the Covered Species following implementation of the Proposed Action should be beneficial.

[2]Direct adverse effects encompass the immediate effect of the proposed action on the Covered Species or its habitat in UMAs:

High level (*H*): Effects result in extensive loss of individuals or their habitat across a substantial portion of UMAs
Medium level (*M*): Effects result in localized loss of individuals or their habitat in UMAs
Low level (*L*): Effects do not result in loss of individuals or their habitat, or result in occasional or localized loss but do not diminish the status of the species in the Permit Area

[3]Indirect adverse effects are not a direct result of, but may occur as a consequence of, the Proposed Action:

H: Affects the status of the Covered Species across a substantial portion of the species' habitat within the Permit Area
M: Affects the status of the Covered Species within a limited portion of the species' habitat within the Permit Area
L: Affects the status of the Covered Species within a small, localized portions of the species' habitat within the Permit Area

[4]Beneficial effects enhance or improve the status of the species in the Permit Area:

H: Conservation actions included within the Proposed Action improve the status of the Covered Species across a substantial portion of the species' habitat
M: Conservation actions improve the status of the Covered Species across a limited portion of the species' habitat
L: Conservation actions improve the status of the Covered Species across a small, localized portion of the species' habitat

[5]Management level:

1. General management: Management provided under existing resource management plans or state regulations resulting in some conservation and protection of the species.
2. Moderate level of management: Same as 1 above with enhanced management through targeted agency actions (e.g., inventory and monitoring).
3. High level of management: Same as 1 or 2 above with additional conservation and protection provided through a CA, species/habitat management plan, or recovery plan (desert tortoise).

The Service and Applicants recognize that it would be neither necessary nor feasible to carry out all proposed conservation actions in the initial years of the Permit period. Immediate conservation needs of the Covered Species have been identified and would be initially funded through the first biennial budget of the Permit. These measures, in conjunction with conservation actions carried out under existing resource management agency budgets and conservation programs, would minimize and mitigate the adverse effects of the proposed action during the initial years of the Permit. As described under *Description of the Proposed Action*, as conditions in Clark County and the overall status of species change, the adaptive management program would gauge the effectiveness of existing conservation measures, and propose additional or alternative conservation measures, or eliminate those measures determined to be unnecessary, as the need arises, to deal with changed circumstances.

Effects of the proposed action on the 11 ecosystems identified in Clark County and the Covered Species that occur within these ecosystems are described below. Each ecosystem discussion describes effects to the Covered Species at the ecosystem-level (*Effects to the Ecosystem*) and at the species level (*Effects to the Covered Species that Primarily Occur in [Each] Ecosystem*). Most of the direct habitat loss and disturbance is expected to occur at lower elevations, within the Mojave Desert scrub, salt desert scrub, and blackbrush ecosystems. However, given that non-Federal lands are present within all except the alpine ecosystem, the ecosystem effects analyses are based on the worst case scenario. For example, given the approximately 1,500 acres of non-federal lands within the mixed conifer forest ecosystem, the effects analysis assumes that all of this area would be subject to direct habitat loss and disturbance.

Because most Covered Species occur in more than one ecosystem, effects to each Covered Species are discussed in the ecosystem that provides its primary habitat within the Permit Area (Primary Ecosystem), as identified in Table 3. Additional ecosystem-level effects to Covered Species that may occur outside their Primary Ecosystems are discussed in the respective sections on those ecosystems. Except as otherwise noted, effects to the covered species are limited to those occurring at the ecosystem-level. Specific threats to a given Covered Species that are not addressed at the ecosystem-level are discussed in the *Effects to the Covered Species* section. Because of the ubiquitous nature of bats, effects of the proposed action on this taxonomic group is discussed in its own section.

Alpine Ecosystem

Effects to the Ecosystem

Direct Effects: Approximately 500 ac of alpine habitat occur in the Permit Area. The extent of the ecosystem occurs entirely within IMAs in the Spring Mountains NRA, including portions of the Mt. Charleston Wilderness and Carpenter Canyon RNA. There are no private lands within this habitat type. The alpine ecosystem is, therefore not expected to be directly affected by the proposed action.

Indirect Effects: Visitor use of the Spring Mountains alpine zone, while at moderate levels today, would increase in the future as the population of Clark County continues to grow. There are no roads into this area, thus all visitation would be by hiking or equestrian travel. Mechanized travel into the area, including mountain bicycle use, while not permitted under the wilderness designation of this area, is likely to increase. There would also be an increase in the amount of overnight use, which would be concentrated in the more accessible portions of the area.

As a result of increased visitation to the alpine ecosystem, the condition of the most easily accessible areas would undergo habitat degradation over time. Adverse effects may include compacted soils, loss of vegetation cover, increased erosion, and altered hydrology. The spread of noxious weeds may also increase as a result of disturbance of soil surfaces and displacement of native vegetation.

Effects to Covered Species That Primarily Occur in the Alpine Ecosystem

Plants: Charleston pussytoes, Jaeger whitlowgrass, hidden ivesia, Clokey catchfly, Charleston tansy, Charleston kittentails

All of these plants are endemic to the Spring Mountains. Because the lands that support these species are managed as IMAs, there will not be any direct impacts to the species. In addition to the ecosystem level effects described above, these plant species may also be subject to trampling or crushing of seedlings and adult plants by hikers and equestrians, or unlawful use of the wilderness for mechanized travel. Increased human activities in the alpine ecosystem may also result in spread of noxious weeds, particularly common dandelion, which may compete with native plants, including the Covered plant species.

Effects to Other Covered Species That Occur in the Alpine Ecosystem

The alpine ecosystem is one of several of the primary ecosystems for Morand's checkerspot. Effects to this species are covered in the bristlecone pine ecosystem section (the ecosystem in which it more commonly occurs). Other Covered Species that occur in the alpine ecosystem, but whose primary habitats occur in other ecosystems, are Clokey thistle, Charleston draba, and Hitchcock bladderpod. In general, the ecosystem-level and species-specific threats described above, and in the discussion of species-specific threats under their primary ecosystem are applicable to these species, however, given the remoteness and roadless quality of the alpine ecosystem, the magnitude of effects on these species would tend to be less than what would be experienced in the other ecosystems.

Proposed Measures to Mitigate and Minimize Effects to the Alpine Ecosystem Including Effects to Covered Species

Conservation actions proposed under the MSHCP for the alpine ecosystem and its Covered Species, would supplement ongoing conservation activities being carried out by the USFS and its partners under the Spring Mountains NRA GMP and CA (refer to MSHCP Appendix A,

section 3.5). In the first biennium, MSHCP measures that would benefit the alpine ecosystem and Covered Species include public information and education (1.a.) agency public education projects (1.c.), and enhanced law enforcement and ranger capabilities on Federal lands (5.d.), as described under *Description of the Proposed Action*. These measures should address the ecosystem- and species-level threats to the Covered Species occurring in the alpine habitat in the initial years of the Permit. The AMP would gauge the effectiveness of existing conservation measures, and propose additional, or alternative conservation measures, as determined necessary, and to deal with changed or unforeseen circumstances.

Summary of Effects to the Alpine Ecosystem and Covered Species

The alpine ecosystem provides habitat for 10 Covered Species, including 7 species which occur primarily within alpine habitat, and 8 species that are endemic to the Permit Area. There would be no direct effects on the alpine habitat as it is completely under Federal management on lands managed as IMAs. Any adverse effects on the alpine ecosystem and its Covered Species would occur indirectly as a result of human population growth in the Permit Area and the resultant increase in recreational use of federal lands.

Conservation measures would be undertaken to preserve the reserve characteristics of the 500 ac of alpine habitat within IMAs on lands under the management authority of the USFS Spring Mountains NRA. Landscape-level effects of the Proposed Action on the alpine ecosystem and population-level effects to Covered Species are generally expected to be positive. Implementation of the conservation measures would occur under both the MSHCP (as described above and in the MSHCP, Appendix A, section 3.5), and the existing Spring Mountains NRA GMP. These actions would more than offset the adverse effects of the proposed action on the alpine ecosystem and Covered Species that occur there, allowing viable populations of the Covered Species to persist within the Permit Area.

In making this determination the following factors were taken into consideration: (1) Rangewide and Action Area status of each of the species occurring in the alpine ecosystem (Table 16), (2) importance of the Permit Area for each of the species within the alpine ecosystem (Table 16), (3) direct, indirect, and beneficial effects of the Proposed Action on each of the species occurring in the alpine ecosystem (Table 17), and, (4) the net change in the management level of these species as a result of the Proposed Action, including the proposed MSHCP conservation measures, special terms and conditions of the Permit, and management actions carried out under existing agency plans (Table 17).

Bristlecone Pine Ecosystem

Effects to the Ecosystem

Direct Effects: Approximately 15,800 ac of bristlecone pine habitat occur within the Permit Area. The MSHCP indicates that the majority of the habitat occurs within IMAs or LIMAs (14,800 ac or 89 percent of the total) in the Spring Mountains NRA, including portions of the Mt. Charleston Wilderness and Carpenter Canyon RNA. The MSHCP also indicates that the

proposed action could result in the loss of up to 1,000 ac (6.3 percent) of bristlecone pine habitat on private lands in UMAs, however, most or all of these lands have been or will be acquired by the USFS. As a result, most of the private lands occurring within the bristlecone pine ecosystem have reverted or will revert to IMA status.

Indirect Effects: Visitor use of the bristlecone pine ecosystem will increase in the future as the population of Clark County continues to grow. There are several roads into the area and therefore, mechanized travel into the area, including mountain bicycle use, is likely to increase. There would also be an increase in overnight use, which would be concentrated in the more accessible portions of the area.

As a result of increased visitation to the bristlecone pine ecosystem, the condition of the most easily accessible areas may undergo habitat degradation over time. Adverse effects may include compacted soils, loss of vegetation cover, increased erosion, altered and more frequent fire regimes, and altered hydrology. The spread of noxious weeds may also increase as a result of disturbance of soil surfaces and displacement of native vegetation.

Effects to Covered Species That Primarily Occur in the Bristlecone Pine Ecosystem

Butterflies: Mt. Charleston blue butterfly, Morand's checkerspot butterfly

Because the lands that support these species are managed as IMAs, or will be placed under IMA management in the near future, no direct impacts are expected to occur to these species. These butterflies are dependent upon specific host plant species, including Torrey milkvetch (larval and nectar host for the Mt. Charleston blue), paintbrush (larval host of the Morand's checkerspot), and desert wallflower (nectar host of the Morand's checkerspot). Indirect impacts to the vegetation from trampling or crushing could result in declines in butterfly populations and reductions in suitable habitat, and increased competition from the spread of noxious weeds in its habitat.

Plants: Charleston draba, Charleston beardtongue, Clokey paintbrush, Jaeger ivesia, and Hitchcock bladderpod

Because the lands that support these species are managed as IMAs, or will be placed under IMA management in the near future, no direct impacts are expected to occur to these plant species. In addition to the ecosystem level effects described above, these species may be subject to the indirect effects of trampling or crushing of seedlings and adult plants by hikers, equestrians, and motorized or non-motorized vehicles. Increased human activities in the bristlecone pine ecosystem could also result in spread of noxious weeds, which may compete with native plants, including the Covered plant species.

Effects to Other Covered Species That Occur in the Bristlecone Pine Ecosystem

The bristlecone pine ecosystem is one of several of the primary ecosystems for the Nevada admiral. Effects to this species are covered in the springs ecosystem discussion (the ecosystem

in which it most commonly occurs). Covered Species that occur in the bristlecone pine ecosystem, but whose primary habitats occur in other ecosystems, are long-eared myotis, long-legged myotis, silver-haired bat, Palmer's chipmunk, dark blue butterfly, Spring Mountains icarioides blue butterfly, Spring Mountains acastus checkerspot, Spring Mountains comma skipper, Carole's silverspot, Charleston pussytoes, Jaeger whitlowgrass, hidden ivesia, Clokey catchfly, Charleston tansy, Charleston kittentails, rosy King sandwort, Clokey thistle, Charleston pinewood lousewort, Clokey mountain sage, and Charleston grounddaisy. Direct effects from development in UMAs are not anticipated since most of these areas are or should revert to IMA status in the near future. In general, the ecosystem-level and species-specific threats described above and in the discussion of species-specific threats under their primary ecosystem or, in the case of bats, under the bats effects section, are applicable to these species. Given the remoteness and roadless quality of much of the bristlecone pine ecosystem, the magnitude of effects on these species would tend to be less than what would be experienced in the lower elevation ecosystems.

Proposed Measures to Mitigate and Minimize Effects to the Bristlecone Pine Ecosystem Including Effects to Covered Species

Conservation actions proposed under the MSHCP for the bristlecone pine ecosystem and its Covered Species, would supplement ongoing conservation activities being carried out by the USFS and its partners under the Spring Mountains NRA GMP and CA (refer to MSHCP Appendix A, section 4.5). In the first biennium, MSHCP measures that would benefit the bristlecone pine ecosystem and Covered Species include public information and education (1.a.), research on Palmer's chipmunk genetics (2.c.), Palmer's chipmunk monitoring (4.c.), enhanced law enforcement and ranger capabilities on Federal lands (5.d.), and the predator control program (5.e.) as described under *Description of the Proposed Action*. These measures should address the ecosystem- and species-level threats to the Covered Species occurring in the bristlecone pine habitat in the initial years of the Permit. The AMP would gauge the effectiveness of existing conservation measures, and propose additional, or alternative conservation measures, as determined necessary, and to deal with changed or unforeseen circumstances.

Summary of Effects to the Bristlecone Pine Ecosystem and Covered Species

The bristlecone pine ecosystem provides habitat for 28 Covered Species, 8 of which primarily occur in the bristlecone pine ecosystem, and 19 of which are endemic to the Permit Area. There is unlikely to be any direct effect on the bristlecone pine ecosystem or the Covered Species that occur there, as most of the UMA lands in this ecosystem have been or soon will be reverted to Federal land management status. Adverse effects on the bristlecone pine ecosystem would occur indirectly as result of human population growth in the Permit Area and the associated increase in recreational use of Federal lands.

Under the MSHCP, conservation measures would be undertaken to preserve the reserve characteristics of the 4,800 ac of bristlecone pine habitat within IMAs and LIMAs on lands under the management authority of the USFS Spring Mountains NRA and DNWR (see *Environmental Baseline*, Table 5). Landscape-level effects to the ecosystem and population-level effects to Covered Species are generally expected to be positive. Implementation of the conservation

measures would occur under both the MSHCP (as described above and in the MSHCP, Appendix A, section 4.5), the Spring Mountains NRA GMP, and DNWR management policies. These actions would more than offset the adverse effects of the proposed action on the bristlecone ecosystem and Covered Species that occur there, allowing viable populations of the Covered Species occurring within the bristlecone pine ecosystem to persist within the Permit Area.

In making this determination the following factors were taken into consideration: (1) Rangewide and Action Area status of each of the species occurring in the bristlecone pine ecosystem (Table 16), (2) importance of the Permit Area for each of the species within the bristlecone pine ecosystem (Table 16), (3) direct, indirect, and beneficial effects of the Proposed Action on each of the species occurring in the bristlecone pine ecosystem (Table 17), and, (4) the net change in the management level of these species as a result of the Proposed Action, including the proposed MSHCP conservation measures, special terms and conditions of the Permit, and management actions carried out under existing agency plans (Table 17).

Mixed Conifer Ecosystem

Effects to the Ecosystem

Direct Effects: Approximately 56,400 ac of mixed conifer forest occur within the proposed Permit Area; including 46,100 ac (81.8 percent) of habitat occur within IMAs in the Spring Mountains NRA and DNWR, and 8,800 ac (15.6 percent) in LIMAs on the Spring Mountains NRA. The proposed action could result in the loss or fragmentation of up to 1,500 ac (2.6 percent) of mixed conifer habitat on private lands in UMAs, mostly in the Kyle and Lee canyon areas on the east side of the Spring Mountains.

Indirect Effects: Visitor use of the mixed conifer ecosystem will increase in the future as the population of Clark County continues to grow. There are many roads into the area and therefore, mechanized travel into the area is likely to increase. Many of the campgrounds and day use facilities in the Spring Mountains NRA are located in the mixed conifer ecosystem. Increased use of these facilities will likely degrade the habitat in the immediately adjacent areas.

Adverse effects to the mixed conifer ecosystem that may result from increased recreational use of the area include compacted soils, loss of vegetation cover, increased erosion, altered and more frequent fire regimes, and altered hydrology. The spread of noxious weeds may also increase as a result of disturbance of soil surfaces and displacement of native vegetation. Plant mortality and fragmentation of habitat may occur as a result of road and trail use in the ecosystem.

Effects to Covered Species That Primarily Occur in the Mixed Conifer Ecosystem

Palmer's chipmunk

In addition to the ecosystem-level effects discussed above, Palmer's chipmunk may be adversely affected by increased predation from feral and domestic animals in the Spring Mountains. Palmer's chipmunk may be particularly susceptible to increased recreational activities. Most

human activities tend to concentrate in cooler canyon bottoms close to riparian areas, which is also preferred chipmunk habitat. Increased recreational activity and motorized travel may increase levels of mortality from road kill. Removal of woody debris from wood gathering activities or wildfire, loss of ground cover from trampling, and loss of water sources from diversions, may degrade essential chipmunk habitat such as cover sites for protection from predators and den sites. The effects of repeated disturbance of favored chipmunk habitat are not well understood, although it has been observed that chipmunk abundance is depressed in those areas that receive high levels of human use.

Carole's silverspot

This species is dependent upon specific host plant species, including Charleston limestone violet (larval host), and Arizona thistle, desert wallflower, and wood rose (nectar hosts). Thus, impacts to the vegetation could result in declines in butterfly populations and reductions in available suitable habitat. Host plant populations occurring in UMAs could be lost or fragmented as a result of the private land development, particularly in Kyle Canyon. Large scale losses of silverspot populations or habitat are not expected given that very little of the mixed conifer ecosystem occurs within UMAs. The Carole's silverspot may also be adversely affected by increased recreational use of its habitat. In addition to the ecosystem level effects described above, the host plant of this species may be subject to trampling or crushing of seedlings and adult plants, or competition through the spread of noxious weeds in its habitat.

Vascular plants: Rosy King sandwort, Clokey thistle, Clokey greasebush, Clokey eggvetch, inch high fleabane, Red Rock Canyon aster, Charleston pinewood lousewort, Jaeger beardtongue, Clokey mountain sage, Charleston grounddaisy, limestone violet

Plant populations occurring in UMAs could be lost or fragmented as a result of private land development. However, large scale losses of plant populations are not expected given that very little of the mixed conifer ecosystem occurs within UMAs, and the Covered Species occurring there tend to be dispersed across the landscape rather than clustered in specific areas. In addition to the ecosystem level effects described above, these plant species may also be subject to trampling or crushing of seedlings and adult plants by hikers and equestrians. Increased human activities in the mixed conifer ecosystem may also result in spread of noxious weeds, which may compete with native plants, including the Covered plant species.

Non-vascular plant: *Dicranoweisia crispula*

In addition to the ecosystem-level and species-specific threats described above for the Covered plant species, this moss is typically associated with downed logs, thus, habitat degradation due to wood collection and litter removal for firewood or decorative purposes is also a threat.

Effects to Other Covered Species That Occur in the Mixed Conifer Ecosystem

The mixed conifer ecosystem is one of several of the primary ecosystems for American peregrine falcon, dark blue butterfly, Spring Mountains icarioides blue butterfly, Mt. Charleston blue

butterfly, Spring Mountains acastus checkerspot, Nevada admiral, and the Spring Mountains comma skipper. Effects to these species are discussed under the ecosystem section in which they most commonly occur, i.e., American peregrine falcon is covered in the desert riparian ecosystem discussion; dark blue butterfly, Spring Mountains icarioides blue butterfly, Spring Mountains acastus checkerspot, Spring Mountains comma skipper, and the Nevada admiral are covered in the springs ecosystem discussion; and the Mt. Charleston blue butterfly is covered in the bristlecone ecosystem discussion.

Covered Species that occur in the mixed conifer ecosystem, but whose primary habitats occur in other ecosystems, are silver-haired bat, long-eared myotis, long-legged myotis, western red-tailed skink, Sonoran lyre snake, Morand's checkerspot, rough angelica, Clokey milkvetch, Clokey paintbrush, Jaeger ivesia, Hitchcock bladderpod, and Charleston beardtongue. In general, the ecosystem-level and species-specific threats described above and in the discussion of species-specific threats under their primary ecosystem or, in the case of bats, under the bats effects section, are applicable to these species. The magnitude of effects on these species compared to the effects they would be exposed to in their primary ecosystems would depend on the differences in levels of development in UMAs and recreational use. These species would likely experience less harmful effects from development and recreation where they occur in higher elevation ecosystems due to the absence of UMAs, and limited accessibility of these areas. Where they occur in lower ecosystems, they may be exposed to greater levels of OHV activity, (e.g., OHV travel in washes), but lower levels of concentrated recreational use, since there are fewer established recreational facilities in the lower elevation ecosystems.

Proposed Measures to Mitigate and Minimize Effects to the Mixed Conifer Ecosystem Including Effects to Covered Species

Conservation actions proposed under the MSHCP for the mixed conifer ecosystem and its Covered Species, would supplement ongoing conservation activities being carried out by the USFS and its partners under the Spring Mountains NRA GMP and CA, and management activities carried out on the DNWR (refer to MSHCP Appendix A, section 5.5). In the first biennium, MSHCP measures that would benefit the mixed conifer ecosystem and Covered Species include public information and education (1.a.), agency public education projects (1.c.), Palmer's chipmunk genetics research (2.c.), Palmer's chipmunk monitoring (4.c.), enhanced law enforcement and ranger capabilities on Federal lands (5.d.), and the predator control program (5.e.), as described under *Description of the Proposed Action*. These measures should address the ecosystem-level and species-specific threats to the Covered Species occurring in the mixed conifer habitat in the initial years of the Permit. The AMP would gauge the effectiveness of existing conservation measures, and propose additional, or alternative conservation measures, as determined necessary, and to deal with changed or unforeseen circumstances.

Summary of Effects to the Mixed Conifer Ecosystem and Covered Species

The mixed conifer ecosystem provides habitat to 33 of the Covered Species, including 21 species that occur primarily within this ecosystem, and 17 that are endemic to the Permit Area.

Localized effects to the Covered Species, including loss or fragmentation of habitat, may occur as a direct result of development of up to 1,500 ac within UMAs. Additional adverse effects on the mixed conifer ecosystem would occur indirectly as a result of human population growth in the Permit Area and the associated increase in recreational use of Federal lands.

Under the MSHCP, conservation measures would be undertaken to preserve the reserve characteristics of 54,900 ac of mixed conifer habitat within IMAs and LIMAs (see *Environmental Baseline*, Table 6). Landscape-level effects to the ecosystem and population-level effects to Covered Species are generally expected to be positive. Implementation of the conservation measures would occur under the MSHCP (as described above and in the MSHCP, Appendix A, section 5.5), the Spring Mountains NRA GMP and CA, and DNWR management policies. These actions would more than offset the adverse effects of the proposed action on the mixed conifer ecosystem and Covered Species that occur there, allowing viable populations of the Covered Species occurring within the mixed conifer ecosystem to persist within the Permit Area.

In making this determination the following factors were taken into consideration: (1) Rangewide and Action Area status of each of the species occurring in the mixed conifer ecosystem (Table 16), (2) importance of the Permit Area for each of the species within the mixed conifer ecosystem (Table 16), (3) direct, indirect, and beneficial effects of the Proposed Action on each of the species occurring in the mixed conifer ecosystem (Table 17), and, (4) the net change in the management level of these species as a result of the Proposed Action, including the proposed MSHCP conservation measures, special terms and conditions of the Permit, and management actions carried out under existing agency plans (Table 17).

Pinyon-Juniper Ecosystem

Effects to the Ecosystem

Direct Effects: Approximately 278,200 ac of pinyon-juniper habitat occur within the Permit Area, in the Spring Mountains, Sheep Range, Virgin Mountains, and various high elevation mountain ranges within the BLM Las Vegas District. The majority of the habitat occurs in IMAs and LIMAs (255,300 ac or 92 percent of the total) on lands managed by USFS, BLM, NAFR, and DNWR. The proposed action could result in the loss of up to 4,200 ac (less than 1 percent of the total) on non-federal lands in UMAs.

Indirect Effects: Visitor use of the pinyon-juniper ecosystem will increase in the future as the population of Clark County continues to grow. There are many roads and trails, as well as informal trails, into the pinyon-juniper ecosystem and therefore, mechanized travel into the area is likely to increase. This ecosystem is easily accessible to OHV users and therefore, off-road activities are likely to increase as well. Many of the established recreation facilities in the Spring Mountains NRA are located in the pinyon-juniper ecosystem. Their increased use will result in degradation of pinyon-juniper habitat in areas within and immediately adjacent to the facilities.

As a result of increased visitation to the pinyon-juniper ecosystem, the condition of the most easily accessible areas will undergo habitat degradation over time. Adverse effects would include compacted soils, loss of vegetation cover, increased erosion, altered and more frequent fire regimes, and altered hydrology. The spread of noxious weeds may also increase as a result of disturbance of soil surfaces and displacement of native vegetation. Species mortality and fragmentation of habitat may result from road and trail use, and through other forms of recreation, such as climbing.

Effects to Covered Species that Primarily Occur in the Pinyon-Juniper Ecosystem

Western red-tailed skink

This subspecies of the Gilbert's skink is widespread, occurring within all ecosystems in the Permit Area with the exception of the alpine, bristlecone pine, salt desert scrub, and spring ecosystems. Of the reptile species proposed for coverage under the MSHCP, this skink is the least known mostly because of its secretive nature and is infrequently encountered in the field. Therefore, potential effects to this species are not well known.

Habitat disturbance that removes potential cover would impact skinks. They may also be impacted by removal of dead/down vegetation, which serve as shelter and foraging areas. The spread of Argentine fire ants introduced through nursery and landscape operations is a potential threat to this species, particularly those populations near the Las Vegas Valley. Human-caused fire may reduce the amount of shelter and foraging habitat. Although this lizard is widespread and found in a wide range of habitats, it most likely occurs as local populations within relatively small areas. Because little is known about this species including its status and distribution, specific threats to known populations cannot be identified at this time. This lack of information on the western red-tailed skink is a potential threat to the species.

Additional potential effects to the skink include use of roads and highways, and mining activities, including removal of decorative rock. Major roads and highways may result in fragmentation of populations by creating barriers to population dispersal. Domestic cats and dogs may capture and kill skinks, particularly at the interface between the habitat and urbanized areas. All of these effects are expected to increase as a result of increased human population in the Permit Area.

Vascular and non-vascular plants: Spring Mountains milkvetch, Clokey milkvetch, smooth pungent (dwarf) greasebush, pungent dwarf greasebush, and the mosses *Anacolia menziesii*, *Claopodium whippleanum*, and *Syntrichia princeps*

Covered plant populations could be lost or fragmented as a result of private land development. However, large scale losses of Covered plant populations are not expected, given that very little of the pinyon-juniper ecosystem occurs within UMAs. In addition to the ecosystem-level effects described above, development and use of Federal lands, including roads, trails, and recreational facilities, may lead to trampling or crushing of Covered plant species, and the spread of noxious weeds which may compete with the Covered plant species. Vegetation disturbance and removal

by recreational climbers may occur along some climbing routes in the Spring Mountains and Red Rock Canyon. Such disturbance or removal could potentially impact smooth pungent (dwarf) greasebush, and pungent dwarf greasebush, both of which occur on limestone cliffs in the pinyon-juniper ecosystem.

Effects to Other Covered Species That Occur in the Pinyon-Juniper Ecosystem

The pinyon-juniper ecosystem is one of several of the primary ecosystems for American peregrine falcon and Carole's silverspot. Effects to these species are discussed under the ecosystem section in which they most commonly occur, i.e., American peregrine falcon is covered in the desert riparian ecosystem section; and Carole's silverspot is covered in the mixed conifer ecosystem section.

Covered Species that occur in the pinyon-juniper ecosystem, but whose primary habitats occur in other ecosystems, are silver-haired bat, long-legged myotis, long-eared myotis, Palmer's chipmunk, western banded gecko, California kingsnake, glossy snake, Sonoran lyre snake, speckled rattlesnake, large-spotted leopard lizard, Great Basin collared lizard, dark blue butterfly, Spring Mountains acastus checkerspot, Nevada admiral, Spring Mountains comma skipper, Morand's checkerspot, Clokey eggvetch, inch high fleabane, Jaeger beardtongue, limestone violet, and the moss *Dicranoweisia crispula*.

In general, the ecosystem-level and species-specific threats described above and in the discussion of species-specific threats under their primary ecosystem or, in the case of bats, under the bats effects section, are applicable to these species. In addition, as human population increases within the Permit Area, collection of reptiles by hobbyists is likely to increase, including in portions of the pinyon-juniper ecosystem.

The magnitude of effects on these species compared to the effects they would be exposed to in their primary ecosystems is likely to be less with respect to direct effects. This is, in part, because there is a relatively small area of pinyon-juniper habitat within UMAs and thus direct loss through development is likely to be fairly minor, and limited to localized areas. The large number of roads in pinyon-juniper habitats increases accessibility by recreationists, thus populations and habitats of the Covered Species may be exposed to greater amounts of OHV and associated activities than these same species would experience in the higher elevation ecosystems. The magnitude of effect on the Covered Species in pinyon-juniper ecosystems in comparison to that which they would experience in lower elevation ecosystems would likely be a function of habitat accessibility along roads into these areas.

Proposed Measures to Mitigate and Minimize Effects to the Pinyon-Juniper Ecosystem, Including Effects to Covered Species

Conservation actions proposed under the MSHCP for the pinyon-juniper ecosystem and its Covered Species, would supplement ongoing conservation activities being carried out by the USFS and its partners under the Spring Mountains NRA GMP and CA, the Red Rock Canyon NCA GMP, and management efforts on the DNWR (refer to MSHCP Appendix A, section 6.5).

In the first biennium, MSHCP measures that would benefit the pinyon-juniper ecosystem and Covered Species include public information and education (1.a.), agency public education projects (1.c.), Palmer's chipmunk genetics research (2.c.), rare plant inventory (3.b.), bat inventory (3.d.), Palmer's chipmunk monitoring (4.c.), enhanced law enforcement and ranger capabilities on Federal lands (5.d.), and the predator control program (5.e.) as described under *Description of the Proposed Action*. These measures should address the ecosystem-level and species-specific threats to the Covered Species occurring in the pinyon-juniper habitat in the initial years of the Permit. The AMP would gauge the effectiveness of existing conservation measures, and propose additional, or alternative conservation measures, as determined necessary, and to deal with changed or unforeseen circumstances.

Summary of Effects to the Pinyon-Juniper Ecosystem and Covered Species

The pinyon-juniper ecosystem provides habitat for 31 Covered Species, including 10 species that occur primarily within this ecosystem, and 10 that are endemic to the Permit Area. Localized effects to the Covered Species, including loss or fragmentation of habitat, may occur as a result of development on up to 4,200 ac within UMAs. Additional adverse effects on the pinyon-juniper ecosystem would occur indirectly as result of human population growth in the Permit Area and the associated increase in recreational use of Federal lands.

Under the MSHCP, conservation measures would be undertaken to preserve the reserve characteristics of 255,300 ac of pinyon-juniper habitat within IMAs and LIMAs, and the functionality of corridor habitat within 18,700 ac of pinyon-juniper habitat within MUMAs, on lands under the management authority of various land management agencies (see *Environmental Baseline*, Table 7). Landscape-level effects to the ecosystem and population-level effects to Covered Species are generally expected to be positive. Implementation of the conservation measures would occur under the MSHCP (as described above and in the MSHCP, Appendix A, section 6.5) and land management agency plans and policies. These actions would more than offset the adverse effects of the proposed action on the pinyon-juniper ecosystem and Covered Species that occur there, allowing viable populations of the Covered Species occurring within the pinyon-juniper ecosystem to persist within the Permit Area.

In making this determination the following factors were taken into consideration: (1) Rangewide and Action Area status of each of the species occurring in the pinyon-juniper ecosystem (Table 16), (2) importance of the Permit Area for each of the species within the pinyon-juniper ecosystem (Table 16), (3) direct, indirect, and beneficial effects of the Proposed Action on each of the species occurring in the pinyon-juniper ecosystem (Table 17), and, (4) the net change in the management level of these species as a result of the Proposed Action, including the proposed MSHCP conservation measures, special terms and conditions of the Permit, and management actions carried out under existing agency plans (Table 17).

Sagebrush Ecosystem

Effects to the Ecosystem

Direct Effects: Approximately 134,600 ac of sagebrush habitat occur within the Permit Area in the Spring Mountains, Sheep Range, Red Rock Canyon, Virgin Mountains, and the McCullough Range. The majority of the habitat occurs in IMAs and LIMAs (117,400 ac or 87 percent of the total). Another 16,300 ac (12.1 percent) occur in MUMAs, which are under the multiple-use management direction of BLM Las Vegas RMP. The proposed action could result in the loss or fragmentation of up to 900 ac (less than 1 percent) of sagebrush habitat on private lands in UMAs.

Indirect Effects: Visitor use of the sagebrush ecosystem will increase in the future as the population of Clark County continues to grow. There are many roads and informal trails into the area and it is likely that mechanized travel into the area will increase. The activities associated with urban and rural development, such as new utility line installation, may adversely effect the sagebrush ecosystem as well.

As a result of increased human use of the sagebrush ecosystem, the condition of the most easily accessible areas will undergo habitat degradation over time. Adverse effects may include compacted soils, loss of vegetation cover, increased erosion, altered and more frequent fire regimes, and altered hydrology. The spread of weeds, especially red brome may also increase as a result of disturbance of soil surfaces and displacement of native vegetation. Direct species mortality and fragmentation of habitat may result from road and trail maintenance as well as OHVs.

Effects to Covered Species that Primarily Occur in the Sagebrush Ecosystem

The sagebrush ecosystem is one of several of the primary ecosystems for American peregrine falcon and Great Basin collared lizard. Effects to these species are discussed under the ecosystem section in which most commonly occur: American peregrine falcon is covered in the desert riparian ecosystem section; Great Basin collared lizard is covered in the salt desert scrub ecosystem section.

Effects to Other Covered Species that Occur in the Sagebrush Ecosystem

Covered Species that occur in the sagebrush ecosystem, but whose primary habitats occur in other ecosystems, are silver-haired bat, long-eared myotis, long-legged myotis, western banded gecko, California kingsnake, glossy snake, western long-nosed snake, speckled rattlesnake, western red-tailed skink, large-spotted leopard lizard, Spring Mountains milkvetch, smooth pungent (dwarf) greasebush, and pungent dwarf greasebush.

In general, the ecosystem-level and species-specific threats described above and in the discussion of species-specific threats under their primary ecosystem or, in the case of bats, under the bats effects section, are applicable to these species. The magnitude of direct effects on these species

compared to the effects they would be exposed to in their primary ecosystems is a function of how much of the sagebrush habitat is developed over the life of the Permit. There is a relatively small area of sagebrush habitat within UMAs (less than one percent of the total amount in the Permit Area), thus direct loss through development is likely to be fairly minor, and limited to localized areas. The large number of roads in sagebrush habitats increases accessibility by recreationists, thus populations and habitats of the Covered Species may be exposed to similar amounts of OHV and associated activities as would be expected for these same species in roaded areas of the pinyon-juniper and other, lower elevation ecosystems.

Proposed Measures to Mitigate and Minimize Effects to the Sagebrush Ecosystem, Including Effects to Covered Species

Conservation actions proposed under the MSHCP for the sagebrush ecosystem and its Covered Species, would supplement ongoing conservation activities being carried out by the USFS and its partners under the Spring Mountains NRA GMP and CA, BLM Las Vegas RMP, Red Rock Canyon NCA GMP, and management of the DNWR (refer to MSHCP Appendix A, section 7.5). In the first biennium, MSHCP measures that would benefit the sagebrush ecosystem and Covered Species include public information and education (1.a.) agency public education projects, (1.c.) rare plant inventory, (4.c.) enhanced law enforcement and ranger capabilities on Federal lands, (5.d.) and the predator control program, (5.e.), as described under *Description of the Proposed Action*. These measures should address the ecosystem-level and species-specific threats to the Covered Species occurring in the sagebrush habitat in the initial years of the Permit. The AMP would gauge the effectiveness of existing conservation measures, and propose additional, or alternative conservation measures, as determined necessary, and to deal with changed or unforeseen circumstances.

Summary of Effects to the Sagebrush Ecosystem and Covered Species

The sagebrush ecosystem provides habitat for 15 Covered Species, including 2 species that occur primarily within this ecosystem, and 3 that are endemic to the Permit Area. Localized effects to the Covered Species, including loss or fragmentation of habitat, may occur as a result of development on up to 900 ac within UMAs. Additional adverse effects on the sagebrush ecosystem would occur indirectly as result of human population growth in the Permit Area and the associated increase in recreational use of Federal lands.

Conservation measures would be undertaken to preserve the reserve characteristics of 117,400 ac of sagebrush habitat within IMAs and LIMAs, and the functionality of corridor habitat within 16,300 ac of sagebrush habitat within MUMAs, on lands under the management authority of various land management agencies (see *Environmental Baseline*, Table 8). Landscape-level effects to the ecosystem and population-level effects to Covered Species are generally expected to be positive. Implementation of the conservation measures would occur under the MSHCP (as described above and in the MSHCP, Appendix A, section 7.5), and land management agency plans and policies. These actions would more than offset the adverse effects of the proposed

action on the sagebrush ecosystem and Covered Species that occur there, allowing viable populations of the Covered Species occurring within the sagebrush ecosystem to persist within the Permit Area.

In making this determination the following factors were taken into consideration: (1) Rangewide and Action Area status of each of the species occurring in the sagebrush ecosystem (Table 16), (2) importance of the Permit Area for each of the species within the sagebrush (Table 16), (3) direct, indirect, and beneficial effects of the Proposed Action on each of the species occurring in the sagebrush ecosystem (Table 17), and, (4) the net change in the management level of these species as a result of the Proposed Action, including the proposed MSHCP conservation measures, special terms and conditions of the Permit, and management actions carried out under existing agency plans (Table 17).

Blackbrush Ecosystem

Effects to the Ecosystem

Direct Effects: Approximately 831,500 ac of blackbrush habitat occur within the Permit Area. The proposed action may result in a loss of 8,700 ac (1 percent of total in Permit Area) of blackbrush habitat, which includes all blackbrush habitat within UMAs in the Permit Area. A total of 536,500 ac of blackbrush habitat (65 percent of total) occur within IMAs and LIMAs. An additional 279,600 ac (34 percent of total) of blackbrush habitat occurs within MUMAs, which are under multiple use management direction. A major direct effect to blackbrush habitat that may result from the proposed action includes an increase in the potential for wildfires.

Indirect Effects: Visitor use of the blackbrush ecosystem will increase in the future as the population of Clark County continues to grow. There are many roads and trails, as well as informal trails, into the area and it is likely that mechanized travel into the area will increase. The activities associated with urban and rural development, such as new utility line installation, will adversely affect the blackbrush ecosystem as well.

As a result of increased human use of the blackbrush ecosystem the condition of the accessible areas will inevitably undergo habitat degradation over time. Adverse effects may include compacted soils, loss of vegetation cover, increased erosion, altered hydrology, and altered and more frequent fire regimes. The Covered Species may be subject to increased casual and commercial collection. As a result of increased human population, mining activities to supply the demand for sand, gravel, and decorative rock may occur in the blackbrush ecosystem causing habitat degradation, damage to the cryptogamic crust, and direct species mortality.

Effects to Covered Species that Primarily Occur in the Blackbrush Ecosystem

The blackbrush ecosystem is not the Primary Ecosystem for any Covered Species.

Effects to Other Covered Species That Occur in the Blackbrush Ecosystem

Covered Species that occur in the blackbrush ecosystem, but whose primary habitats occur at other elevations, are silver-haired bat, long-legged myotis, desert tortoise, western banded gecko, western red-tailed skink, California kingsnake, glossy snake, western long-nosed snake, speckled rattlesnake, Mojave green rattlesnake, large spotted leopard lizard, Great Basin collared lizard, and white-margined beardtongue. Direct species mortality and fragmentation of habitat may result from road and trail construction and maintenance as well as OHV use.

Proposed Measures to Mitigate and Minimize Effects to the Blackbrush Ecosystem

Conservation actions proposed under the MSHCP for the blackbrush ecosystem and its Covered Species, would supplement ongoing conservation activities being carried out by under the Spring Mountains NRA GMP and CA, BLM Las Vegas RMP, Red Rock Canyon NCA GMP, and DNWR plans and policies (refer to MSHCP Appendix A, section 8.5). The BLM has identified blackbrush habitat as a high priority for fire response. In the first biennium, MSHCP measures that would benefit the blackbrush ecosystem and Covered Species include public information and education (1.a.) desert tortoise pickup and adoption, (1.b.) agency public education projects, (1.c.) rare plant inventory, (4.c.) ACEC protection and management, (5.a.) construction of desert tortoise fencing along roads and highways, (5.c.) enhanced law enforcement and ranger capabilities on Federal lands, (5.d.) predator control program, and (5.e.) upland restoration and rehabilitation, (6.c.), as described in the *Description of the Proposed Action*. In addition, the special terms and conditions of the Permit would require development of conservation management plans for the DWMAs. These measures should address the ecosystem-level threats to the Covered Species occurring in the blackbrush ecosystem in the initial years of the Permit. The AMP would gauge the effectiveness of existing conservation measures, and propose additional, or alternative conservation measures, as determined necessary, and to deal with changed or unforeseen circumstances.

Summary of Effects to the Blackbrush Ecosystem and Covered Species

The blackbrush ecosystem provides habitat for 14 Covered Species. Localized effects to the Covered Species, including loss or fragmentation of habitat, may occur as a result of development on up to 8,700 ac within UMAs, primarily within relatively small, isolated patches of blackbrush, rather than large, contiguous blocks of habitat (Figure 8-2, MSHCP Appendix A). Additional adverse effects on the blackbrush ecosystem would occur indirectly as a result of human population growth in the Permit Area and the associated increase in recreational use of Federal lands. Under the MSHCP, conservation measures would be undertaken to preserve the reserve characteristics of 536,500 ac of blackbrush habitat within IMAs and LIMAs, and the functionality of corridor habitat within 279,600 ac of blackbrush habitat within MUMAs, on lands under the management authority of various land management agencies (see *Environmental Baseline*, Table 9).

Most landscape-level effects to the ecosystem and population-level effects to Covered Species that would occur as a result of the Covered Activities are anticipated to be positive. Because this ecosystem does not provide primary habitat for any of the Covered Species and approximately 65 percent of the blackbrush ecosystem occurs in IMAs and LIMAs, the overall magnitude of effect to Covered Species that occurs in this ecosystem is anticipated to be low or beneficial (Table 16). Implementation of the conservation measures would occur under the MSHCP (as described above and in the MSHCP, Appendix A, section 8.5), and land management agency plans and policies. These actions would more than offset the adverse effects of the proposed action on the blackbrush ecosystem and Covered Species that occur there, allowing viable populations of the Covered Species occurring within the blackbrush ecosystem to persist within the Permit Area.

In making this determination the following factors were taken into consideration: (1) Rangewide and Action Area status of each of the species occurring in the blackbrush ecosystem (Table 16), (2) importance of the Permit Area for each of the species within the blackbrush ecosystem (Table 16), (3) direct, indirect, and beneficial effects of the Proposed Action on each of the species occurring in the blackbrush ecosystem (Table 17), and, (4) the net change in the management level of these species as a result of the Proposed Action, including the proposed MSHCP conservation measures, special terms and conditions of the Permit, and management actions carried out under existing agency plans (Table 17).

Salt Desert Scrub Ecosystem

Effects to the Ecosystem

Direct Effects: The proposed action may result in the loss of up to 19,800 ac (10 percent) of salt desert scrub habitat, which includes all salt desert scrub habitat within UMAs in the Permit Area. An additional 39,600 ac (21 percent of total) of salt desert scrub habitat occurs within MUMAs, which are under multiple-use management direction. A total of 131,300 ac of salt desert scrub habitat (69 percent of total) occur within IMAs and LIMAs.

Indirect Effects: Salt desert scrub habitat will be adversely affected by the anticipated increase in human populations and tourism, resulting in an overall increase in compacted soils, crushed or destroyed vegetation, removal of vegetation, increased soil erosion, altered hydrology, and altered fire regimes, as well as the potential for point source pollution. The Covered species may be subject to increased casual and commercial collection. Mining activities to supply the demand for sand, gravel, and decorative rock may occur in the salt desert scrub ecosystem contributing to habitat degradation, damage to cryptogamic crusts, and direct species mortality. Direct species mortality and fragmentation of habitat may result from road and trail construction and maintenance as well as OHV use.

Effects to Covered Species that Primarily Occur in the Salt Desert Scrub Ecosystem

Large spotted leopard lizard and Great Basin collared lizard

Adverse effects to the large-spotted leopard lizard and Great Basin collared lizard from the Covered Activities include mortality, injury, harm, harassment, and population fragmentation as a result of increased vehicle encounters on existing and future roads, trails, and highways (including OHV activities). Construction of utilities and infrastructure that involve towers or other artificial perch sites for ravens and other predatory birds may result in an increase in the predation rate of avian predators on leopard and collared lizards. As human population increases within the Permit Area, collection of these lizard species by hobbyists is likely to increase.

The Applicants propose to continue the installation of tortoise-proof fencing along roads and project sites under the MSHCP. This fencing would minimize the number of desert tortoise that would be removed from the population as a result of vehicle encounters. However, the fencing may trap large lizards such as the leopard and collared lizard as they attempt to pass through the mesh. It is not known to what degree the fencing is effective in protecting these lizards from mortality as a result of vehicle encounters.

White bearpoppy, Pahrump Valley buckwheat, and Parish's phacelia

The majority of the habitat supporting these species occurs within IMAs and LIMAs, where no direct effects from the proposed action would occur. In addition to the ecosystem-level effects described above, indirect effects may include development and use of roads, trails, and recreational facilities, which may result in trampling or crushing of individual plants. This type of disturbance may also lead to spread of noxious weeds within the habitat, resulting in competition for resources. While some habitat contained within UMAs may be lost as a result of urban development and associated activities, these impacts should be offset by conservation measures proposed under the MSHCP.

Effects to Other Covered Species That Occur in the Salt Desert Scrub Ecosystem

Covered Species that occur in the salt desert scrub ecosystem, but whose primary habitats occur at other elevations or ecosystems are the desert tortoise, western banded gecko, desert iguana, California kingsnake, glossy snake, long-nosed snake, leaf-nosed snake, Sonoran lyre snake, sidewinder, western red-tailed skink, sticky ringstem, and Las Vegas bearpoppy. In general, the ecosystem-level and species-specific threats described above and in the discussion of species-specific threats under their primary ecosystem, are applicable to these species. The magnitude of overall effects to the desert tortoise, western banded gecko, desert iguana, California kingsnake, glossy snake, long-nosed snake, leaf-nosed snake, Sonoran lyre snake, sidewinder, sticky ringstem, and Las Vegas bearpoppy will be substantially less intense in this ecosystem than in the Mojave desert scrub ecosystem where most individuals or populations of these Covered Species would be affected. Effects to the western red-tailed skink will be of similar magnitude across all the ecosystems in which it occurs. As human population increases within the Permit Area, collection of reptiles by hobbyists is likely to increase.

Proposed Measures to Mitigate and Minimize Effects to the Salt Desert Scrub Ecosystem Including Effects to Covered Species

Conservation actions proposed under the MSHCP for the salt desert scrub ecosystem and its Covered Species, would supplement ongoing conservation activities being carried out by the various land management agencies (refer to MSHCP Appendix A, section 9.5). In the first biennium, MSHCP measures that would benefit this ecosystem and Covered Species include public information and education (1.a.) desert tortoise pickup and adoption, (1.b.) agency public education projects, (1.c.) rare plant inventory, (3.b.) ACEC protection and management, (5.a.) construction of desert tortoise fencing along roads and highways (5.c.) enhanced law enforcement and ranger capabilities on Federal lands, (5.d.) the predator control program, (5.e.) upland restoration and rehabilitation, (6.c.) management plans for state-listed plants, (7.a.) and acquisition of grazing allotments, (7.c.) as described in the *Description of the Proposed Action*. In addition, the special terms and conditions of the Permit would require development of conservation management plans for the DWMAs and low elevation plant species. These measures should address the ecosystem-level and species specific threats occurring in the salt desert scrub habitat in the initial years of the Permit. The AMP would gauge the effectiveness of existing conservation measures, and propose additional, or alternative conservation measures, as determined necessary, and to deal with changed or unforeseen circumstances.

Summary of Effects to the Salt Desert Scrub Ecosystem and Covered Species

The salt desert scrub ecosystem provides habitat for 16 Covered Species, 5 of which occur primarily within salt desert scrub habitat. Most landscape-level effects to the ecosystem and population-level effects to Covered Species, including loss or fragmentation of habitat, may occur as a result of development on up to 19,800 ac within UMAs, primarily within the UMA directly north of Las Vegas (Figure 9-2, MSHCP Appendix A). Additional adverse effects on the salt desert scrub ecosystem would occur indirectly as result of human population growth in the Permit Area and the associated increase in recreational use of Federal lands. Under the MSHCP, conservation measures would be undertaken to preserve the reserve characteristics of 131,300 ac of salt desert scrub habitat within IMAs and LIMAs, and the functionality of corridor habitat within 39,600 ac of salt desert scrub habitat within MUMAs, on lands under the management authority of various land management agencies (see *Environmental Baseline*, Table 10).

The overall magnitude of effect to Covered Species that occur in this ecosystem are anticipated to be low or beneficial (Table 17). Implementation of the conservation measures would occur under the MSHCP (as described above and in the MSHCP, Appendix A, section 9.5), and land management agency plans and policies. These actions would more than offset the adverse effects of the proposed action on the salt desert scrub ecosystem and Covered Species that occur there, allowing viable populations of the Covered Species occurring within the salt desert scrub ecosystem to persist within the Permit Area.

In making this determination the following factors were taken into consideration: (1) Rangewide and Action Area status of each of the species occurring in the salt desert scrub ecosystem (Table

16), (2) importance of the Permit Area for each of the species within the salt desert scrub ecosystem (Table 16), (3) direct, indirect, and beneficial effects of the Proposed Action on each of the species occurring in the salt desert scrub ecosystem (Table 17), and, (4) the net change in the management level of these species as a result of the Proposed Action, including the proposed MSHCP conservation measures, special terms and conditions of the Permit, and management actions carried out under existing agency plans (Table 17).

Mojave Desert Scrub Ecosystem

Effects to the Ecosystem

Direct Effects: The proposed action may result in the loss of up to 145,000 ac (4 percent of total) of Mojave desert scrub habitat. An additional 1,111,800 ac (34 percent of total) of Mojave desert scrub habitat occur within MUMAs, which are currently under multiple-use-management direction. A total of 1,876,200 ac of Mojave desert scrub habitat (57 percent of total) occur within IMAs and LIMAs.

Indirect Effects: Mojave desert scrub habitat will be adversely affected by the anticipated increase in human populations and tourism, resulting in an overall increase in compacted soils, crushed or destroyed vegetation, removal of vegetation, increased soil erosion, and altered hydrology that results in harm to Covered Species through habitat loss or degradation. Compaction of soil, loss of vegetation cover, increased erosion, altered hydrology and lowered water table, and altered fire regimes, as well as the potential for point source pollution from illegal dumping may all increase with a rise in human population. The Covered Species may be subject to increased casual and commercial collection. Mining activities to supply the demand for sand, gravel, and decorative rock may occur in the Mojave desert scrub ecosystem causing habitat degradation, damage to cryptogamic crusts, and direct species mortality. Direct species mortality and fragmentation of habitat may result from road and trail construction and maintenance as well as OHV use. Removal of topsoil associated with many surface-disturbing activities may result in removal of organic material and seeds, thus reducing the potential for recovery and rehabilitation of the affected area

Effects to Covered Species that Primarily Occur in the Mojave Desert Scrub Ecosystem

Desert tortoise

Adverse effects on the desert tortoise as a result of the proposed action are expected to be similar wherever it occurs, including the blackbrush and salt desert scrub ecosystems, as previously discussed. The Permit would allow incidental take of desert tortoise in areas not proposed for recovery, with the exception of a relatively small area within Coyote Springs Valley. Weighed against the approximate 3.5 million ac of tortoise habitat remaining in Clark County, the loss of 145,000 ac represents 4 percent of the total tortoise habitat within the County.

Because over 90 percent of the land in Clark County is administered by eight Federal agencies, recovery of the desert tortoise will occur largely on Federal lands and on both Federal and non-

Federal lands within Coyote Springs Valley. Proposed mitigation and minimization measures in the MSHCP are intended to enhance the desert tortoise's chances for survival and recovery in the wild. Because most development under the MSHCP and Permit is anticipated to occur within desert tortoise habitat, the level of effect on this reptilian species would likely be greater than that on Covered Species occurring in other ecosystems not subject to equivalent amounts of habitat loss. Most of these effects would extend to co-occurring species within the Mojave desert scrub ecosystem, such as the desert iguana and Mojave green rattlesnake, which inhabit identical or similar habitat.

The cumulative amount of human and disease-related mortality accompanied by habitat destruction, degradation, and fragmentation is the most serious threat facing the desert tortoise. Due to the patchy distribution of desert tortoises in the Permit Area, it is possible that growth and development could occur without direct incidental take of desert tortoises. In such an event, development would indirectly affect the desert tortoise as disturbance proceeds in hopscotch patterns, with patches of occupied habitat left undeveloped and eventually surrounded by development. The Permit would provide the opportunity for more orderly development within the Las Vegas Valley by removing the constraint of having to avoid the patchy distribution of habitat occupied by the desert tortoise.

In addition to habitat-level effects described in the blackbrush, salt desert scrub, and Mojave desert scrub ecosystems, there are a number of species-level effects that would negatively affect the desert tortoise as a result of permitted activities. These additional effects include: (1) normal and emergency road maintenance operations and construction activities outside of DWMAs by NDOT; (2) an increase in vehicular traffic and consequential road mortality as tortoises use dirt roads for drinking rain water or attempt to cross paved roads; (3) an increase in the number of captive tortoises, both desert and exotic, released into wild populations; (4) collection of tortoises by the public for pets or food; (5) possible effects of noise and vibration from vehicles, heavy equipment, and aircraft; (6) predation by domestic dogs and cats; (7) utility and energy facilities and corridors that create open, barren areas that increase the visibility of tortoises to avian and other predators and reduce the thermal cover for tortoises and contribute towards fragmentation of tortoise habitat and populations; (8) vandalism of tortoises by shooting or other methods; (9) spread of disease and disruption of established home ranges as a result of escaped or unauthorized releases of tortoises, including those adopted through the adoption programs endorsed through the MSHCP; and (10) exposure or ingestion of toxicants from mining, industrial, residential or illegal dumping sources. Because desert tortoises are known to eat harmful objects such as balloons and plastic, an increase in trash and litter in desert tortoise habitat would increase the level of effect on tortoises. Desert tortoise may also be killed or injured by vehicles or equipment if they enter project areas, commercial or residential developments, or fall into excavated areas such as mine sites or utility trenches. Effects of activities that may occur under the Permit would occur largely within areas not recommended for recovery of the species, with the exception of a relatively small portion of Coyote Springs Valley.

Western banded gecko and desert iguana

The western banded gecko would be adversely affected by the ecosystem-level effects to the pinyon-juniper, sagebrush, blackbrush, salt desert scrub, mesquite/catclaw, and desert riparian ecosystems in addition to effects within the Mojave desert scrub ecosystem. In addition, the gecko may be impacted by removal of dead/down vegetation which serves as shelter and foraging areas, but may benefit from trash dumping which serves the same purpose as dead/down vegetation. Thus, clean up of trash and debris may be an adverse effect for the western banded gecko. The desert iguana would be adversely affected by the ecosystem-level effects within the salt desert scrub and mesquite/catclaw ecosystems in addition to Mojave desert scrub ecosystem effects. As tortoise-proof fencing is installed along project sites and roads, desert iguanas may become trapped by attempting to pass through the fence mesh.

Additional effects on both the western banded gecko and desert iguana include OHV and mining activities described previously. Roads and highways provide access into otherwise inaccessible areas and result in lizard mortalities by fatal encounters with vehicles. Major roads and highways result in fragmentation of populations by creating barriers to population dispersal. Some mining operations result in population "sinks" or sources of mortality by attracting lizards into harmful situations associated with active mining operations including exposure to chemicals and toxicants. Extraction of sand, gravel, and decorative rock further contribute to mortality and harm through habitat loss and degradation. Domestic cats and dogs capture and kill geckos and iguanas, particularly at the interface between the habitat and urbanization. As human population increases within the Permit Area, all these effects and the collection of reptiles by hobbyists is likely to increase.

California kingsnake

The California kingsnake will be adversely affected by the proposed action by general ecosystem-level effects of activities within the pinyon-juniper, sagebrush, blackbrush, salt desert scrub, mesquite/catclaw, and desert riparian ecosystems in addition to those effects within the Mojave desert scrub ecosystem. Some activities in these areas will affect the habitat of their prey base (e.g., rodents, lizards, other snakes). Because hatchling and juvenile kingsnakes feed on banded geckos, another Covered Species, these age classes may be adversely affected if gecko populations are reduced. Human sources of cover for this species and its prey, which also includes rodents, lizards, and other snakes, may be beneficial to the kingsnake. The removal or increase in this artificial habitat may be an adverse or beneficial effect to the kingsnake.

Kingsnakes commonly occur in close proximity to development-habitat interfaces and are often killed by dogs and cats, and intentionally by humans when encountered. Although collected by commercial and hobby collectors, most demand for the pet trade is met by captive-bred animals. As human population increases within the Permit Area, collection of kingsnakes and the by hobbyists is likely to increase. Roads, trails, and highways will result in mortality through vehicular encounters and increasing the success of commercial and hobby collectors by increasing the access into remote habitat and increasing the visibility of individuals on roads. Kingsnakes are likely harmed by environmental toxicants as described previously. The increase

or expansion of irrigated landscapes may provide resources in the form of water and prey such as rodents, thus serving as a benefit to the kingsnake which is known to inhabit these types of areas in greater abundance.

Glossy snake, western leaf-nosed snake, and western long-nosed snake

The glossy and western leaf-nosed snakes would be adversely affected by the ecosystem-level effects to the sagebrush, blackbrush, and salt desert scrub ecosystems in addition to the effects of activities within the Mojave desert scrub ecosystem. In addition, the glossy snake would also be affected by activities within the pinyon-juniper ecosystem. The western long-nosed snake would be adversely affected by the ecosystem-level effects to the sagebrush, blackbrush, and salt desert scrub ecosystems in addition to the effects of action within the Mojave desert scrub ecosystem. As human population increases within the Permit Area, all of these effects and the collection of reptiles by hobbyists is likely to increase. However, implementation of terms and conditions of biological opinions issued within the Permit Area for the desert tortoise would also minimize effects to these species that occur in similar habitats. The leaf-nosed snake prefers sandy, rocky washes and would be impacted by activities that may occur in washes such as OHV activities and spill or discharge of environmental contaminants, both of which often follow washes.

Some ecosystem-level effects would indirectly affect these three snake species by affecting the habitat of their prey base, which includes primarily lizards and to a lesser degree, small rodents. All age classes of leaf-nosed snakes and hatchling and juvenile glossy and long-nosed snakes feed extensively on banded geckos. Therefore, reductions in gecko populations would likely adversely affect these species. All three snake species are impacted by roads and trails that result in mortalities associated with vehicle encounters; infrastructure construction.

Sonoran lyre snake

The Sonoran lyre snake would be adversely affected by the ecosystem-level effects to the mixed conifer, pinyon-pine, and salt desert scrub ecosystems in addition to the effects of activities within the Mojave desert scrub ecosystem. Due to the nocturnal and secretive nature of this snake, the major impacts to the species include road mortality and habitat destruction. Only 11 lyre snakes have been reported as commercially collected from 1986 to 1998. Because hatchling and juvenile lyre snakes feed on banded geckos, these age classes may be adversely affected if gecko populations are substantially reduced. All of the effects to the lyre snake described in this Opinion, including collection, are expected to increase as a result of issuance of the Permit.

Sidewinder

The sidewinder would be adversely affected by the ecosystem-level effects to the salt desert scrub and mesquite/catclaw ecosystems in addition to activities within the Mojave desert scrub ecosystem. All of the ecosystem-level effects to these snakes described in this Opinion are expected to increase as a result of issuance of the Permit.

Sidewinders that are encountered on private lands and to some degree, on public lands, are often killed by humans because they are venomous and may pose a threat to human health and safety. The increased use of the desert by recreationists, particularly those activities associated with motor vehicles, would impact the sidewinder. Most of these impacts would occur between dusk and dawn, within areas used by OHVs and sidewinders. Because hatchling and juvenile sidewinders feed on banded geckos and other lizards species, these age classes may be adversely affected if populations of prey lizards are substantially reduced. As human population increases within the Permit Area, collection of reptiles by hobbyists is likely to increase

Speckled and Mojave green rattlesnakes

The speckled rattlesnake would be adversely affected by the ecosystem-level effects to the pinyon-juniper, sagebrush, and blackbrush ecosystems in addition to activities within the Mojave desert scrub ecosystem. Mojave green rattlesnake would be adversely affected by the general ecosystem-level effects to the blackbrush ecosystem in addition to Mojave desert scrub ecosystem effects. As human population increases within the Permit Area, all of the effects to these snakes described in this Opinion and the collection of reptiles by hobbyists is likely to increase.

Vehicle encounters on paved roads are an important source of mortality for these snake species. Snakes, particularly rattlesnakes, are commonly killed by humans when encountered because they are venomous and threaten human health and safety. Rattlesnakes encountered on private lands and project sites are often intentionally or incidentally killed by humans. The period of activity for both of these rattlesnakes include daytime and night time, thus increasing the potential conflict with humans. Speckled rattlesnakes are often encountered by hikers due to their preference for rocky hillsides.

Blue Diamond cholla: The majority of the Blue Diamond cholla habitat (about 95 percent) occurs within the Red Rock Canyon NCA in IMAs and LIMAs. There is a slight potential for loss of individual plants on the five percent of the habitat within UMAs. Most effects would occur indirectly as a result of increased public use of the Red Rock Canyon NCA, although the Blue Diamond Hills are visited much less frequently than other areas within the NCA. The Blue Diamond cholla CA identifies conservation actions to be implemented by BLM and others, to ensure the continued existence of this species.

Sticky ringstem and Las Vegas bearpoppy. These species occur on edaphic islands within Mojave desert scrub. Approximately 17 percent of occupied and suitable habitat occurs within lands managed as UMAs, most of which are likely to be lost to urban expansion. These species and their habitats would also be subject to the indirect effects of population growth. In addition to the ecosystem-level effects described above, increased development and use of Federal lands, including roads, trails, and recreational facilities, may lead to trampling or crushing of the ringstem and bearpoppy, and the spread of competitive noxious weeds into their habitats.

Sticky buckwheat and threecorner milkvetch. These species overlap in distribution within the Permit Area. Less than 4 percent of the total occupied and suitable habitat for these species occurs within lands managed as UMAs, and between 70 and 82 percent, respectively, of the habitat occurs within MUMAs, which may be indirectly affected due to their proximity to UMAs and urban populations. These species and their habitats would also be subject to the indirect effects of population growth. In addition to the ecosystem-level effects described above, increased development and use of Federal lands, including roads, trails, and recreational facilities, may lead to trampling or crushing of the sticky buckwheat and threecorner milkvetch, and the spread of competitive noxious weeds into their habitats.

Alkali mariposa lily and white-margined beardtongue. These species are widely distributed in the eastern Mojave Desert. Within the Permit Area, the majority of occupied and suitable habitat for these species occurs in IMAs, LIMAs, and MUMAs. Some direct losses of individuals and their habitat may occur in UMAs as a result of urban development and associated activities. In other areas, these species and their habitats would be subject to the indirect ecosystem-level effects described above. Increased development and use of Federal lands, including roads, trails, and recreational facilities, may lead to trampling or crushing of the alkali mariposa lily and white-margined beardtongue, and the spread of competitive noxious weeds into their habitats.

Effects to Other Covered Species That Occur in the Mojave Desert Scrub Ecosystem

The Mojave desert scrub ecosystem is one of several of the primary ecosystems for large-spotted leopard lizard and Great Basin collared lizard. Effects to these species are covered in the salt desert scrub ecosystem section (the ecosystem in which they most commonly occur). Covered Species that occur in the Mojave desert scrub ecosystem, but whose primary habitats occur at other elevations, are the western red-tailed skink and the white bearpoppy. In general, the ecosystem-level and species-specific threats described above and in the discussion of species-specific threats under their primary ecosystem are applicable to these species.

The magnitude of effects on these species compared to the effects they would be exposed to in their primary ecosystems would depend upon the extent of their occurrence in UMAs and the proximity of populations in other areas to UMAs. Most of the urban land development would occur in the Mojave desert scrub ecosystem, and there would be increased proximity of urbanized areas to undeveloped Mojave desert scrub habitats. Therefore, populations of Covered Species in these areas may be subject to a greater magnitude of effect than in other ecosystems where they may be further from the developed areas.

Proposed Measures to Mitigate and Minimize Effects to the Mojave Desert Scrub Ecosystem Including Effects to Covered Species

Conservation actions proposed under the MSHCP for the Mojave desert scrub ecosystem and its Covered Species, would supplement ongoing conservation activities being carried out under the various agency management plans (refer to MSHCP Appendix A, section 10.5). In the first biennium, MSHCP measures that would benefit the Mojave desert scrub ecosystem and Covered Species include public information and education (1.a.) desert tortoise pickup and adoption,

(1.b.) agency public education projects, (1.c.) desert tortoise translocation, (2.a.) research on desert tortoise survivorship, (2.b.) rare plant inventory, (3.b.) desert tortoise line distance sampling, (4.a.) ACEC protection and management, (5.a.) bearpoppy fencing, (5.b.) construction of desert tortoise fencing along roads and highways, (5.c.) enhanced law enforcement and ranger capabilities on Federal lands, (5.d.) predator control program, (5.e.) upland restoration and rehabilitation, (6.c.) management plans for state-listed plants, (7.a.) and acquisition of grazing allotments, (7.c.) as described in the *Description of the Proposed Action*. In addition, the special terms and conditions of the Permit would require development of conservation management plans for the DWMAs and low elevation plant species. These measures should address the ecosystem-level and species-specific threats to the Covered Species occurring in the Mojave desert scrub habitat in the initial years of the Permit. The AMP would gauge the effectiveness of existing conservation measures, and propose additional, or alternative conservation measures, as determined necessary, and to deal with changed or unforeseen circumstances.

Summary of Effects to the Mojave Desert Scrub Ecosystem and Covered Species

The Mojave desert scrub ecosystem is the most extensive ecosystem in the Permit Area (3.3 million ac), providing habitat for 22 Covered Species, 19 of which occur primarily within Mojave desert scrub habitat, and 1 which is endemic to the Permit Area. Most landscape-level effects to the ecosystem and population-level effects to Covered Species that would occur as a result of the Covered Activities are anticipated to occur within this ecosystem, primarily in the Las Vegas Valley, Eldorado Valley, Hidden Valley and Apex area, Coyote Springs Valley, and Mesquite Valley (MSHCP Appendix A, Figure 10-2). However, only 145,000 ac of UMAs within the Mojave desert scrub ecosystem may be affected by Covered Activities (i.e., maximum number of acres covered under the Permit).

Conservation measures would be undertaken to preserve the reserve qualities of 1,876,200 ac of Mojave desert scrub habitat within IMAs and LIMAs, and functionality of corridor habitat on 1,111,800 ac of Mojave desert scrub habitat within MUMAs, on lands under the authorities of the various land management agencies (see *Environmental Baseline*, Table 11). Implementation of the conservation measures would occur under both the MSHCP (as described above and in the MSHCP, Appendix A, section 10.5), and existing agency management plans. These actions would more than offset adverse effects of the Proposed Action on the Mojave desert scrub ecosystem and Covered Species that occur there, thus allowing viable populations of the Covered Species to persist within the Permit Area. The magnitude of effect to Covered Species that occur in this ecosystem is anticipated to be low or beneficial (Table 17).

This determination was made in consideration of the following information: (1) Rangewide and Action Area status of each of the species occurring in the Mojave desert scrub ecosystem (Table 16), (2) importance of the Permit Area for each of the species within the Mojave desert scrub ecosystem (Table 16), (3) direct, indirect, and beneficial effects of the Proposed Action on each of the species occurring in the Mojave desert scrub ecosystem (Table 17), and, (4) the net change in the management level of these species as a result of the Proposed Action, including the proposed MSHCP conservation measures, special terms and conditions of the Permit, and management actions carried out under existing agency management plans.

Mesquite/Catclaw Ecosystem

Effects to the Ecosystem

Direct Effects: The effects of the proposed action may result in the loss of up to 5,000 ac (23 percent) of mesquite and catclaw habitat in Clark County (acreage occurring in UMAs) due to urban development. In addition, approximately 35 ac of mesquite (Glendale area) and 3,000 ac of catclaw habitat (North Las Vegas Valley) occurring on lands identified for disposal by the BLM (classified as MUMAs) may also be lost.

Indirect Effects: Approximately 8,000 ac (37 percent) of mesquite/catclaw habitat occur in MUMAs, which are managed under the general management direction of the land management agencies. These lands will receive greater human use as the population in Clark County continues to grow. Greater human use of mesquite woodlands may result in increased wood cutting and gathering activities, increased frequency of wildfires, and higher levels of motorized vehicle use. New golf courses, parks, and agricultural lands adjacent to these woodlands may promote increases in local rodent and lagomorph populations, which may result in increased herbivory pressure in mesquite stands adjacent to these land uses. Additional groundwater pumping to meet water needs of the growing communities of Clark County may lower current water table levels. An unknown acreage of catclaw habitat occurring in IMAs and LIMAs may be lost as a result of expanded sand and gravel operations for improvement of transportation routes. Increased OHV activity may damage wash channels and impact catclaw vegetation. Construction and maintenance of future utility lines may remove or damage mesquite and catclaw vegetation wherever these rights-of-way cross the habitat. Future flood control projects may impound or divert water in washes, which may expose associated mesquite and catclaw to unfavorable conditions for growth and survival.

Increases in these activities may result in additional loss of mesquite and catclaw habitat outside of UMAs. Depleted water tables may place mesquite stands under additional physiological stress, and may eventually eliminate mesquite in some locations. As water tables continue to decline, it will also become more difficult for mesquite seedlings to establish and survive. Higher levels of herbivory may result in higher rates of seedling mortality, and reduced recruitment of new mesquite trees. Greater use of mesquite and catclaw habitats may result in compacted soils and trampling and displacement of seedlings, which may also reduce recruitment of new plants.

Effects to Covered Species that Primarily Occur in the Mesquite/Catclaw Ecosystem

Phainopepla

The phainopepla is the only Covered Species that uses the mesquite/catclaw ecosystem as its primary habitat. In addition to the ecosystem-level effects of habitat loss and degradation described above, indirect effects to phainopeplas may result from an increase in the human population of Clark County. Mesquite woodlands are popular hunting areas. Game species such as mourning dove and Gambel's quail are common in mesquite woodlands. Mesquite

woodlands are also popular target shooting areas. Local increases in the human population may result in mortality from higher incidence of inappropriate or unlawful hunting or target shooting activities in mesquite woodlands.

An increasing human population may also result in an increase in domestic and feral cats, which is a known cause of high avian mortality rates. Phainopepla populations within, or in close proximity to, human settlements may be particularly susceptible to high rates of predation by cats. Removal or destruction of vegetation during the breeding season is also a source of avian mortality. Removal of mesquite or catclaw vegetation could occur as a result of wood cutting and gathering, removal during construction activities or sand and gravel operations, or destruction from wildfire. Disturbance in nesting areas from recreational activities such as OHV or shooting events may cause birds to abandon their nests. Pesticide spraying may also affect phainopeplas either by contamination or by depleting their food source during the nestling period when adults initially feed young chicks a diet consisting mainly of insects.

Effects to Other Covered Species That Occur in the Mesquite/Catclaw Ecosystem

The mesquite/catclaw ecosystem is one of several of the primary ecosystems for blue grosbeak, vermilion flycatcher, Arizona Bell's vireo, and western banded gecko. Effects to these Covered Species are discussed in the ecosystem section in which they most commonly occur, i.e., blue grosbeak, vermilion flycatcher and Arizona Bell's vireo are covered in the desert riparian ecosystem section; and western banded gecko is covered in the Mojave desert scrub ecosystem section.

Covered Species that occur in the mesquite/catclaw ecosystem, but whose primary habitats occur in other ecosystems, are silver-haired bat, long-legged myotis, desert iguana, western red-tailed skink, Great Basin collared lizard, California kingsnake, Sonoran lyre snake, sidewinder, Pahrump Valley buckwheat, and Parish's phacelia. In general, the ecosystem-level and species-specific threats described above and in the discussion of species-specific threats under their primary ecosystems or, in the case of bats, under the bat effects section, are applicable to these species. The magnitude of indirect effect on these species may be greater than what they would experience in their primary ecosystems, because mesquite/catclaw habitats tend to receive more frequent visitation and intensity of use than the surrounding, more extensive upland habitats.

Proposed Measures to Mitigate and Minimize Effects to the Mesquite/Catclaw Ecosystem Including Effects to Covered Species

Conservation actions proposed under the MSHCP for the mesquite/catclaw ecosystem and its Covered Species would supplement ongoing conservation activities being carried out by the BLM under the Las Vegas RMP and Mesquite Woodland Habitat Management Plan (MSHCP Appendix D), NPS under the Lake Mead NRA GMP, DNWR and under management plans and policies. In the first biennium, MSHCP measures that would benefit the mesquite/catclaw ecosystem and Covered Species include public information and education (1.a.) agency public education programs, (1.c.) banded gecko surveys, (3.a.) rare plant inventory, (3.b.) neotropical breeding bird surveys, (3.c.) enhanced law enforcement and ranger capabilities on Federal lands,

(5.d.) predator control program, (5.e.) Mesquite Management Program, (5.f.) bat gates on mines and caves, (5.g.) MRREIAC restoration program on Muddy River, (6.a.) utilization of the Southern Nevada Restoration Team (6.b.) Las Vegas Wash Wetlands Park habitat restoration, (6.d.) acquisition of grazing allotments, (7.b.) and Muddy River Land Acquisition Program, (7.c.) as described in the *Description of the Proposed Action*. In addition, Clark County has committed to the acquisition of interests in real property and water rights on a willing-seller/willing-buyer basis, to assure viability of habitats and species dependent upon those lands and waters (MSHCP section 2.8.3.6). Finally, the special terms and conditions of the Permit would require development of conservation management plans for catclaw habitats. These measures should address the ecosystem-level and species-specific threats to the Covered Species occurring in mesquite/catclaw habitat in the initial years of the Permit. The AMP would gauge the effectiveness of existing conservation measures, and propose additional, or alternative conservation measures, as determined necessary, and to deal with changed or unforeseen circumstances.

Summary of Effects to the Mesquite/Catclaw Ecosystem and Covered Species

The mesquite/catclaw ecosystem provides habitat for 15 Covered Species under the MSHCP, 5 of which occur primarily within mesquite and catclaw habitat. Approximately 21,700 ac of mesquite and catclaw habitat occur in the Permit Area, of which approximately 4,900 ac occur on private lands. Adverse effects may occur either as direct effects associated with development of private lands supporting mesquite and catclaw habitat, or indirect effects that result from human population growth and an increase in recreational use of public lands. It is unlikely that mesquite and catclaw habitats on private lands located in riparian areas along the Muddy and Virgin Rivers and Las Vegas Wash would be developed. However, it is highly likely that mesquite and catclaw habitats on private lands in other locations outside of these watersheds would be developed. This includes 3,000 ac of catclaw habitat in North Las Vegas and 35 ac of mesquite in the Glendale area that occur on lands identified for disposal by the BLM.

Conservation measures would be undertaken to preserve the reserve qualities of 8,700 ac of mesquite/catclaw habitat within IMAs, most of which is comprised of catclaw, and the functionality of corridor habitat on 8,000 ac of mesquite/catclaw habitat within MUMAs, on lands under the authorities of various land management agencies (see *Environmental Baseline*, Table 12). Implementation of the conservation measures would occur under both the MSHCP (as described above and in the MSHCP, Appendix A, section 11.5), and existing agency management plans. These actions would offset adverse effects of the Proposed Action on the mesquite/catclaw ecosystem and Covered Species that occur there, thus allowing viable populations of the Covered Species to persist within mesquite/catclaw habitat in the Permit Area. The magnitude of effect to Covered Species that occur in this ecosystem is anticipated to be low or beneficial (Table 17).

This determination was made in consideration of the following information: (1) Rangewide and Action Area status of each of the species occurring in the mesquite/catclaw ecosystem (Table 16), (2) importance of the Permit Area for each of the species within the mesquite/catclaw ecosystem (Table 16), (3) direct, indirect, and beneficial effects of the Proposed Action on each

of the species occurring in the mesquite/catclaw ecosystem (Table 17), and, (4) the net change in the management level of these species as a result of the Proposed Action, including the proposed MSHCP conservation measures, special terms and conditions of the Permit, and management actions carried out under existing agency management plans.

Desert Riparian Ecosystem

Effects to the Ecosystem

Direct Effects: The effects of the proposed action may result in the loss of up to 2,700 ac (16 percent) of desert riparian habitat in Clark County (acreage occurring in UMAs) due to urban development. Another 3,300 ac of desert riparian habitat occur on Tribal lands, for which activities would not be covered under the Permit. For those activities that would require permits under section 404 of the Clean Water Act, section 7 consultation under the Act would be required, and those activities would not be covered under the Permit.

Indirect Effects: Approximately 5,700 ac (34 percent) of desert riparian habitat occur in MUMAs and are under general agency management direction. There are many potential indirect effects to the desert riparian ecosystem that may result from an increase in the population of Clark County, including additional diversions and ground water pumping to meet increasing water demands, flood control practices that channelize and stabilize stream beds, increases in recreational activities in the flood plains, and increases in activities such as wood cutting and gathering. Additional road construction may be needed to improve transportation routes, and urban and industrial development would produce additional point and non-point pollution. Development in or adjacent to the flood plain may also promote the use of pesticides to control insect populations around areas of development.

A greater demand on available water resources may lead to a decline in groundwater levels, thus altering the river system's ability to establish and maintain riparian vegetation. The Muddy River is spring-fed, and additional ground water pumping in this area may deplete spring flows into the Muddy River. Flood control practices would result in removal of riparian vegetation and alteration of the natural flow of the river. Increases in recreational activities in the flood plain may damage or destroy vegetation, and may promote an increase in the incidence of wildfires. Additional road construction within the vicinity of riparian areas may cause an acceleration in erosion, destabilization of stream banks, and additional sedimentation. Recreational activities that result in vegetation and soil disturbance may promote the spread of exotic plants and animals throughout the riparian ecosystem.

Effects to Covered Species that Primarily Occur in the Desert Riparian Ecosystem

Southwestern willow flycatcher

The southwestern willow flycatcher is dependent on dense vegetation within, or in close proximity to, standing or slow-moving water, and /or saturated soil. Several known breeding sites occur along the Virgin River, but are patchy in distribution. The Virgin River is known to

frequently change its course of flow within the flood plain, and breeding flycatchers along the Virgin River have been known to shift their nesting sites from year to year to follow the change in the flow of the river. Thus, any site within the flood plain that can accommodate a change in stream course, and has or could support dense riparian vegetation, may also be considered potential habitat for the southwestern willow flycatcher. Breeding flycatchers have also been observed in the Muddy and Virgin River deltas, but these habitats are highly susceptible to frequent long-term inundation or draw down. Flycatchers have also been detected at Las Vegas Wash, but breeding has yet to be observed at this location. The range-wide population size of this subspecies is relatively low, estimated at about 1,000 territories. Most of the known breeding sites range-wide support small populations of less than 10 territories. The Virgin River in Nevada is one of the few sites range-wide that supports a breeding population of more than 10 territories.

Most of the flycatcher's suitable and potential habitat along the Virgin River occurs in UMAs or MUMAs. However, because the flycatcher is usually found in wetland habitats, it is presumed that most project-related actions, such as flood control or construction activities, that would result in modification of flycatcher habitat would require a section 404 permit under the Clean Water Act, and therefore would also be subject to section 7 consultation under the Act. Section 404 permits are required for both Federal and non-Federal lands, including Tribal and private lands, and policies under section 404 generally require avoidance, minimization, or mitigation of any impacts to wetland habitat.

Activities that cause destruction, disturbance, or alteration to riparian habitat during the flycatcher breeding season may be a source of mortality for this species. In addition, human activities that promote the spread and proliferation of brown-headed cowbirds may increase rates of nest parasitism. Additional human development close to riparian areas may also increase the population of feral or domestic cats, which may result in increased predation of birds and nests. Disturbance from recreational activities in the vicinity of nesting flycatchers may cause birds to abandon their nests. Increased incidence of inappropriate or unlawful hunting and shooting activities may also cause nest abandonment or mortality. Some known occupied breeding sites are maintained in part by agricultural irrigation runoff. Conversion of agricultural to residential or other land uses may result in the loss of this water source, and subsequent loss of nesting habitat. Pesticide spraying to control insects may result in depletion of the flycatcher's main food source.

Yellow-billed cuckoo and summer tanager

Most ecosystem-level and species-specific threats described above apply to both these species. Nest parasitism by brown-headed cowbirds is not known to be a problem for yellow-billed cuckoos, but may be for summer tanagers. Both yellow-billed cuckoos and summer tanagers are most often found in large, mature riparian forests. Most riparian communities in southern Nevada include very little vegetation with this particular profile. Neither of these species are common along the Virgin and Muddy rivers, but individuals may potentially be affected by any activities described above that destroy, disturb, or modify riparian habitat. In addition, pesticide

spraying may be particularly harmful to yellow-billed cuckoos because of their dietary dependence on an abundant supply of large-sized insects.

American peregrine falcon

American peregrines occurring in this ecosystem breed in tall, steep cliffs along the Colorado River and in the Lake Mead and Mojave areas, and use riparian areas for hunting prey. Territories may exist in other ecosystems located in the Spring Mountains, and one or two pairs may breed on the ledges of tall buildings in Las Vegas. The ecosystem-level effects described for the desert riparian section may not apply for the American peregrine to the extent that they do for songbirds, unless those effects result in a significant reduction in the prey base. The greatest threats to the American peregrine may be related to expanding recreational rock-climbing and other related activities that may disturb nesting and roosting sites, and the addition of future power lines that may increase the chance of electrocution.

Blue grosbeak, vermilion flycatcher, and Arizona Bell's vireo

These three species are found in relatively dense, shrubby vegetation, often adjacent to open areas, agricultural fields, or wet meadows within riparian areas. These species occur, or potentially occur, along the Muddy and Virgin rivers, Meadow Valley Wash, and Las Vegas Wash. No comprehensive studies have been conducted, but using the current information available for these species, it is assumed that all ecosystem-level effects as well as specific threats to the southwestern willow flycatcher, would apply. These species are known to be hosts to the brown-headed cowbird, and although specific nest site characteristics may vary, in southern Nevada they generally use similar vegetation in close proximity to wetlands, slow-flowing water, or saturated soil.

Effects to Other Covered Species That Occur in the Desert Riparian Ecosystem

The desert riparian ecosystem is one of several of the primary ecosystems for phainopepla and western red-tailed skink. Effects to these Covered Species are discussed in the ecosystem section in which they most commonly occur, i.e., phainopepla is covered in the mesquite/catclaw ecosystem section, and western red-tailed skink is covered in the pinyon-juniper ecosystem section.

Covered Species that occur in the desert riparian ecosystem, but whose primary habitats occur in other ecosystems, are silver-haired bat, long-legged myotis, western banded gecko, Great Basin collared lizard, California kingsnake, and relict leopard frog. In general, the ecosystem-level and species-specific threats described above and in the discussion of species-specific threats under their primary ecosystem or, in the case of bats, under the bat effects section, are applicable to these species. The magnitude of indirect effect on these species may be greater than what they would experience in their primary ecosystems, because desert riparian habitats tend to receive more frequent visitation and intensity of use than the surrounding, more extensive upland habitats.

Proposed Measures to Mitigate and Minimize Effects to the Desert Riparian Ecosystem Including Effects to Covered Species

Conservation actions proposed under the MSHCP for the desert riparian ecosystem and its Covered Species would supplement ongoing conservation activities being carried out by the various land management agencies, restoration activities implemented under the Las Vegas Wash Comprehensive Adaptive Management Plan, and BOR actions to acquire southwestern willow flycatcher habitat under the Reasonable and Prudent Alternative under the biological opinion for the Lower Colorado River Operations and Maintenance Program.

In the first biennium, MSHCP measures that would benefit the desert riparian ecosystem and Covered Species include public information and education (1.a.), agency public education programs (1.c.), banded gecko surveys (3.a.), neotropical breeding bird surveys (3.c.), bat inventory (3.d.), relict leopard frog inventory (3.e.), Monitoring Avian Productivity and Survivorship (MAPS) Program (4.d.), enhanced law enforcement and ranger capabilities on Federal lands (5.d.), predator control program (5.e.), bat gates on mines and caves (5.g.), MRREIAC restoration program on Muddy River (6.a.), utilization of the Southern Nevada Restoration Team (6.b.), Las Vegas Wash Wetlands Park habitat restoration (6.d.), and Muddy River Land Acquisition Program (7.c.) as described in the *Description of the Proposed Action*. In addition, Clark County has committed to the acquisition of interests in real property and water rights on a willing-seller/willing-buyer basis, to assure viability of habitats and species located upon those lands and waters (MSHCP section 2.8.3.6), and the special terms and conditions of the Permit would require development of conservation management plans for desert riparian habitats along the Virgin and Muddy rivers, and Meadow Valley Wash. These measures should address the ecosystem-level and species-specific threats to the Covered Species occurring in desert riparian habitat in the initial years of the Permit. The AMP would gauge the effectiveness of existing conservation measures, and propose additional, or alternative conservation measures, as determined necessary, and to deal with changed or unforeseen circumstances.

Summary of Effects to the Desert Riparian Ecosystem and Covered Species

The desert riparian ecosystem provides habitat for 15 Covered Species under the MSHCP, including 9 species that occur primarily within this ecosystem. This ecosystem provides habitat for the southwestern willow flycatcher, listed as endangered under the Act, and the yellow-billed cuckoo, a species petitioned for listing under the Act. Approximately 16,900 ac of desert riparian habitat occur in the Permit Area, of which approximately 2,700 ac occurs on private lands. Most adverse effects would occur as indirect effects that result from human population growth and an increase in recreational use of public lands. Most activities that would result in adverse effects to the desert riparian ecosystem, whether on Federal or non-Federal lands, would require a permit under section 404 of the Clean Water Act. It is highly unlikely that extensive development of private lands in flood plains would occur. Implementation of the MSHCP, conservation measures, and special terms and conditions of the Permit would offset adverse effects of the proposed action on the desert riparian ecosystem and associated Covered Species, thus allowing Covered Species to persist within the Permit Area.

Conservation measures would be undertaken to preserve the reserve qualities of 5,200 ac of desert riparian habitat within IMAs, and functionality of corridor habitat on 5,700 ac of desert riparian habitat within MUMAs, on lands under the authorities of various land management agencies (see *Environmental Baseline*, Table 13). Implementation of the conservation measures would occur under both the MSHCP (as described above and in the MSHCP, Appendix A, section 12.5), and existing agency management plans. These actions would offset adverse effects of the Proposed Action on the desert riparian ecosystem and Covered Species that occur there, thus allowing viable populations of the Covered Species to persist within desert riparian habitat in the Permit Area. The magnitude of effect to Covered Species that occur in this ecosystem is anticipated to be low or beneficial (Table 17).

This determination was made in consideration of the following information: (1) Rangewide and Action Area status of each of the species occurring in the desert riparian ecosystem (Table 16), (2) importance of the Permit Area for each of the species within the desert riparian ecosystem (Table 16), (3) direct, indirect, and beneficial effects of the Proposed Action on each of the species occurring in the desert riparian ecosystem (Table 17), and, (4) the net change in the management level of these species as a result of the Proposed Action, including the proposed MSHCP conservation measures, special terms and conditions of the Permit, and management actions carried out under existing agency management plans.

Springs Ecosystem

Effects to the Ecosystem

Direct Effects: Approximately 506 springs occur within the proposed Permit Area. Of these, 78 (16 percent) occur in UMAs where they have already been modified, or could be modified or destroyed as a result of development.

Indirect Effects: Approximately 104 springs (21 percent) occur in MUMAs, for which no specific wildlife or habitat conservation management or land use restrictions are identified. An increase in Clark County's population from the development of 145,000 ac may result in an increase in recreational use around springs. Additional ground water pumping needed to meet the water demands of a growing human population may deplete ground water levels and current water flow from springs. Future diversions and impoundment of springs would further degrade or destroy the habitat in and adjacent to springs.

These activities would result in loss of spring-associated vegetation from trampling and displacement of vegetation, accelerated erosion, decreased water quality, and promotion of invading non-native and invasive species. Higher levels of recreational use may also result in the increased frequency of wildfires, increased point and non-point pollution, and incidence of inappropriate or unlawful activities. Diversions redirect spring water to an alternate location that may or may not be confined to a trough or water catchment, and may result in the conversion of spring-associated vegetation from a wetland or riparian community to a drier upland community.

Although no studies have examined the effects of impoundments of springs, the impacts may be assumed to be similar to those occurring where dams have converted stream-associated biota to lentic species.

Effects to Covered Species that Primarily Occur in the Springs Ecosystem

Relict leopard frog

Effects to the relict leopard frog would occur primarily at the ecosystem-level, and many include removal of vegetation that serves as cover for the frog, or habitat modifications that favor non-native or competitive species. As the human population within the Permit Area increases, relict leopard frogs may be adversely affected by the increased level of recreation within springs or sites occupied by the frog, introduction and encroachment of non-native predatory animals such as crayfish, bullfrogs, and largemouth bass, and increased ground water pumping that may adversely affect spring flow. An increase in the number of visitors to springs on Lake Mead NRA occupied by relict frogs may result in adverse effects to the population by damaging or destroying eggs and tadpoles. Visitors may also collect tadpoles and frogs.

The distribution of the relict leopard frog in the Permit Area represents more than 90 percent of its range-wide distribution and includes all known locations except one in Arizona. If relict leopard frogs are translocated and established in refugia, relict leopard frogs may occur on non-Federal lands (UMAs) and would be subject to additional adverse effects, where they currently do not occur in the Permit Area. These additional effects may include trampling of eggs, tadpoles, and frogs by livestock, domestic animals, and humans; harm through habitat disturbance or modification; predation by domestic animals; or mortality by exposure to toxicants. Overall, most effects to the relict leopard frog are anticipated to be beneficial as agencies involved with current management for the species would cooperatively develop and implement a management plan for the relict leopard frog as described in the *Description of the Proposed Action*.

Butterflies: Dark blue butterfly, Spring Mountains icarioides blue, Spring Mountains acastus checkerspot, Nevada admiral, Spring Mountains comma skipper

These species are dependent upon the presence of shallow water such as mud puddles, and specific larval and nectar host plant species. Thus, impacts to vegetation and substrates around springs could result in declines in butterfly populations and reductions in available suitable habitat. Host plants of the species may be subject to trampling or crushing of seedlings and adult plants, or competition from the spread of noxious weeds in their habitats. Host plant populations occurring in UMAs could be lost or fragmented as a result of the private land development, particularly in Kyle and Lee canyons, and Deer and Cold creeks. However, large scale losses of these butterflies are not expected given that very little of their habitat occurs within UMAs.

Springsnails: Spring Mountains springsnail, Southeast Nevada springsnail

In addition to the ecosystem-level effects described above, any alteration in water flow or water quality of springs, including diversion or impoundment, and alteration in temperature, clarity, or mineral content of spring water, may result in direct loss of springsnails.

Plant: Rough angelica

Habitat disturbance around springs and spring outflows could result in declines in plant populations. Individual plants may be subject to trampling or crushing of seedlings and adult plants, or competition from the spread of noxious weeds in their habitats. Several populations in Red Rock Canyon occur in narrow canyons at the bases of cliffs. These areas would increase in popularity to hikers and climbers, thus they will be subject to increased levels of trampling and other forms of damage. Plant populations occurring in UMAs could be lost or fragmented as a result of the private land development, particularly in Kyle Canyon. Large scale loss of this species is not expected given that very little of its habitat occurs within UMAs.

Effects to Other Covered Species That Occur in the Springs Ecosystem

The springs ecosystem is one of several of the primary ecosystems for Palmer's chipmunk and phainopepla. Effects to these Covered Species are discussed in the ecosystem section in which they most commonly occur, i.e., Palmer's chipmunk is covered in the mixed conifer ecosystem section, and phainopepla is covered in the mesquite/catclaw ecosystem section.

Covered Species that occur in the springs ecosystem, but whose primary habitats occur in other ecosystems, are silver-haired bat, long-eared myotis, long-legged myotis, alkali mariposa lily, Clokey thistle, inch high fleabane, and Charleston kittentails. In general, the ecosystem-level and species-specific threats described above and in the discussion of species-specific threats under their primary ecosystems or, in the case of bats, under the bat effects section, are applicable to these species. The magnitude of indirect effect on these species may be greater than that which they would experience in their primary ecosystems, because spring areas tend to receive more frequent visitation and intensity of use than the surrounding, more extensive upland habitats.

Proposed Measures to Mitigate and Minimize Effects to the Springs Ecosystem Including Effects to Covered Species

More than 64 percent of springs in Clark County are located either in IMAs or LIMAs, where existing management is focused on protection of natural resources, or low-impact recreational activities. Conservation actions proposed under the MSHCP for the springs ecosystem and its Covered Species would supplement ongoing conservation activities being carried out by the various land management agencies (MSHCP section 2.8). In the first biennium, MSHCP measures that would benefit the springs ecosystem and Covered Species include public information and education (1.a.), agency public education programs (1.c.), Palmer's chipmunk genetics research (2.c.), neotropical breeding bird surveys (3.c.), bat inventory (3.d.), relict

leopard frog inventory (3.e.), springsnail surveys and monitoring (3.f, 4.b.), Palmer's chipmunk monitoring (4.c.), enhanced law enforcement and ranger capabilities on Federal lands (5.d.), predator control program (5.e.), utilization of the Southern Nevada Restoration Team (6.b.), and springsnail habitat restoration and reintroduction (6.f.), as described in the *Description of the Proposed Action*. In addition, the special terms and conditions of the Permit would require development of conservation management plans for the low elevation springs and species dependent upon these ecosystems, including amphibians and aquatic species.

These measures should address the ecosystem-level and species-specific threats to the Covered Species associated with springs in the initial years of the Permit. The AMP would gauge the effectiveness of existing conservation measures, and propose additional, or alternative conservation measures, as determined necessary, and to deal with changed or unforeseen circumstances.

Summary of Effects to the Springs Ecosystem and Covered Species

Approximately 506 springs occur within the proposed Permit Area and are widely distributed throughout most ecosystems. Springs provide habitat for 18 Covered Species, including 11 species that occur primarily within this ecosystem, and 10 that are endemic to the Permit Area. Some springs may be directly affected by development in UMAs. Most adverse effects on springs would occur indirectly as result of human population growth in the Permit Area and the associated increase in recreational use of Federal lands. Implementation of the MSHCP and conservation measures would offset adverse effects of the proposed action on the springs ecosystem and Covered Species that occur there, thus allowing viable populations of the Covered Species to persist within the Permit Area.

Implementation of the conservation measures would occur under both the MSHCP (as described above and in the MSHCP, Appendix A, section 13.5), and existing agency management plans. Landscape-level effects to the ecosystem and population-level effects to Covered Species in springs are generally expected to be positive.

This determination was made in consideration of the following information: (1) Rangewide and Action Area status of each of the species occurring in the springs ecosystem (Table 16), (2) importance of the Permit Area for each of the species within the springs ecosystem (Table 16), (3) direct, indirect, and beneficial effects of the Proposed Action on each of the species occurring in the springs ecosystem (Table 17), and, (4) the net change in the management level of these species as a result of the Proposed Action, including the proposed MSHCP conservation measures, special terms and conditions of the Permit, and management actions carried out under existing agency management plans

Bats

Effects to Bats

The long-eared myotis, long-legged myotis, and silver-haired bat, are somewhat ubiquitous in nature, and can occur in a wide range of habitats in Clark County. These species are mostly tree-roosting bats, and are most commonly found in forested habitats in the Spring Mountains, or in the case of the silver-haired bat and possibly the long-legged myotis, within lowland desert riparian habitats. These bats may also roost or hibernate in caves, crevices, mines, and buildings throughout Clark County. They use riparian areas, springs, and artificial water developments such as wildlife water catchments and livestock troughs for foraging. Effects of the proposed action on habitat for bats include activities that would alter, degrade, or destroy roosting, foraging, or hibernating habitat, such as springs, water developments, riparian areas, forested areas, mines, caves, crevices, buildings, and bridges. Effects on bat habitat are assumed to be the same regardless of the ecosystem within which the effect occurs.

The Proposed Action would result in an increase in Clark County's population that may lead to an overall increase in recreational activities throughout the permit area, such as hiking, biking, horseback riding, hunting, OHV activity, spelunking (caving), and recreational rock-climbing. Increases in other activities that may affect habitat for bats include illegal dumping, woodcutting, increased frequency of wildfire, mining activity, and pesticide spraying. Additional ground water pumping needed to meet the water demands of a growing human population may deplete ground water levels and current water flow from springs. Future diversions and impoundment of springs would further degrade or destroy the habitat in and adjacent to springs. Increasing numbers of people exploring remote areas of Clark County may elevate the need to close abandoned mine shafts for public safety purposes.

Adverse effects that may result from an increase in the above activities include loss or degradation of foraging habitat, loss of favored tree-roosting sites, and degradation of cave, crevice, and mine roosting sites and hibernacula. Woodcutting and wildfires may result in the loss of roosting habitat, pesticide spraying may contribute to depletion of bat food sources, and excessive ground water pumping may cause springs to dry. In addition, bats may be directly affected by disturbance of maternity roosts or hibernacula. Repeated disturbance of bat-roosting habitat may cause bats to abandon favored sites. Bats may respond to disturbance during hibernation by raising their metabolic rates, which uses more stored fat and shortens the time the bat can survive in hibernation. An acceleration in cave and mine closures for reasons of public safety, may result in entombment of entire roosting or hibernating bat colonies. Bats may also be susceptible to pesticide poisoning. Organochlorine-based pesticides may be stored in fat during the late summer and fall and may cause death to bats as they use this fat during hibernation.

Proposed Measures to Mitigate and Minimize Effects to Bats

Conservation actions proposed under the MSHCP for bats would supplement ongoing conservation activities being carried out by the various land management agencies (MSHCP, section 2.8 and appendices). In the first biennium MSHCP measures that would benefit bats

include public information and education (1.a.) agency public education programs (1.c.), bat inventory (3.d.), enhanced law enforcement and ranger capabilities on Federal lands (5.d.), bat gates on mines and caves (5.g.), MRREIAC restoration program on Muddy River (6.a.), activities of SNRT (6.b.), and the Muddy River Land Acquisition Program (7.c.), as described in the *Description of the Proposed Action*. In addition, the special terms and conditions of the Permit would require development of conservation management plans for the low elevation springs, taking into consideration the conservation needs of bats within these ecosystems. These measures should address the ecosystem-level and species-specific threats to bats in the initial years of the Permit. The AMP would gauge the effectiveness of existing conservation measures, and propose additional, or alternative conservation measures, as determined necessary, and to deal with changed or unforeseen circumstances.

Summary of Effects to Bats

The three bat species covered under the MSHCP have been observed mainly in the upper elevations of the Spring Mountains, although they may occur in other ecosystems wherever mines, caves, buildings, bridges, or water provide appropriate habitat for foraging, roosting, or hibernacula. Most adverse effects would occur as indirect effects that result from human population growth and an increase in recreational use of federal lands. The silver-haired bat is not known to breed within the Permit Area, therefore, it is highly unlikely that covered activities under the MSHCP would adversely affect breeding habitat for this species.

Implementation of the conservation measures would occur under the MSHCP (as described above and in the MSHCP, Appendix A, section 14.5), and existing agency management plans. These actions would offset the adverse effects of the Proposed Action on Covered bat species, allowing viable populations of these species to persist within the Permit Area.

The magnitude of effect to Covered Species of bats is anticipated to be low or beneficial (Table 17). This determination was made in consideration of the following information: (1) Rangewide and Action Area status of each of the Covered bat species (Table 16), (2) importance of the Permit Area for each of the Covered bat species (Table 16), (3) direct, indirect, and beneficial effects of the Proposed Action on each of the Covered bat species (Table 17), and, (4) the net change in the management level of these species as a result of the Proposed Action, including the proposed MSHCP conservation measures, special terms and conditions of the Permit, and management actions carried out under existing agency management plans.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this Opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Projects located within the Permit Area that lack a Federal nexus, could contribute to significant cumulative impacts to Covered Species. However, section 9 of the Act protects listed Covered Species from unlawful take. To avoid section 9 violations, projects resulting in take of listed Covered Species require approval of the Service through the section 10(a)(1)(B) permit process. The MSHCP accompanying the application for the Permit, includes mitigation and minimization measures to offset the impacts of the incidental take.

It is expected that all non-Federal actions within Clark County over the next 30 years, would fall under purview of the proposed Permit. Future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this Opinion include the following:

- Activities associated with mining claims for locatable minerals that disturb a total of less than 5 ac outside of ACECs are not considered Federal actions, and therefore not subject to section 7 consultation.

- Future acquisition of water rights is not considered a Federal action, and therefore not subject to section 7 consultation. This action is reasonably certain to occur at an escalating rate as the population of Clark County continues to grow. Additional acquisition of water rights may result in depletion of ground water and/or instream flows, and may seriously impact listed Covered Species that are dependent on water from ground and/or surface sources.

- A small portion of non-Federal lands located in Coyote Springs Valley may be developed under a future HCP.

- Livestock grazing, residential and commercial development, agriculture, and other activities that may result in adverse effects to Covered Species, will continue on Moapa, Las Vegas Paiute, and Fort Mojave Indian Reservations. Most of these activities are not Federal actions and, therefore, not subject to section 7 consultation.

CONCLUSION

Federally Listed Species/Critical Habitat

After reviewing the current status of the desert tortoise and southwestern willow flycatcher, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is the Service's biological opinion that issuance of an incidental take permit pursuant to section 10(a)(1)(B) of the Act is not likely to jeopardize the continued existence of these species. Furthermore, critical habitat would not be destroyed or adversely modified to the extent that the constituent elements are appreciably diminished and the habitat no longer serves its role in the survival and recovery of the species. Below is a summary of the activities and conditions that were particularly instrumental in supporting the Service's conclusion with regard to the desert tortoise and southwestern willow flycatcher:

Desert Tortoise

1. BLM has designated ACECs within the Permit Area and secured habitat within them through the Las Vegas RMP, in accordance with the Desert Tortoise Recovery Plan. These areas are designated in the MSHCP as IMAs which would be conserved and contribute towards recovery of the tortoise.

2. Recovery actions have been implemented by the Applicants, and State and Federal agencies, through the Short-Term HCP and DCP that should result in a substantial improvement in the status of the desert tortoise over the environmental baseline within the Northeast Mojave RU and Eastern Mojave RU.

3. Critical habitat/DWMAs would not be directly or indirectly impacted by permitted activities to the extent that they no longer function as reserves pursuant to recommendations in the Desert Tortoise Recovery Plan.

4. Most development and habitat disturbance within desert tortoise habitat in the Permit Area, would occur within urbanized, degraded areas and would not directly impact conserved habitat or any area designated for recovery of the desert tortoise. The loss of 145,000 ac of desert tortoise habitat represents approximately 4 percent of the total amount of tortoise habitat in the Permit Area.

5. Impacts to desert tortoises within the Permit Area represent a small impact to the Northeast Mojave RU and Eastern Mojave RU when total desert tortoise population numbers and geographical extent are considered within these recovery units.

6. The level of management and conservation established under the Short-Term HCP and DCP would continue under the MSHCP to maintain or improve the status of the desert tortoise in the Permit Area and affected RUs.

Southwestern Willow Flycatcher

1. Most activities that may adversely affect southwestern willow flycatcher would require permits from the Army Corps of Engineers under section 404 of the Clean Water Act. Actions requiring section 404 permits are considered Federal actions which are subject to consultation under section 7 of the Act, and are not covered under the Permit.

2. Lethal take, including disturbance of active nests, is not authorized under the Permit.

3. Conservation measures proposed in the MSHCP, along with implementation of the special terms and conditions of the Permit (e.g., acquisition of private lands in riparian habitats and development of conservation management plans), would result in a net improvement of the status of the flycatcher over the environmental baseline for the desert riparian ecosystem in Clark County.

Other Covered Species - Not listed as Threatened or Endangered

After reviewing the current status of the other 76 Covered Species (see Table 1 for list of these species), the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, and the issuance of an incidental take permit, it is the Service's opinion that should any of these species be listed in the future, issuing the incidental take permit and executing the process described in the IA are not likely to jeopardize the continued existence of the 76 unlisted Covered Species in the wild. Below is a summary of the components of the proposed MSHCP that were particularly instrumental in supporting the Service's conclusion with regard to currently unlisted Covered Species:

1. Prior and ongoing conservation and recovery actions for the desert tortoise have resulted in a net conservation benefit to co-occurring Covered Species in the Mojave desert scrub, salt desert scrub, and blackbrush ecosystems.

2. The MSHCP would enhance the ability of the Federal land management agencies in carrying out conservation activities for Covered Species under existing resource management plans including the BLM Las Vegas RMP, USFS Spring Mountains NRA GMP, and NPS Lake Mead NRA GMP.

3. Adaptive management would monitor the effectiveness of measures during the term of the Permit, and recommend additional measures or modifications to existing measures as necessary.

4. Silver-haired bat, long-eared myotis, and long-legged myotis. Most of the habitat for these species occurs in IMAs and LIMAs, where existing management is focused on protection of natural resources or low-impact recreational activities. Most activities associated with the issuance of the Permit would not impact these bat species. The silver-haired bat is known only as a transient spring migrant in Clark County. All three bat species are widespread throughout the United States. Existing conservation efforts by the

land management agencies, along with measures proposed in the MSHCP, and implementation of the special terms and conditions of the Permit (e.g., conservation management plans for low elevation springs) would result in a net improvement in the baseline conditions for bat species in Clark County.

5. Palmer's chipmunk. Most of the habitat for this species occurs in IMAs and LIMAs, where existing management is focused on protection of natural resources, or low-impact recreational activities. Actions identified in the Spring Mountains NRA CA, including predator control programs and habitat restoration projects, would protect Palmer's chipmunk and its habitat. Increased law enforcement and ranger capabilities proposed by the MSHCP would reduce the chance of road kill from speeding vehicles, and other unauthorized or inappropriate activities that may adversely affect Palmer's chipmunk and its habitat.

6. Yellow-billed cuckoo. Most activities that may adversely affect the yellow-billed cuckoo would require permits under section 404 of the Clean Water Act. Actions requiring section 404 permits are considered Federal actions which are subject to consultation under section 7 of the Act, and are not covered under the Permit. Lethal take, including disturbance of active nests, is not authorized under the Permit. Suitable or potential habitat for the species is limited in Clark County. Existing conservation efforts, along with measures proposed in the MSHCP and implementation of the special terms and conditions of the Permit (e.g. acquisition of private lands in riparian habitats and development of conservation management plans) would result in a net improvement in the baseline conditions of habitat important to the species.

7. American peregrine falcon. Lethal take, including disturbance of active nests, is not authorized under the Permit. The species is widely distributed throughout North America. Activities proposed in the MSHCP for non-Federal lands in Clark County would not adversely affect the rangewide status of the American peregrine falcon and should not result in substantial habitat loss within the Permit Area.

8. Phainopepla. Lethal take, including disturbance of active nests, is not authorized under the Permit. Existing conservation efforts, along with measures proposed in the MSHCP, and implementation of the special terms and conditions of the Permit (e.g. acquisition of private lands in riparian habitats) would result in a net improvement in the baseline conditions of habitat important to the species.

9. Blue grosbeak, summer tanager, vermilion flycatcher, and Arizona Bell's vireo. Most activities that may adversely affect these species would require permits under section 404 of the Clean Water Act. Actions requiring section 404 permits are considered Federal actions which are subject to consultation under section 7 of the Act, and are not covered under the Permit. Lethal take, including disturbance of active nests, is not authorized under the Permit. Existing conservation efforts, along with measures proposed in the MSHCP and implementation of the special terms and conditions of the Permit (e.g.

acquisition of private lands in riparian habitats and development of conservation management plans) would result in a net improvement in the baseline conditions of habitat important to the species.

10. Large-spotted leopard lizard, desert iguana, and Great Basin collared lizard. While these species are subject to commercial collection and habitat disturbance within the Permit Area, their ecology, range and distribution, and relative abundance, as described in the *Status of the Species* sections, conservation provided in the IMAs and LIMAs including prohibition of all collecting on NPS lands and other conservation areas, and an increase in law enforcement presence provide the basis for providing coverage for these species.

11. Western banded gecko (two subspecies). This lizard is widely distributed within the Permit Area and is an important component of the food chain for other Covered Species and non-Covered Species. Conservation of this species would involve protection of habitat (e.g., dead and down woody material), and management of roads and OHV activity in a manner that does not impact this species and its habitat. The impacts to the banded gecko that occur in the Permit Area that may result from this activity are believed to be low because: (1) banded geckos are widely distributed across millions of acres and seven ecosystems within the Permit Area, and (2) these lizards are locally abundant, produce multiple egg clutches, and reach sexual maturity in approximately 1 year.

12. Western red-tailed skink. This lizard is widely distributed across the Permit Area, although not known to be abundant at any location. Conservation of remote areas under current management and implementation of protective measures in the MSHCP would enhance the status of this species, ensuring persistence of viable populations throughout the Permit Area.

13. Relict leopard frog. All known populations and occurrences of this amphibian are within IMAs managed by NPS. Collaborative conservation efforts by NPS, NDOW, University of Nevada, Reno (UNR), the Service, and other species experts would ensure that conservation of this species is accomplished under the MSHCP.

14. California kingsnake, glossy snake (two subspecies), western long-nosed snake, western leaf-nosed snake, and Sonoran lyre snake. Limited numbers of these snakes are commercially collected in the Permit Area; however, most collection occurs on roads or by chance encounter. Most impacts to these species occur as a result of vehicle encounters and habitat disturbance. Measures proposed in the MSHCP to reduce impacts to these and other species impacted by roads and degradation of habitat in IMAs and LIMAs (e.g., wilderness areas, NRAs, and ACECs) would result in conservation of these species beyond the level to which they would be impacted by Covered Activities.

15. Sidewinder, speckled rattlesnake (two subspecies), and Mojave green rattlesnake. As stated above for other Covered snake species, a relatively small number of these rattlesnakes (i.e., 6 to 17 per year within the Permit Area) are collected by chance encounter and on roads. The emotion that rattlesnakes evoke on humans make these

more vulnerable to human impacts. Rattlesnakes are frequently killed when encountered by humans out of fear or ignorance. Measures are proposed in the MSHCP to inform the public of conservation measures that they may implement to conserve these snakes and other Covered Species, and the ecosystems on which they depend. In addition, other measures proposed in the MSHCP to reduce impacts to these and other species impacted by roads and degradation of habitat in IMAs and LIMAs would result in conservation of these species beyond the level to which they would be impacted by Covered Activities.

16. Plant and invertebrate species included in the Spring Mountains CA: These species include: Clokey eggvetch, rough angelica, Charleston pussytoes, rosy King sandwort, Clokey milkvetch, Spring Mountains milkvetch, Clokey paintbrush, Clokey thistle, Jaeger whitlowgrass, Charleston draba, inch high fleabane, Clokey greasebush, smooth pungent greasebush, pungent dwarf greasebush, hidden ivesia, Jaeger ivesia, Hitchcock bladderpod, Charleston pinewood lousewort, Charleston beardtongue, Jaeger beardtongue, Clokey mountain sage, limestone (Charleston) violet, Clokey catchfly, Charleston tansy, Charleston kittentails, Charleston grounddaisy, dark blue butterfly, Spring Mountains icarioides blue butterfly, Mount Charleston blue butterfly, Spring Mountains acastus checkerspot, Morand's checkerspot, Carole's silverspot, Nevada admiral, Spring Mountains comma skipper, Spring Mountains springsnail, and southeast Nevada springsnail.

    There are very few areas in the Spring Mountains not under Federal management. Therefore, very little of the habitat of the Spring Mountains species would be directly disturbed or destroyed by the Proposed Action. All of the Spring Mountains endemic Covered Species are protected and managed under the Spring Mountains NRA CA. Several covered plant species which occur in the Spring Mountains but are not specifically named in the CA, are incidentally protected under the CA. These species include Clokey paintbrush, inch high fleabane, Hitchcock bladderpod, Charleston pinewood lousewort, Jaeger beardtongue, and limestone violet. Other management plans are in place that provide conservation benefits for these species, including the Red Rock Canyon NCA GMP, the Spring Mountains NRA GMP, and DNWR plans and policies.

17. Plant species not addressed in the Spring Mountains NRA Conservation Agreement:

    - Blue Diamond cholla. The vast majority of occupied and suitable habitat for this species occurs within lands managed as a LIMA in the Red Rock Canyon NCA. Blue Diamond cholla is afforded protection through the implementation of a CA that would focus resources toward on-the-ground conservation and management activities. In addition, this species receives other conservation benefits through the Red Rock Canyon NCA GMP.

    - Sticky ringstem and Las Vegas bearpoppy. These species occur in similar habitats within Mojave desert scrub and are subject to similar effects on an ecosystem as well as species-specific level. While approximately 17 percent of occupied and suitable habitat for the Las Vegas bearpoppy occurs within UMAs

and much of these lands are expected to be lost to urban expansion, existing conservation efforts under BLM's bearpoppy habitat management plan and the Lake Mead NRA GMP, together with measures proposed in the MSHCP, including the Las Vegas bearpoppy MOA, are expected to offset any adverse impacts resulting from the Proposed Action. Because sticky ringstem generally occurs in habitats similar to those occupied by the bearpoppy, it incidentally benefits from these conservation actions.

- Sticky buckwheat and threecorner milkvetch. These species overlap in distribution within the Permit Area. Less than 4 percent of the total occupied and suitable habitat for these species occurs within UMAs, and between 70 and 82 percent, respectively, of the habitat occurs within MUMAs, which would not be directly impacted by the Proposed Action. Indirect effects would be minimized and offset by conservation measures proposed under the MSHCP. Under the special permit terms and conditions, management plans for the Covered low-elevation plant species would be developed to address conservation needs for the species and their habitats.

- Alkali mariposa lily and white-margined beardtongue. Within the Permit Area, the majority of occupied and suitable habitat for these species occurs in IMAs, LIMAs, and MUMAs. While some direct losses of individuals and their habitat may be lost in UMAs as a result of urban development and associated activities, no direct effects would occur in the conservation management areas. These losses would be offset by conservation measures proposed under the MSHCP. Under the special permit terms and conditions, management plans for the Covered low-elevation plant species would be developed to address conservation needs for the species and their habitats.

- White bearpoppy, Pahrump Valley buckwheat, and Parish's phacelia. The majority of the habitat supporting these species occurs within IMAs and LIMAs, where no direct effects from the proposed action would occur. While some habitat contained within UMAs may be lost as a result of urban development and associated activities, these impacts would be offset by conservation measures proposed under the MSHCP. Where the Pahrump Valley buckwheat and Parish's phacelia occur in mesquite ecosystems, they are provided protection through management actions included in BLM's Mesquite Management Plan. Under the special permit terms and conditions, management plans for the Covered low-elevation plant species would be developed to address conservation needs for the species and their habitats.

- Red Rock Canyon aster. The entire range of the Red Rock Canyon aster occurs within the Red Rock Canyon NCA, thus, no direct impacts would occur. Any indirect effects would be offset by conservation measures proposed under the MSHCP and carried out under the Red Rock Canyon NCA GMP.

- *Anacolia menziesii, Claopodium whippleanum, Dicranoweisia crispula, and Syntrichia princeps*. The known populations of these mosses in the Permit Area occur on lands managed as IMAs and LIMAs, therefore they would not be directly affected by the Proposed Action. Any indirect effects would be offset by conservation measures proposed under the MSHCP and carried out under the Red Rock Canyon NCA GMP, Spring Mountains GMP, and BLM Las Vegas RMP.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act, and Federal regulations issued pursuant to section 4(d) of the Act, prohibit take of endangered and threatened species, respectively, without special exemption. *Take* is defined as to *harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct* of listed species of fish and wildlife. *Harm* is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering (50 CFR § 17.3). *Harass* is defined as actions that create the likelihood of injury to listed species by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering (50 CFR § 17.3). *Incidental take* is any take of listed animal species that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or the Applicants. Under the terms of sections 7(b)(4) and 7(o)(2) of the Act, taking that is incidental to and not intended as part of the agency action, is not considered a prohibited taking provided that such taking is in compliance with this incidental take statement.

The MSHCP identifies anticipated effects to Covered Species likely to result from the proposed action and the measures that may be necessary and appropriate to minimize and mitigate those effects. All conservation measures described in the MSHCP, together with the terms and conditions described in the IA and Permit are hereby incorporated by reference as reasonable and prudent measures and terms and conditions within this Incidental Take Statement, pursuant to 50 CFR section 402.14(i). Such terms and conditions are non-discretionary and must be undertaken for the exemptions under section 10(a)(1)(B) and section 7(o)(2) of the Act to apply. If the Applicants fail to adhere to these terms and conditions, the protection of the Permit, and section 7(o)(2) may lapse. The amount or extent of the incidental take anticipated under the MSHCP, associated reporting requirements, and provisions for disposing of dead or injured animals, are as described in the Permit.

Because 76 of the 78 Covered Species addressed in this Opinion are not currently listed or proposed for listing, there is no take prohibition under the Act for these species at the time of writing. The incidental take statement for the unlisted Covered Species and the Permit do not become effective until they are listed under the Act.

Sections 7(b)(4) and 7(o)(2) of the Act, generally do not apply to listed plant species. However, limited protection of listed plants is provided to the extent that the Act prohibits the removal and reduction to possession of federally-listed endangered plants, or the malicious damage of such plants, on areas under Federal jurisdiction, or the destruction of endangered plants on non-Federal areas, in violation of State law or regulation, or in the course of any violation of a State criminal trespass law.

To the extent the incidental take statements conclude that take of any migratory bird species listed as threatened or endangered under the Act would result from the Service's issuance of the Permit, the Service would not refer the incidental take of such migratory bird or eagle for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 USC sections

703-712) or the Bald and Golden Eagle Protection Act of 1940, as amended (16 USC sections 668-668-d), if such take is in compliance with the terms and conditions (including amount and/or number) specified herein.

Amount or Extent of Take

It was determined that a numeric cap on incidental take of Covered Species in the Permit Area would be arbitrary and difficult to administer. The Applicants propose to disturb or develop a maximum of 145,000 ac within the 11 ecosystems. The Applicants would track the number of acres of habitat disturbance under the Permit, by ecosystem. If the number of acres of disturbance for a given ecosystem is reached, no additional take of Covered Species or loss of their habitat would be covered under the Permit as issued. In this case, the Applicants shall contact the Service for instruction. This acreage of disturbance would occur within UMAs, but the precise locations of these lands to be disturbed are unknown at this time. In addition, the Service does not have precise estimates of the number of individual Covered Species that may be taken as a result of development within the Permit Area. Therefore, the Service anticipates habitat loss may occur up to the limits defined below for each ecosystem.

Alpine Ecosystem

The only Covered Species for which incidental take may apply (i.e., animal species) is the Morand's checkerspot butterfly, an unlisted species that uses this ecosystem as its secondary habitat. All alpine habitat occurs within IMAs thus, there would be no direct loss of alpine habitat under the MSHCP. Therefore, no incidental take is provided for this butterfly within the alpine ecosystem.

Bristlecone Pine Ecosystem

According to the MSHCP, a total of 1,000 ac of bristlecone pine habitat, representing 6 percent of the total acreage of bristlecone pine habitat, occurs within UMAs and is subject to disturbance under the MSHCP. However, most or all of these private lands have been, or would be, acquired by the USFS. Therefore, while disturbance of the entire 1,000 ac is unlikely, such a loss of habitat would be permitted under the MSHCP. No currently listed Covered Species occur within this ecosystem.

The bristlecone pine ecosystem is the primary ecosystem for the Mount Charleston blue butterfly and Morand's checkerspot butterfly. Other unlisted Covered Species that occur within this ecosystem for which incidental take applies, include the long-legged myotis, silver-haired bat, long-eared myotis, Palmer's chipmunk, dark blue butterfly, Spring Mountains icarioides blue butterfly, Spring Mountains acastus checkerspot butterfly, Carole's silverspot butterfly, and Spring Mountains comma skipper. Incidental take in the form of killing, wounding, harming, or harassing of all Covered Species identified above may occur on up to 1,000 ac of the bristlecone pine ecosystem located in UMAs, although it is highly unlikely that much of this area would be disturbed under the Permit.

Mixed Conifer Ecosystem

A total of 1,500 ac of mixed conifer habitat occurs within UMAs and is subject to disturbance under the MSHCP. This represents 3 percent of the total acreage of mixed conifer habitat within the Permit Area. It is unlikely that all of this area would be disturbed under the MSHCP. Although no currently listed Covered Species occur within this ecosystem, the mixed conifer ecosystem is the Primary Ecosystem for unlisted species of Covered animals including the Palmer's chipmunk, American peregrine falcon, dark blue butterfly, Spring Mountains icarioides blue butterfly, Mount Charleston blue butterfly, Spring Mountains acastus checkerspot butterfly, Carole's silverspot butterfly, Nevada admiral, and Spring Mountains comma skipper. Other unlisted Covered Species that occur within this ecosystem for which incidental take applies, include the silver-haired bat, long-eared myotis, long-legged myotis, western red-tailed skink, Sonoran lyre snake, and Morand's checkerspot butterfly,. Incidental take in the form of killing, wounding, harming, or harassing of all Covered Species identified above, with the exception of the American peregrine falcon, may occur on up to 1,500 ac of the mixed conifer ecosystem located in UMAs. Lethal take of avian species covered under the Permit, including disturbance of active nests, is not authorized. Incidental take of the American peregrine falcon may occur in the form of harassment.

Pinyon-Juniper Ecosystem

A total of 4,200 ac of pinyon-juniper habitat occurs within UMAs and is subject to disturbance under the MSHCP. This represents 1 percent of the total acreage of pinyon-juniper habitat within the Permit Area. It is unlikely that all of this area would be disturbed under the Permit. Although no currently listed Covered Species occurs within this ecosystem, it serves as the Primary Ecosystem for unlisted species of Covered animals including the American peregrine falcon, western red-tailed skink, and Carole's silverspot butterfly. Other unlisted Covered Species that occur within this ecosystem for which incidental take applies, include the silver-haired bat, long-eared myotis, long-legged myotis, Palmer's chipmunk, western banded gecko, large-spotted leopard lizard, Great Basin collared lizard, California kingsnake, glossy snake, Sonoran lyre snake, speckled rattlesnake, dark blue butterfly, Morand's checkerspot butterfly, Nevada admiral, and Spring Mountains comma skipper. Incidental take in the form of killing, wounding, harming, or harassing of all Covered Species identified above, with the exception of the American peregrine falcon, may occur on up to 4,200 ac of the UMAs in pinyon-juniper ecosystem. Lethal take of avian species covered under the Permit, including disturbance of active nests, is not authorized. Incidental take of the American peregrine falcon may occur in the form of harassment.

Sagebrush Ecosystem

A total of 900 ac of sagebrush habitat occurs within UMAs and is subject to disturbance under the MSHCP. This represents less than 1 percent of the total acreage of sagebrush habitat within the Permit Area. It is unlikely that all of this area would be disturbed under the MSHCP. Although no currently listed Covered Species occurs within this ecosystem, it serves as the Primary Ecosystem for unlisted species of Covered animals including the American peregrine

falcon and Great Basin collared lizard. Unlisted Covered Species that occur within this ecosystem for which incidental take applies, include the silver-haired bat, long-eared myotis, long-legged myotis, western banded gecko, western red-tailed skink, large-spotted leopard lizard, California kingsnake, glossy snake, western long-nosed snake, speckled rattlesnake, and Spring Mountains acastus checkerspot. Incidental take in the form of killing, wounding, harming, or harassing of all Covered Species identified above, with the exception of the American peregrine falcon, may occur on up to 900 ac of the sagebrush ecosystem located in UMAs. Lethal take of avian species covered under the Permit, including disturbance of active nests, is not authorized. Incidental take of the American peregrine falcon may occur in the form of harassment.

Blackbrush Ecosystem

A total of 8,700 ac of blackbrush habitat occurs within UMAs, of which 8,500 ac is subject to disturbance under the MSHCP. This represents 1 percent of the total acreage of blackbrush habitat within the Permit Area. It is unlikely that all of this area would be disturbed under the MSHCP. Blackbrush habitat provides marginal to low-density desert tortoise habitat. This ecosystem does not serve as the Primary Ecosystem for any Covered Species. Unlisted Covered Species that occur within this ecosystem for which incidental take applies, include the silver-haired bat, long-legged myotis, western banded gecko, western red-tailed skink, large-spotted leopard lizard, Great Basin collared lizard, California kingsnake, glossy snake, western long-nosed snake, Sonoran lyre snake, speckled rattlesnake, and Mojave green rattlesnake. Incidental take in the form of killing, wounding, harming, or harassing of all Covered Species identified above may occur on up to 8,500 ac of the blackbrush ecosystem located in UMAs.

Salt Desert Scrub Ecosystem

A total of 19,800 ac of salt desert scrub habitat occurs within UMAs, of which 18,500 ac is subject to disturbance under the MSHCP. This represents 10 percent of the total acreage of salt desert scrub habitat within the Permit Area. It is unlikely that all of this area would be disturbed under the MSHCP. The salt desert scrub ecosystem provides secondary habitat for the desert tortoise. This ecosystem serves as the Primary Ecosystem for unlisted species of Covered animals including the large-spotted leopard lizard and Great Basin collared lizard. Other unlisted Covered Species that occur within this ecosystem for which incidental take applies, include the western banded gecko, desert iguana, California kingsnake, glossy snake, western long-nosed snake, western leaf-nosed snake, Sonoran lyre snake, and sidewinder. Incidental take in the form of killing, wounding, harming, or harassing of all Covered Species identified above may occur on up to 18,500 ac of the salt desert scrub ecosystem in UMAs.

Mojave Desert Scrub Ecosystem

A total of 285,000 ac of Mojave desert scrub habitat occurs within UMAs, of which, up to 145,000 ac is subject to disturbance under the MSHCP (acreage limit for the Permit). This represents 4 percent of the total acreage of Mojave desert scrub habitat within the Permit Area. The Mojave desert scrub ecosystem serves as the Primary Ecosystem for the desert tortoise and unlisted species of Covered animals including the western banded gecko, desert iguana, large-

spotted leopard lizard, Great Basin collared lizard, California kingsnake, glossy snake, western long-nosed snake, western leaf-nosed snake, Sonoran lyre snake, sidewinder, speckled rattlesnake, and Mojave green rattlesnake. Other unlisted Covered Species that occur within this ecosystem for which incidental take applies, include the western red-tailed skink. Incidental take in the form of killing, wounding, harming, or harassing of all Covered Species identified above may occur on up to 145,000 ac of the Mojave desert scrub ecosystem located in UMAs.

Mesquite/Catclaw Ecosystem

A total of 5,000 ac of mesquite/catclaw habitat, representing 23 percent of the total acreage in this ecosystem, occurs within UMAs. Of this acreage, 100 ac are located on Tribal lands, for which coverage is not authorized under the Permit. The remaining 4,900 ac of private lands are subject to disturbance under the MSHCP. Furthermore, additional acreage of mesquite and catclaw habitat, currently classified as MUMAs may exist on lands identified for disposal by BLM, and are likely to be developed in the future. A majority of the habitat in UMAs occurs in areas that are either surrounded by existing development (habitat in Las Vegas Valley) or are highly likely to be developed for urban or agricultural purposes (habitat located in North Las Vegas and Glendale).

The mesquite/catclaw ecosystem serves as the Primary Ecosystem for unlisted Covered Species including the blue grosbeak, phainopepla, vermilion flycatcher, Arizona Bell's vireo, and western banded gecko. Other non-listed Covered Species that occur within this ecosystem for which incidental take applies, include the silver-haired bat, long-legged myotis, desert iguana, western red-tailed skink, Great Basin collared lizard, California kingsnake, Sonoran lyre snake, and sidewinder.

Under the special permit terms and conditions, take of avian species, with the exception of the phainopepla, would not be authorized until acquisition of private lands in desert riparian habitats along the Muddy and Virgin rivers, and Meadow Valley Wash has occurred. These lands may also include mesquite and/or catclaw habitat. Covered Species most closely associated with mesquite/catclaw habitat in riparian areas that would benefit from this condition include blue grosbeak, vermilion flycatcher, and Arizona Bell's vireo. The total number and location of acres to be acquired within each watershed would be identified in conservation management plans to be developed in accordance with the special permit terms and conditions. Therefore, the total acreage of mesquite/catclaw habitat subject to disturbance under the MSHCP is unknown, but would be less than 4,900 ac.

Lethal take of all avian species covered under the Permit, including disturbance of active nests, is not authorized. Incidental take of avian species may occur in the form of harassment. Incidental take of the silver-haired bat, long-legged myotis, western banded gecko, desert iguana, western red-tailed skink, Great Basin collared lizard, California kingsnake, Sonoran lyre snake, and sidewinder may occur in the form of killing, wounding, harming, or harassment.

Desert Riparian Ecosystem

The desert riparian ecosystem is the Primary Ecosystem for one federally-listed Covered Species, (southwestern willow flycatcher), and one Covered Species that has been petitioned for listing (yellow-billed cuckoo). The desert riparian ecosystem is also the Primary Ecosystem for other unlisted species of Covered animals including the American peregrine falcon, blue grosbeak, phainopepla, summer tanager, vermilion flycatcher, and Arizona Bell's vireo. Other unlisted Covered Species that occur within this ecosystem for which incidental take applies, include the long-legged myotis, silver-haired bat, western banded gecko, western red-tailed skink, Great Basin collared lizard, California kingsnake, and relict leopard frog.

A total of 6,000 ac of desert riparian habitat, representing 35 percent of the total acreage in this ecosystem, occurs within UMAs. Of this acreage, 3,300 ac are located on Tribal lands, for which coverage is not authorized under the Permit for the MSHCP. The remaining 2,700 ac of private land in UMAs, are subject to disturbance under the MSHCP. All of the habitat in UMAs occurs in flood plains where future urban development is unlikely. However, effects related to high levels of disturbance resulting from agricultural and recreational activities, are highly likely to occur throughout riparian habitats in UMAs. Furthermore, suitable and/or occupied habitat for the southwestern willow flycatcher is present within a majority of the habitat within UMAs along the Virgin River. Under the special permit terms and conditions, take of avian species, with the exception of American peregrine falcon and phainopepla, would not be authorized until acquisition of private lands in desert riparian habitats along the Muddy and Virgin rivers, and Meadow Valley Wash has occurred. Covered avian species associated with desert riparian habitat that would benefit from this condition include southwestern willow flycatcher, yellow-billed cuckoo, blue grosbeak, summer tanager, vermilion flycatcher, and Arizona Bell's vireo. The total number and location of ac to be acquired within each watershed would be identified in conservation management plans to be developed in accordance with the special permit terms and conditions. Therefore, the total acreage of desert riparian habitat subject to disturbance under the MSHCP is unknown, but would be less than 2,700 ac.

Lethal take of all avian species covered under the Permit, including disturbance of active nests, is not authorized. Incidental take of avian species may occur in the form of harassment. Incidental take of the long-legged myotis, silver-haired bat, western banded gecko, western red-tailed skink, Great Basin collared lizard, California kingsnake, and relict leopard frog may occur in the form of killing, wounding, harming, or harassment.

Springs Ecosystem

A total of 74 springs, representing 15 percent of the total number of springs in Clark County, occur within UMAs and are subject to disturbance or modification under the MSHCP. An additional four springs located in UMAs occur on Tribal lands, for which coverage is not authorized under the Permit for the MSHCP. No currently listed Covered Species occur within this ecosystem.

The springs ecosystem serves as the Primary Ecosystem for unlisted species of Covered animals including the Palmer's chipmunk, phainopepla, relict leopard frog, dark blue butterfly, Spring Mountains icarioides blue butterfly, Spring Mountains acastus checkerspot butterfly, Nevada admiral, Spring Mountains comma skipper, Spring Mountains springsnail, and southeast Nevada springsnail. Other unlisted Covered Species that occur within this ecosystem for which incidental take applies, include the long-eared myotis, long-legged myotis, and silver-haired bat. Incidental take in the form of killing, wounding, harming, or harassing of all Covered Species identified above, with the exception of phainopepla, may occur on up to 74 springs located within UMAs. Lethal take of avian species, including disturbance of active nests, is not authorized. Incidental take of phainopepla may occur in the form of harassment.

Effect of Take

Covered Species - Listed as Threatened or Endangered

In the accompanying biological opinion, the Service determined that this level of incidental take is not likely to result in jeopardy to the desert tortoise or southwestern willow flycatcher, or destruction or adverse modification of critical habitat to the extent that it no longer serves for recovery of the Species.

Covered Species - Not Listed as Threatened or Endangered

In the accompanying conference opinion, the Service determined that this level of incidental take is not likely to result in jeopardy to the following unlisted, un-proposed Covered Species: silver-haired bat, long-eared myotis, long-legged myotis, Palmer's chipmunk, yellow-billed cuckoo, American peregrine falcon, blue grosbeak, phainopepla, summer tanager, vermilion flycatcher, Arizona Bell's vireo, western banded gecko, desert iguana, western red-tailed skink, large-spotted leopard lizard, Great Basin collared lizard, California kingsnake, glossy snake, western long-nosed snake, western leaf-nosed snake, Sonoran lyre snake, sidewinder, speckled rattlesnake, Mojave green rattlesnake, relict leopard frog, dark blue butterfly, Spring Mountains icarioides blue butterfly, Mount Charleston blue butterfly, Spring Mountains acastus checkerspot, Morand's checkerspot butterfly, Carole's silverspot butterfly, Nevada admiral, Spring Mountains comma skipper, Spring Mountains springsnail, and southeast Nevada springsnail.

Reasonable and Prudent Measures and Terms and Conditions

The MSHCP and accompanying agreements and the special permit terms and conditions identify anticipated adverse effects to all Covered Species likely to result from the proposed actions, and the specific measures and levels of species and habitat protection that are necessary and appropriate to minimize those adverse effects. All of the conservation and management measures in the MSHCP and accompanying agreements, together with the terms identified in the associated IA and the special permit terms and conditions, are hereby incorporated by reference as reasonable and prudent measures, and terms and conditions for this incidental take statement pursuant to 50 CFR 402.14(I). Such terms and conditions are non-discretionary and must be

undertaken by the Applicants for the exemptions under section 10(a)(1)(B) and section 7(o)(2) of the Act to apply. If the Applicants fails to adhere to these terms and conditions, the protective coverage of the Permit and section 7(o)(2) may lapse.

Further, the following terms and conditions apply to the Service after issuance of the Permit:

1. The Service shall provide technical assistance to Clark County throughout the term of the Permit, including staffing the I & M Committee described in this Opinion and the MSHCP;

2. The Service shall, at the time of listing of any of the 76 currently unlisted Covered Species, reassess the analyses in this Opinion, and determine whether continued implementation of the MSHCP and Permit would jeopardize the continued existence of any of the Covered Species;

3. The Service shall participate in the biennial budget process, and, in cooperation with Clark County, its AMP contractor, and the land management agencies, shall review and prioritize conservation measures identified in the MSHCP, assist in technical review of proposals submitted to the County through the biennial budget process, and assist in determining the need to fund these measures through the MSHCP.

4. The Service shall participate in studies proposed and funded under the MSHCP, including evaluation of effectiveness for conservation of Covered Species, and shall ensure that all funded activities are consistent with the conservation goals of the MSHCP.

Reporting Requirements

In accordance with 50 CFR 402.14(I)(3), the MSHCP and accompanying agreements specify provisions for monitoring and reporting the effects and effectiveness of the mitigation and minimization measures on the Covered Species and their habitats. Clark County shall ensure that the reporting requirements proposed in section 2.12 of the MSHCP are implemented.

Conservation Recommendations

Sections 7(a)(1) of the Act direct Federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The Service recommends the following conservation recommendations:

1. The Service recommends that the County, BLM, and Service develop a strategy to contain urbanization to a defined area, encouraging development within the urbanized Las Vegas Valley.

2. The Service recommends that the Applicants not seek further incidental take and habitat loss under section 10(a)(1)(B) of the Act within the Permit Area.

3. The Applicants, in coordination with NDOW and commercial reptile collectors, should encourage removal of reptiles from substantial parcels that are scheduled for blading or development and encourage captive breeding of reptiles, particularly for those extensively collected. Animals removed from areas to be developed should be used to provide stock for captive breeding programs, in accordance with state wildlife regulations.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

Reinitiation Requirement

This concludes formal consultation and conference on the implementation of the MSHCP and issuance of a Permit. As provided in 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may impact listed species or critical habitat in a manner or to an extent not considered in this Opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this Opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

At the time of listing, the Service is to confirm the conference opinion as a biological opinion issued through formal consultation if any currently unlisted Covered Species is listed. If the Service reviews the proposed action and finds that there has been no significant changes in the action as planned or in the information used during the conference, the Service will confirm the conference opinion as the biological opinion on the proposed action and no further section 7 consultation will be necessary.

After listing of any currently unlisted Covered Species, and any subsequent adoption of this conference opinion, the Service shall request reinitiation of consultation if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may impact listed species or critical habitat in a manner or to an extent not considered in this Opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this Opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action.

The incidental take statement provided in this conference opinion for unlisted Covered Species does not become effective until the unlisted Covered Species is listed and the conference opinion is adopted as the biological opinion issued through formal consultation. At that time, the project will be reviewed to determine whether any take of any unlisted Covered Species has occurred. Modifications of the opinion and incidental take statement may be appropriate to reflect that take.

If you have any questions regarding this Opinion, please contact Janet Bair, in the Southern Nevada Field Office, at 702-647-5230.

Robert D. Williams

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